BMJ open

INSIGHTS FROM INTER-CULTURAL EPIDEMIOLOGY: A CROSS-SECTIONAL STUDY OF DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2012-002012
Article Type:	Research
Date Submitted by the Author:	27-Aug-2012
Complete List of Authors:	Zuluaga, German; Universidad del Rosario, Escuela de Medicina; Cemi, General Direction Andersson, Neil; Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Public health, Sexual health, Obstetrics and gynaecology
Keywords:	Intercultural , Dysmenorrhoea, Medicine tradicional, Initiation rites

INSIGHTS FROM INTER-CULTURAL EPIDEMIOLOGY: A CROSS-SECTIONAL STUDY OF DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Apdo 2-25 Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Medicine, Traditional

Initiation rites

Word count: 2154

ABSTRACT

Objectives: Investigate the association between dysmenorrhoea and the decline of female initiation rites among Amazonian indigenous peoples of Vaupés in Colombia.

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 2009.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations.

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with a protective effect of initiation rites. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Article summary

Article focus

- Cross-sectional study 2009.
- Female initiation rites and dysmenorrhoea.

- Epidemiology and cultural safety.

Key messages

- Association between abandoning initiation rites and dysmenorrhoea.
- Suggests an effective traditional practice.
- Suggests feasibility and usefulness of intercultural epidemiology.

Strengths and limitations of this study

- No epidemiological studies of indigenous initiation and dysmenorrhoea.
- Even with all eligible women participating the small numbers problem is recognized.

INTRODUCTION

Qualitative research methods, like unstructured conversations, are relatively easily adapted to cultural contexts. This cultural adaptation is less common in epidemiology, which is often perceived as unreceptive to alternative epistemologies.[1] Yet inter-cultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[2] The Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[3, 4] In collective reservations, the seven communities with very similar customs in a subsistence economy.[5] In the context of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, the indigenous authorities of these communities requested scientific support to study their loss of cultural practices and the effect of this on women's reproductive health, particularly dysmenorrhoea.

Problems related to women's reproductive cycle are increasing worldwide.[6-8] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[9-11] A sparse epidemiological literature addresses the links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations.

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] Because pain perception is subjective, we used a well established graphic approach showing faces with different grades of discomfort (Figure 1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Traditional healers described initiation rites at the onset of menarche, lasting three to five days, during which time the young women completed a number of discrete activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation; the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with we, another vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and water or a plant precipitated emesis. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle the component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect.

Instrument: A month of consultation with local healers clarified the main research question and a list of culturally appropriate questions. After piloting, the authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (Community Information and Epidemiological Technologies, New York), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analyzed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (ORa) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire documented type of family planning (none, plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, sd 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.3% (32/185) with secondary education. Few used family planning (11.1% based on 15/135) with an average of 4.9 children each (sd 2.7).

The average age of menarche was 13.8 years (sd 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation during menarche. Table 1 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 1: Exposure to different aspects of initiation rite

Initiation rite	% of all women receiving this rite	Risk of dysmenorrhoea in each subgroup				
		Si	No	ORa	95% CI	
Emesis	38.4%	27/71	70/114	2.59*	1.42	4.75
Cared for during the ceremony	76.8%	69/142	28/43	1.97	0.98	3.99
Applied *carayurú* powder	84.3%	78/156	19/29	1.9	0.84	4.32
Spent time in isolation	71.9%	64/133	33/52	1.87	0.97	3.61
Followed prescribed diet	71.9%	64/133	33/52	1.87	0.97	3.61
Body painted with *we*	50.8%	44/94	53/91	1.58	0.89	2.83
Had a godmother	50.8%	45/94	50/88	1.43	0.8	2.57
Cut hair	68.6%	64/127	33/58	1.3	0.69	2.43
Inhaled *ají*	49.2%	45/91	52/94	1.27	0.71	2.26
Blessed by traditional healer	88.6%	85/164	12/21	1.24	0.49	3.1

* Adjusted for age and level of education.

To understand the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites.

The contrast was more stark between those who did no rituals at all (10/14), and those who completed the ten activities (8/32) (Fisher p 0.01). Those who did some but not all rites were somewhere in-between (89/153) (p-Fisher 0.001).

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker Faces Pain Rating Scale. Table 2 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014), and compared with those who did no rites (p= 0.0039).

Table 2 Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88

Extended Mantel-Haenszel chi square for linear trend = 10.16

p-value(1 degree of freedom) = 0.0014

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2

Extended Mantel-Haenszel chi square for linear trend = 8.33

p-value(1 degree of freedom) = 0.0039

DISCUSSION

Our results support the idea that abandoning traditional initiation rites, or adopting practices that go along with abandoning these rites, is a risk factor for dysmenorrhoea. Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect of the other rites for those who did not abandon the initiation practices. The apparent lack of specific effects of each component rite supports the idea that synergy between all components completes the protective effect.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised[28-31] and has no easy solution. As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Inter-cultural approaches have received little attention in the epidemiological literature, and these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led the interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

In these important dynamics, the research was culturally safe. Even so, cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their

distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation.

The average age of menarche of our sample was higher than typically reported in the literature,[32-37] possibly indicating a relatively low level of secular change.[38, 39] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[40-44] Although the local definition (facial expressions) was useful for internal comparisons, it is of limited value in international comparisons.

We tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Resolving this requires a randomised controlled trial that supports initiation rites in some communities and not in others, measuring decrease in dysmenorrhoea as the outcome.

Since the 1950s, public health programmes have contemplated primary, secondary and tertiary prevention.[45] More recently, *primordial prevention* identified social, economic and cultural patterns that affect risks.[46] Albeit with limitations, our study suggests that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association. The study suggests feasibility and usefulness of inter-cultural epidemiology: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it generated evidence suggesting an effective traditional practice, without understanding how this works.

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

DATA SHARING

Asatrizy, Gests and Cemi signed a data sharing agreement in May 18th 2008. All the information is available in the Cemi's document bank.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCE LIST

1. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

2. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

3. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

4. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Plan de vida: unidos con un Solo pensamiento para vivir bien*. Sarmiento I, Amaya C, eds. Bogotá (CO): Asoc. de Aut. Trad. Indíg. de la Zona de Yapú, 2008.

5. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Sarmiento I, Amaya C, eds. Bogotá (CO): Asoc. de Aut. Trad. Indíg. de la Zona de Yapú, 2008.

6. World Health Organization. *Engaging for Health. 11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

7. Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

8. Cuevas E. *Mortalidad materna, Colombia 2005: análisis de la información de la vigilancia rutinaria*. In: Inf. quincenal Epidemiológico Nac. Bogotá (CO): Ministerio de Protección Social, Dir. General de Salud Pública; 2007 Mar 15. 12(5):65-80. (Inf. quincenal Epidemiol Nal.).

9. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva (CH): WHO, 1983.

10. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva, (CH): WHO, 2002.

11. Organización Panamericana de la Salud, División de Desarrollos de Sistemas y Servicios de Salud. *Fortalecimiento y desarrollo de los sistemas de salud tradicionales: plan de acción 1995-1998*. Washington: OPS, 1995.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among mexican preadolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management. *Obstet Gynecol* 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain

intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007.

http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 2.3.1.

www.OpenEpi.com (accessed 23 August 2012).

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud [CEMI Web site], 2008.

http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

29. Friedsam D. *Racial and Ethnic Data: are They Reliable for Program and Policy Development?.* Madison (Wis): Population Health Institute, University of Wisconsin, 2002. Wisconsin Public Health and Health Policy Institute Issue Brief Vol. 3 no. 5.

30. Landau LB, Roever S. The Burden of Representation in Humanitarian Contexts: Survey Research on Mobile and Marginal Populations. Wits (ZA): Forced Migration Studies Programme, University of the Witwatersrand; 2004. (Working paper no. 10).

http://migration.org.za/research/downloads/papers/10_landauroever.pdf (accessed 21 January 2008).

31. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

32. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

33. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

34. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

35. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

36. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

37. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

38. Padez C. Social background and age at menarche in portuguese university students: a note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

39. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

40. Woods NF, Most A, Dery GK. Prevalene of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

41. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

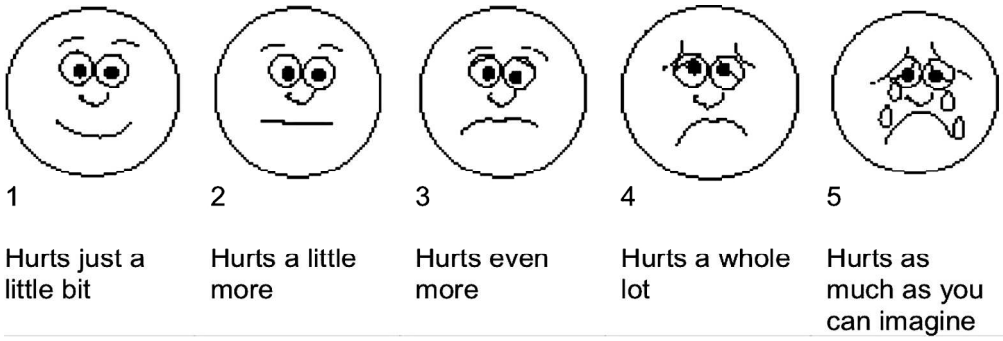
42. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

43. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

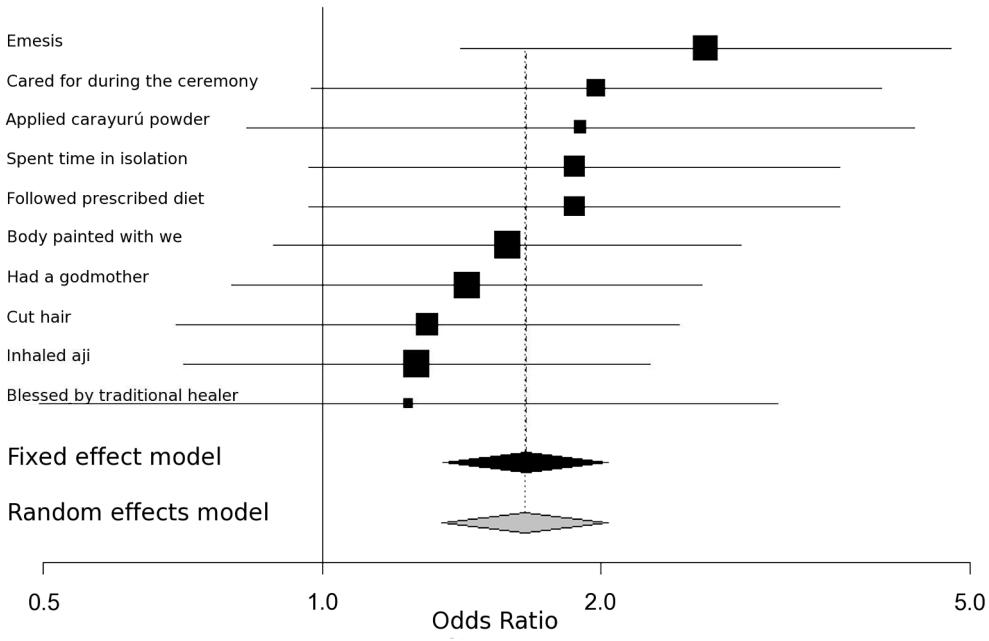
44. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

45. Blanco J, Maya J, eds. *Fundamentos de salud pública, Tomo 1, salud pública*. Medellín (CO): Corporación para Investigaciones Biológicas, 1997.

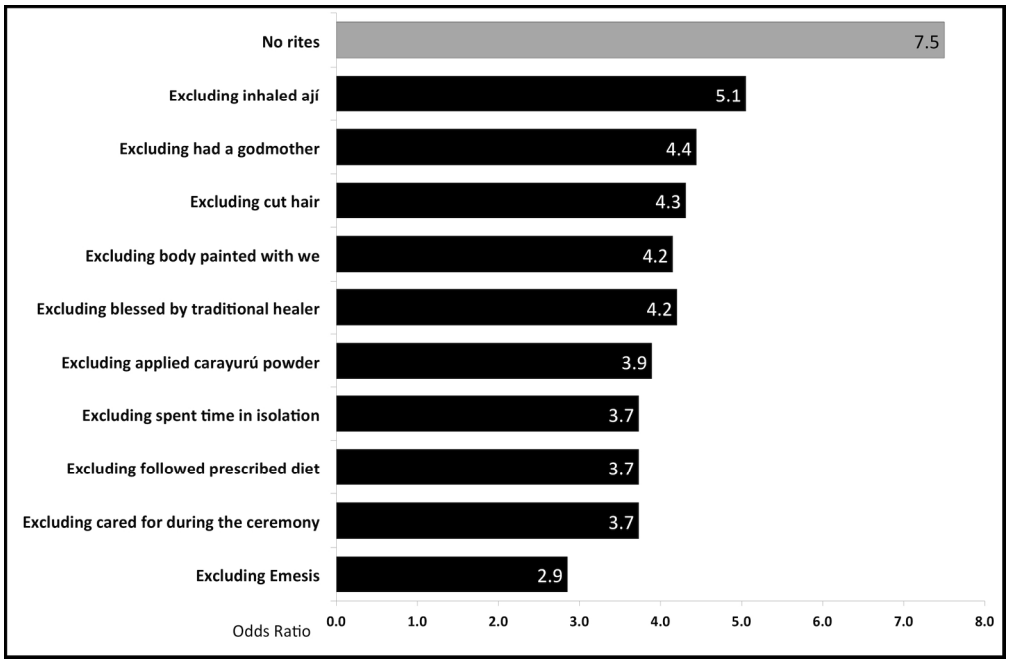
46. Beaglehole R, Bonita R, Kjellstrom T. Epidemiología básica. Washington: OPS, 2003.



Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)



Forest plot of individual initiation rites and risk of dysmenorrhoea
180x114mm (300 x 300 DPI)



Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)
180x117mm (300 x 300 DPI)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	"Cross-sectional studies" appears in title
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Structured abstract provided
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Abstract and para 1 and 3 of introduction (p3)
Objectives	3	State specific objectives, including any prespecified hypotheses	Abstract and para 2 Introduction (p3)
Methods			
Study design	4	Present key elements of study design early in the paper	Abstract, paras 1 and 3 of Introduction (p1), para 1 of Discussion (p7)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods (p3 and p4)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	First para of Methods, p3
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Paras 2-3 of Methods (p3 and p4), and para 2 of Discussion (p8)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Paras 2-3 of Methods (p3 and p4)
Bias	9	Describe any efforts to address potential sources of bias	Para 7 of Methods (p5)
Study size	10	Explain how the study size was arrived at	Para 2 of Discussion (p7), all available women were included.

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Abstract, paras 2, 3, 5, 6 of Methods (p3 and p4), para 5 Discussion (p8)
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Paras 5-6 of Methods (p4)
		(*b*) Describe any methods used to examine subgroups and interactions	Para 6 of Discussion (p8)
		(*c*) Explain how missing data were addressed	Para 1 of Results (p5)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Paras 5-6 of Methods (p4)
		(*e*) Describe any sensitivity analyses	Para 3 of Results (Figure 3) (p6)
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Para 1 of Results (p5), para 1 of methods (p3)
		(b) Give reasons for non-participation at each stage	Para 1 of Results (p5)
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Para 2 of Introduction (p3), para 1 of Methods (p3), para 1 of Results (p5)
		(b) Indicate number of participants with missing data for each variable of interest	Para 1 of Results (p5)
Outcome data	15*	Report numbers of outcome events or summary measures	Para 2-5 of Results (p5 and p6)
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 1 and 2
		(*b*) Report category boundaries when continuous variables were categorized	Tables 1 and 2
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not Applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Table 2 and Figure 2
Discussion			
Key results	18	Summarise key results with reference to study objectives	Paras 2, 4, 5 of Results (p5 and p6), para 5 of Discussion (p8)

Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Abstract, para 1 of Introduction (p3), para 7 of Methods (p5), paras 2 and 5 of Discussion (p7 and p8)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Abstact and Discussion
Generalisability	21	Discuss the generalisability (external validity) of the study results	Paras 2, 3, 5 and 7 of Discussion (p7 and p8)
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P9

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

CONVENIO PARA COMPARTIR INFORMACIÓN

ENTRE: La Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY, representada por su Junta Directiva.

Y: El Grupo de Estudios en Sistemas Tradicionales de Salud de la Facultad de Medicina de la Universidad del Rosario (GESTS) y el Centro de Estudios Médicos Interculturales (CEMI), representados por su director.

1. Preámbulo

El presente convenio reconoce y respeta el derecho a la autodeterminación de los pueblos indígenas de la zona de Yapú, en el marco de los cinco derechos fundamentales de los pueblos indígenas reconocidos por la Constitución Política de 1991, la Ley 21 de 1991 de la República de Colombia, aprobatoria del Convenio # 169 de la Organización Internacional del Trabajo, y su naturaleza jurídica de entidad de derecho público de carácter especial, que incluye la potestad para tomar decisiones sobre investigación en sus comunidades. Se considera que los beneficios a las comunidades, a cada región y al esfuerzo nacional se deben fortalecer por medio de la investigación, culturalmente sensible. La investigación tiene que facilitar la propiedad y el manejo por parte de las comunidades de la información sobre su salud y contribuir con la promoción de estilos de vida saludables, prácticas y planeación efectiva de programas, en el marco de sus Planes de Vida.

2. Propósito

El presente convenio define los términos para compartir información entre Asatrizy y el GESTS, en relación con los datos recogidos en el *Estudio epidemiológico para un programa de intervención en atención primaria de salud para la promoción y prevención de las enfermedades relacionadas con el ciclo reproductivo de las mujeres indígenas en comunidades del Vaupés*, (en adelante el Proyecto). El propósito del presente convenio es formalizar un acuerdo entre ASATRIZY y el GESTS, respecto de la ejecución del proyecto de investigación, incluyendo la propiedad y el manejo de todos los datos recogidos como parte del proyecto.

3. Antecedentes

La Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú está conformada por siete capitanías vecinas a los ríos Papurí, Yapú y Caño Colorado, en el departamento del Vaupés y tiene como propósito impulsar y liderar la ejecución del Plan de Vida promoviendo la cultura, los valores y las normas tradicionales de manera que permita el desarrollo integral y la conservación física y cultural de la comunidad.

El Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la Universidad del Rosario, reconocido formalmente por COLCIENCIAS desde el año 2002, tiene como objetivo aportar al estudio, conservación, recuperación y promoción de los sistemas médicos tradicionales para contribuir al mejoramiento de la salud humana.

El Centro de Estudios Médicos Interculturales, CEMI, es una organización no gubernamental colombiana, sin ánimo de lucro, cuyo objetivo es contribuir al desarrollo de una política intercultural de salud, mediante el estudio, la evaluación, el diseño y la aplicación de estrategias de atención en las que se amplía la noción del concepto salud-enfermedad, considerando los aspectos culturales y ambientales.

Integrantes del GESTS y del CEMI vienen acompañando a las comunidades indígenas de Yapú en su proceso de organización, diseño y ejecución del Plan de Vida, siempre procurando la protección de la diversidad biológica y la defensa de la cultura y los conocimientos tradicionales. En noviembre de 2007 Asatrizy y el CEMI firmaron un convenio de acompañamiento que tiene vigencia hasta junio de 2009, el cual incluye reglas claras sobre el manejo compartido de la información resultante del trabajo conjunto y que tienen vigencia para el presente convenio.

Asatrizy, después de tres años de trabajo comunitario, en mayo de 2007 estableció el Plan de Vida, uno de cuyos capítulos promueve la construcción de un modelo propio de atención de salud, basado en la defensa y promoción de la cultura y los conocimientos tradicionales, pero procurando una prudente y respetuosa articulación con el sistema occidental de salud.

Para esto Asatrizy ha pedido al Dr. Zuluaga su acompañamiento, de manera que se pueda trabajar conjuntamente, conscientes de que las comunidades están siendo afectadas por muchos problemas de salud que no siempre tienen solución con la medicina occidental y que se han perdido muchas tradiciones y prácticas culturales que antes mantenían la salud. Esto incluye el desarrollo de un programa de recuperación y promoción de conocimientos tradicionales y prácticas de autocuidado.

En la reunión de Junta Directiva de enero 11 de 2008 recibimos información sobre la propuesta de investigación que el CEMI propone realizar en nuestras comunidades, en el marco de los estudios de Maestría en Ciencias Médicas, Vertiente Epidemiología Aplicada, que el Dr. Zuluaga adelanta con la Universidad Autónoma de Guerrero (México) y el CIET, siendo aceptada de manera preliminar, por lo que se envió carta al Dr. Neil Andersson manifestando nuestro acuerdo.

4. Meta

Realizar un estudio epidemiológico para un programa de intervención en atención primaria de salud para la promoción y prevención de las enfermedades relacionadas con el ciclo reproductivo de las mujeres indígenas en comunidades de Asatrizy, Vaupés.

5. Objetivos

a. Fortalecer, recuperar y promover los conocimientos tradicionales y la cultura de las comunidades de Asatrizy.
b. Adelantar un estudio transversal con la participación de las mujeres pertenecientes a las siete comunidades de Asatrizy.
c. Estudiar la prevalencia de problemas de salud relacionados con el ciclo vital de la mujer.
d. Estudiar la frecuencia de prácticas tradicionales relacionadas con el cuidado de los ciclos vitales de la mujer.
e. Determinar las posibles asociaciones entre enfermedades propias de la mujer y la pérdida de las prácticas tradicionales y culturales de salud.
f. Divulgar los resultados del estudio a las mujeres participantes, miembros de las comunidades, líderes, agentes sanitarios y educativos y la Junta Directiva de Asatrizy.
g. A partir de los resultados, realizar un programa de intervención en autocuidado y atención primaria en salud para la promoción y prevención de enfermedades relacionadas con el ciclo vital de la mujer.

h. A partir de los resultados, incluir un proceso de formación específica en salud tradicional en el proceso de educación propia que adelanta Asatrizy.
i. Compartir los resultados del estudio con las entidades de carácter municipal, departamental y nacional que tienen responsabilidad en los programas de salud, educación y desarrollo adelantados en las comunidades de Asastrizy, de manera que los programas tengan mayor sensibilidad cultural.

6. Principios

a. El proyecto mejorará la capacidad y habilidades de miembros de la comunidad en investigación basada en la comunidad.
b. Las comunidades se involucrarán como socios en todos los aspectos de la investigación, desde el diseño hasta la implementación.
c. Se guardará el anonimato de los encuestados en todas las etapas y su identidad será protegida cuando los datos sean recogidos y los resultados presentados.
d. Asatrizy retiene la propiedad de los datos y será la primera en recibir los resultados.
e. Para proteger la identidad de los encuestados, el Gests guardará los datos en nombre de Asatrizy en un lugar seguro.
f. Todos los datos serán recogidos y guardados según lo establecido en este convenio.
g. Los datos de este proyecto sólo serán utilizados para alcanzar los objetivos y la meta establecida.

7. Responsabilidades

Las partes se comprometen a que el proyecto se desarrolle como sigue:

a. Asatrizy supervisará el proyecto a través de la Junta Directiva y la Coordinadora de Mujeres.
b. El Gests trabajará con un individuo identificado por Asatrizy para coordinar la comunicación entre las comunidades participantes.
c. El Gests vinculará a investigadores de la comunidad seleccionados por Asatrizy para acompañar la investigación, recoger los datos e interpretar los resultados que han de compartir con sus comunidades.
d. El Gests validará el instrumento de recolección con los investigadores seleccionados por Asatrizy, considerando los aspectos culturales, de traducción de lengua y de sensibilidad de género.
e. El Gests financiará según necesidad la reunión de mujeres de las siete comunidades para la realización y retroalimentación del proyecto.
f. Asatrizy acompañará, con por lo menos un representante, la gira para la realización de las encuestas y la recolección de todos los datos.
g. El Gests presentará los resultados a Asatrizy de manera apropiada y útil, y responderá ante solicitudes adicionales de análisis.
h. Los hallazgos serán presentados a los participantes de la comunidad y serán invitados a ofrecer retroalimentación/interpretación de los resultados. El Gests también asistirá en la presentación de los hallazgos a nivel comunitario, según solicitud.

8. Confidencialidad

Asatrizy y Gests se comprometen a salvaguardar la privacidad y seguridad de toda la información que contenga identificaciones personales y/o comunitarios. Se obtendrá consentimiento informado, culturalmente adecuado, según los requerimientos de la Junta

Directiva de Asatrizy, de la Unión de Mayores Kumuá Yoamará, de las mujeres encuestadas, previo a la recolección de la información personal.

9. Posterior divulgación

Asatrizy y Gests no divulgarán la información recolectada para ningún otro propósito a menos que acuerden lo contrario las dos partes y lo autoricen por escrito.

10. Modificaciones de éste convenio

Las modificaciones a este convenio se harán por escrito y firmadas por las partes.

En constancia las partes suscriben el presente convenio, en dos ejemplares del mismo tenor y valor, a los 18 días del mes de mayo de 2008.

Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la Universidad del Rosario
Centro de Estudios Médicos Interculturales (CEMI)

Germán Zuluaga R.
Director General
Investigador Principal

Carolina Amaya P.
Investigadora asociada

Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY

Efraín R. Mejía A.
Presidente

Gustavo Vargas B.
Vicepresidente

Benjamín Jaramillo G.
Secretario

Ramiro Ardila
Fiscal

Nelson C. Muñoz L.
Coord. Plan de vida

María C. Duque
Coord. Mujeres

David Ramírez
Suplente fiscal

DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2012-002012.R1
Article Type:	Research
Date Submitted by the Author:	05-Nov-2012
Complete List of Authors:	Zuluaga, German; Universidad del Rosario, Escuela de Medicina; Cemi, General Direction Andersson, Neil; Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Public health, Sexual health, Obstetrics and gynaecology
Keywords:	Intercultural , Dysmenorrhoea, Medicine tradicional, Initiation rites

DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Medicine, Traditional

Initiation rites

Word count: 2133

ABSTRACT

Objectives: Investigate the association between dysmenorrhoea and the decline of female initiation rites among Amazonian indigenous peoples of Vaupés in Colombia.

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 2008.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations.

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with a protective effect of initiation rites. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Article summary

Article focus

- Female initiation rites and dysmenorrhoea.
- Epidemiology and cultural safety.

Key messages

- There is an association between abandoning initiation rites and dysmenorrhoea.
- The study suggests effectiveness of traditional practice.
- The study proposes the feasibility and usefulness of intercultural epidemiology.

Strengths and limitations of this study

- There are no epidemiological studies of indigenous initiation and dysmenorrhoea.
- The small numbers problem is recognized, even with all eligible women participating.

INTRODUCTION

Qualitative research methods, like unstructured conversations, are relatively easily adapted to cultural contexts. This cultural adaptation is less common in epidemiology, which is often perceived as unreceptive to alternative epistemologies.[1] Yet inter-cultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[2] The Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[3, 4] In collective reservations, the seven communities with very similar customs in a subsistence economy.[5] In the context of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, the indigenous authorities of these communities requested scientific support to study their loss of cultural practices and the effect of this on women's reproductive health, particularly dysmenorrhoea.

Problems related to women's reproductive cycle are increasing worldwide.[6-8] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[9-11] A sparse epidemiological literature addresses the links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations in their lifetime.

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] Because pain perception is subjective, we used a well-established graphic approach showing faces with different grades of discomfort

(Figure 1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Traditional healers described initiation rites at the onset of menarche, lasting three to five days, during which time the young women completed a number of discrete activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation; the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and water or a plant precipitated emesis. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle the component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect.

Instrument: A month of consultation with local healers (*payés*) clarified the main research question and a list of culturally appropriate questions. After approval of the questionnaire for semantic and cultural equivalence with the *payés,* the researchers piloted it with 14 women of the same ethnic group living in Mitu (not part of the study). The authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analysed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire inquired for current family planning, and if so, which is the method used (plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, sd 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.4% (32/184 women interviewed) with secondary education. Few used family planning (11.1% based on 15/135 women of reproductive age) with an average of 4.9 children each (SD 2.7).

The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation

during menarche. Table 1 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 1: Exposure to different aspects of initiation rite and risk of dysmenorrhoea (odds ratio)

Initiation rite	**% of all women receiving this rite****	**Risk of dysmenorrhoea in each subgroup**				
		Receiving rite	Not receiving rite	aOR*	95% CI	
Emesis	38.4%	27/71	70/114	0.39*	0.21	0.70
Cared for during the ceremony	76.8%	69/142	28/43	0.51	0.25	1.02
Applied *carayurú* powder	84.3%	78/156	19/29	0.53	0.23	1.19
Spent time in isolation	71.9%	64/133	33/52	0.53	0.28	1.03
Followed prescribed diet	71.9%	64/133	33/52	0.53	0.28	1.03
Body painted with *we*	50.8%	44/94	53/91	0.63	0.35	1.12
Had a godmother	50.8%	45/94	50/88	0.70	0.39	1.25
Cut hair	68.6%	64/127	33/58	0.77	0.41	1.45
Inhaled *ají*	49.2%	45/91	52/94	0.79	0.44	1.41
Blessed by traditional healer	88.6%	85/164	12/21	0.81	0.32	2.04

* Adjusted for age and level of education in a stratified analysis..

** Total 185 women; no missing data

To understand the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites. Those who completed the 10 rites (8/32) contrasted sharply with those who completed some or no rites (89/153) (p-Fisher 0.001).

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker Faces Pain Rating Scale. Table 2 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014). It also contrasts those who did no rites with those who completed all rites (p= 0.0039).

Table 2 Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88
		Mantel-Haenszel chi square for linear trend = 10.16 p-value = 0.0014			
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2
		Mantel-Haenszel chi square for linear trend = 8.33; p-value = 0.0039			

DISCUSSION

Our results support the idea that abandoning traditional initiation rites, or adopting practices that go along with abandoning these rites, is a risk factor for dysmenorrhoea. Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect of the other rites for those who did not abandon the initiation practices. The apparent lack of specific effects of each component rite supports the idea that synergy between all components completes the protective effect.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised[28-31] and has no easy solution. As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Inter-cultural approaches have received little attention in the epidemiological literature, and these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led the interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

In these important dynamics, the research was culturally safe. Even so, cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation.

The average age of menarche of our sample was higher than typically reported in the literature,[32-37] possibly indicating a relatively low level of secular change.[38, 39] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[40-44] Although the local definition (facial expressions) was useful for internal comparisons, it is of limited value in international comparisons.

We tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Resolving this requires a randomised controlled trial that supports initiation rites in some communities and not in others, measuring decrease in dysmenorrhoea as the outcome.

Since the 1950s, public health programmes have contemplated primary, secondary and tertiary prevention.[45] More recently, *primordial prevention* identified social, economic and cultural patterns that affect risks.[46, 47] Albeit with limitations, our study suggests that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women

who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association. The study suggests feasibility and usefulness of inter-cultural epidemiology: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it generated evidence suggesting an effective traditional practice, without understanding how this works.

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men, healers) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCE LIST

1. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

2. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

3. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

4. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Plan de vida: unidos con un Solo pensamiento para vivir bien*. Sarmiento I, Amaya C, eds. Bogotá (CO): Asoc. de Aut. Trad. Indíg. de la Zona de Yapú, 2008.

5. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Sarmiento I, Amaya C, eds. Bogotá (CO): Asoc. de Aut. Trad. Indíg. de la Zona de Yapú, 2008.

6. World Health Organization. *Engaging for Health. 11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

7. Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

8. Cuevas E. *Mortalidad materna, Colombia 2005: análisis de la información de la vigilancia rutinaria*. In: Inf. quincenal Epidemiológico Nac. Bogotá (CO): Ministerio de Protección Social, Dir. General de Salud Pública; 2007 Mar 15. 12(5):65-80. (Inf. quincenal Epidemiol Nal.).

9. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva (CH): WHO, 1983.

10. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva,

(CH): WHO, 2002.

11. Organización Panamericana de la Salud, División de Desarrollos de Sistemas y Servicios de Salud. *Fortalecimiento y desarrollo de los sistemas de salud tradicionales: plan de acción 1995-1998*. Washington: OPS, 1995.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among mexican preadolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management.

Obstet Gynecol 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007.

http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 2.3.1.

www.OpenEpi.com (accessed 23 August 2012).

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud [CEMI Web site], 2008.

http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

29. Friedsam D. *Racial and Ethnic Data: are They Reliable for Program and Policy Development?.* Madison (Wis): Population Health Institute, University of Wisconsin, 2002. Wisconsin Public Health and Health Policy Institute Issue Brief Vol. 3 no. 5.

30. Landau LB, Roever S. The Burden of Representation in Humanitarian Contexts: Survey Research on Mobile and Marginal Populations. Wits (ZA): Forced Migration Studies Programme, University of the Witwatersrand; 2004. (Working paper no. 10).

http://migration.org.za/research/downloads/papers/10_landauroever.pdf (accessed 21 January 2008).

31. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

32. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato

social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

33. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

34. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

35. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

36. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

37. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

38. Padez C. Social background and age at menarche in portuguese university students: a note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

39. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

40. Woods NF, Most A, Dery GK. Prevalence of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

41. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

42. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

43. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

44. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

45. Blanco J, Maya J, eds. *Fundamentos de salud pública, Tomo 1, salud pública*. Medellín (CO): Corporación para Investigaciones Biológicas, 1997.

46. Beaglehole R, Bonita R, Kjellstrom T. Epidemiología básica. Washington: OPS, 2003.

47. García-Pérez H, Harlow SD, Erdmann CA, Denman C. Pelvic pain and associated characteristics among women in northern Mexico. *Int Perspect Sex Reprod Health*. 2010;**36**:90-8.

~~INSIGHTS FROM INTER-CULTURAL EPIDEMIOLOGY: A CROSS-SECTIONAL STUDY OF~~ DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Comment [Germán Zu1]: From the managing editor: please remove the first part of the title as this does not really add anything specific that assists the reader.
>>Done

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Medicine, Traditional

Initiation rites

Word count: 2133

ABSTRACT

Objectives: Investigate the association between dysmenorrhoea and the decline of female initiation rites among Amazonian indigenous peoples of Vaupés in Colombia.

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 20089.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations.

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with a protective effect of initiation rites. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Comment [Germán Zu2]: HGP: Abstracts. In page 2, row 19 the authors indicate that data collection took place in 2009 yet in page 5, row 31 they also mention that data collection was completed on December 2008. This point needs clarification. CORRECTED

Article summary

Article focus

~~Cross sectional study 2009.~~

- Female initiation rites and dysmenorrhoea.
- Epidemiology and cultural safety.

Key messages

- There is an association between abandoning initiation rites and dysmenorrhoea.
- The study suggests ~~an~~ effectiveness of ~~ity of a~~traditional practice.
- The study proposes the~~uggests~~ feasibility and usefulness of ~~an~~ intercultural epidemiology.

Strengths and limitations of this study

- There are n~~N~~o epidemiological studies of indigenous initiation and dysmenorrhoea.
- The small numbers problem is recognized, e~~E~~ven with all eligible women participating ~~the small numbers problem is recognized~~.

INTRODUCTION

Qualitative research methods, like unstructured conversations, are relatively easily adapted to cultural contexts. This cultural adaptation is less common in epidemiology, which is often perceived as unreceptive to alternative epistemologies.[1] Yet inter-cultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[2] The Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[3, 4] In collective reservations, the seven communities with very similar customs in a subsistence economy.[5] In the context of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, the indigenous authorities of these communities requested scientific support to study their loss of cultural practices and the effect of this on women's reproductive health, particularly dysmenorrhoea.

Problems related to women's reproductive cycle are increasing worldwide.[6-8] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[9-11] A sparse epidemiological literature addresses the links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations in their lifetime.

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] Because pain perception is subjective, we used a well-established graphic approach showing faces with different grades of discomfort

Comment [Germán Zu3]: KEM: Article summary needs copy editing: Main focus is not on cross sectional study 2009.
>copy editing done

Key messages and strength and limitations of the study are not in complete sentences. Difficult to understand.
>CORRECTED

Comment [Germán Zu4]: KEM: Introduction: why is qualitative research mentioned in the first sentence of the introduction? Is it important?

>Qualitative studies have been able to adapt more easily to intercultural perspectives. The first sentence simply sets up the second

Comment [Germán Zu5]: KEM: Descriptive data were not provided in full for appraisal.
> the references provide this detailed information

Comment [Germán Zu6]: HGP: Women's sampling criteria were defined as "all women over the age of 13 years who had experienced at least two menstruations". The authors need to clarify the specific time frame used, for example at least two menstruation during last year.
>>clarified

(Figure 1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Traditional healers described initiation rites at the onset of menarche, lasting three to five days, during which time the young women completed a number of discrete activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation; the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and water or a plant precipitated emesis. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle the component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect.

Instrument: A month of consultation with local healers (*payés*) clarified the main research question and a list of culturally appropriate questions. After approval of the questionnaire for semantic and cultural equivalence with the *payés*, the researchers piloted it with 14 women of the same ethnic group living in Mitu (not part of the study). The authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Comment [Germán Zu7]: KEM: How was the quality of the translation of the 37 item questionnaire ensured for semantic and cultural equivalence?
>>Clarified in the text

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (~~Community Information and Epidemiological Technologies, New York~~Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analysed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with

the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire ~~documented~~ inquired for ~~type of~~current family planning, and if so, which is the method used (~~none,~~ plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, sd 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.~~43~~% (32/18~~45~~ women interviewed) with secondary education. Few used family planning (11.1% based on 15/135 women of reproductive age) with an average of 4.9 children each (SD 2.7).

Comment [Germán Zu8]: HGP: Also, the authors should provide a more clear definition of all the independent variables: contraceptive use (current or 12□months contraceptive use?)
>>Done

Comment [Germán Zu9]: HGP: Also, the authors should clarify (page 6, row 39 and 40) whether the percent of women in the categories of education were computed in a population of 184 or 185 women.
>>Done

Comment [Germán Zu10]: KEM: Missing number for family planning is big.
>>This question was only asked of 135 women in their reproductive years, no clarified in the text.

The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation during menarche. Table 1 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 1: Exposure to different aspects of initiation rite and risk of dysmenorrhoea (odds ratio)

Initiation rite	% of all women receiving this rite**	Risk of dysmenorrhoea in each subgroup				
		~~Si~~Receiving rite	Not receiving rite	aOR*	95% CI	
Emesis	38.4%	27/71	70/114	~~2.59~~ 0.39*	~~1.42~~ 0.21	~~4.75~~ 0.70
Cared for during the ceremony	76.8%	69/142	28/43	~~1.97~~ 0.51	~~0.98~~ 0.25	~~3.99~~ 1.02
Applied *carayurú* powder	84.3%	78/156	19/29	~~1.9~~ 0.53	~~0.84~~ 0.23	~~4.32~~ 1.19
Spent time in isolation	71.9%	64/133	33/52	~~1.87~~ 0.53	~~0.97~~ 0.28	~~3.61~~ 1.03
Followed prescribed diet	71.9%	64/133	33/52	~~1.87~~ 0.53	~~0.97~~ 0.28	~~3.61~~ 1.03
Body painted with *we*	50.8%	44/94	53/91	~~1.58~~ 0.63	~~0.89~~ 0.35	~~2.83~~ 1.12
Had a godmother	50.8%	45/94	50/88	~~1.43~~ 0.70	~~0.8~~ 0.39	~~2.57~~ 1.25
Cut hair	68.6%	64/127	33/58	~~1.3~~ 0.77	~~0.69~~ 0.41	~~2.43~~ 1.45
Inhaled *ají*	49.2%	45/91	52/94	~~1.27~~ 0.79	~~0.71~~ 0.44	~~2.26~~ 1.41
Blessed by traditional healer	88.6%	85/164	12/21	0.81	~~0.49~~ 0.32	~~3.1~~ 2.04

* Adjusted for age and level of education~~, after~~ in a stratified analysis..

** Total 185 women; no missing data~~.~~

To understand the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites. Those who completed the 10 rites (8/32) contrasted sharply with those who

Comment [Germán Zu11]: HGP: Table 1. It is no clear whether table 1 is describing the "risk" of experiencing dysmenorrhea or its absence. The title of the table should clearly state that the values correspond to odds ratios.
>>title changed to clarify this

Formatted Table

Comment [Germán Zu12]: HGP: The study reports an OR of 2.59 for the initiation rite of emesis. Table 1 suggests that there is an increase in the odds of dysmenorrhea for this initiation rite but in the abstract and in the conclusion it is stated that emesis has a protective effect. . If this is the case, then values should be presented in a more standard way with an OR below 1 and the information should indicate what the reference group is.
>>Corrected

Comment [Germán Zu13]: HGP: In its current state the table does not communicate well how the adjustment by age and education was computed.
>Done

Comment [Germán Zu14]: KEM: Table 1, % of each rites were given but not number (N) and the total N to account for missing values. Please provide this for each items.
>>Clarified with a footnote to table

completed some or no rites (89/153) (p-Fisher 0.001).

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker Faces Pain Rating Scale. Table 2 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014). It also contrasts those who did no rites with those who completed all rites (p= 0.0039).

Table 2 Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88
		Mantel-Haenszel chi square for linear trend = 10.16 p-value = 0.0014			
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2
		Mantel-Haenszel chi square for linear trend = 8.33; p-value = 0.0039			

DISCUSSION

Our results support the idea that abandoning traditional initiation rites, or adopting practices that go along with abandoning these rites, is a risk factor for dysmenorrhoea. Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect of the other rites for those who did not abandon the initiation practices. The apparent lack of

Comment [Germán Zu15]: KEM: Table 3 (assuming it is the table below table 2 as there is no label) results were singled out to no rites compared with all rites. This would introduce bias to the result
Table 2 and 3. The number of those with severe intensity was only 1. There will be problem with the significance analysis
>> Tables have been consolidated. The sparse data do affect the analysis, but the trend is still significant however we set the contrast.

Comment [Germán Zu16]: HGP: Table 2 and the remaining charts don't add much to the analysis. In my opinion it does not make sense to include table 2 because the 95% CI are not only very wide but also because several of these interval overlap each other. It is not clear what the intentions of the authors are, with the inclusion of this material.
KEM: Table 2. There was 180/185 that had a response to rites, which was not described in the text.
How is the intensity of dysmenorrhoea categorized? (table 2) what is 4y5?
>> 180 women responded to the scale of severity; this i show intensity was categorised. We feel the table adds a useful confirmatory dimensión, sugggesting that severity is also associated with rites.

specific effects of each component rite supports the idea that synergy between all components completes the protective effect.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised[28-31] and has no easy solution. As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Inter-cultural approaches have received little attention in the epidemiological literature, and these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led the interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

In these important dynamics, the research was culturally safe. Even so, cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation.

The average age of menarche of our sample was higher than typically reported in the literature,[32-37] possibly indicating a relatively low level of secular change.[38, 39] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[40-44] Although the local definition (facial expressions) was useful for internal comparisons, it is of limited value in international comparisons.

We tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Resolving this requires a randomised controlled trial that supports initiation rites in some communities and not in others, measuring decrease in dysmenorrhoea as the outcome.

Since the 1950s, public health programmes have contemplated primary, secondary and tertiary prevention.[45] More recently, *primordial prevention* identified social, economic and

cultural patterns that affect risks.[46, 47] Albeit with limitations, our study suggests that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association. The study suggests feasibility and usefulness of inter-cultural epidemiology: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it generated evidence suggesting an effective traditional practice, without understanding how this works.

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men, healers) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCE LIST

1. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

2. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

3. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

4. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Plan de vida: unidos con un Solo pensamiento para vivir bien*. Sarmiento I, Amaya C, eds. Bogotá (CO): Asoc. de Aut. Trad. Indíg. de la Zona de Yapú, 2008.

5. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Sarmiento I, Amaya C, eds. Bogotá (CO): Asoc. de Aut. Trad. Indíg. de la Zona de Yapú, 2008.

6. World Health Organization. *Engaging for Health.□11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

7. Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

8. Cuevas E. *Mortalidad materna, Colombia 2005: análisis de la información de la vigilancia rutinaria*. In: Inf. quincenal Epidemiológico Nac. Bogotá (CO): Ministerio de Protección Social, Dir. General de Salud Pública; 2007 Mar 15. 12(5):65-80. (Inf. quincenal Epidemiol Nal.).

9. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva (CH): WHO, 1983.

10. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva,

(CH): WHO, 2002.

11. Organización Panamericana de la Salud, División de Desarrollos de Sistemas y Servicios de Salud. *Fortalecimiento y desarrollo de los sistemas de salud tradicionales: plan de acción 1995-1998*. Washington: OPS, 1995.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among mexican preadolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management.

Obstet Gynecol 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007.

http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version 2.3.1.

www.OpenEpi.com (accessed 23 August 2012).

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud [CEMI Web site], 2008.

http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

29. Friedsam D. *Racial and Ethnic Data: are They Reliable for Program and Policy Development?*. Madison (Wis): Population Health Institute, University of Wisconsin, 2002. Wisconsin Public Health and Health Policy Institute Issue Brief Vol. 3 no. 5.

30. Landau LB, Roever S. The Burden of Representation in Humanitarian Contexts: Survey Research on Mobile and Marginal Populations. Wits (ZA): Forced Migration Studies Programme, University of the Witwatersrand; 2004. (Working paper no. 10).

http://migration.org.za/research/downloads/papers/10_landauroever.pdf (accessed 21 January 2008).

31. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

32. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato

social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

33. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

34. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

35. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

36. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

37. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

38. Padez C. Social background and age at menarche in portuguese university students: a note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

39. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

40. Woods NF, Most A, Dery GK. Prevalence of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

41. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

42. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

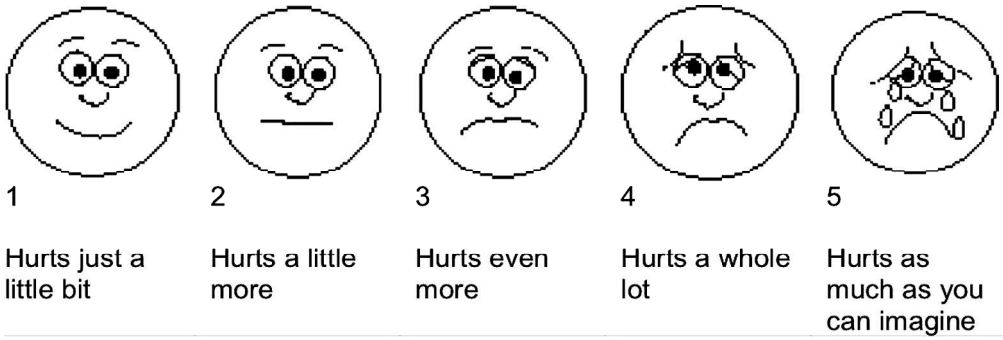
43. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

44. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

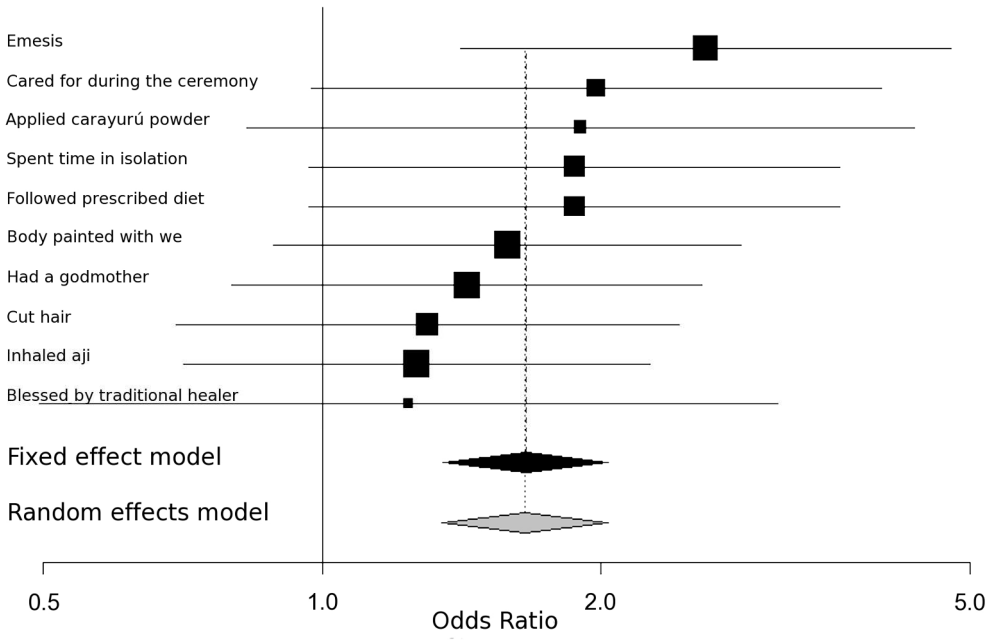
45. Blanco J, Maya J, eds. *Fundamentos de salud pública, Tomo 1, salud pública*. Medellín (CO): Corporación para Investigaciones Biológicas, 1997.

46. Beaglehole R, Bonita R, Kjellstrom T. Epidemiología básica. Washington: OPS, 2003.

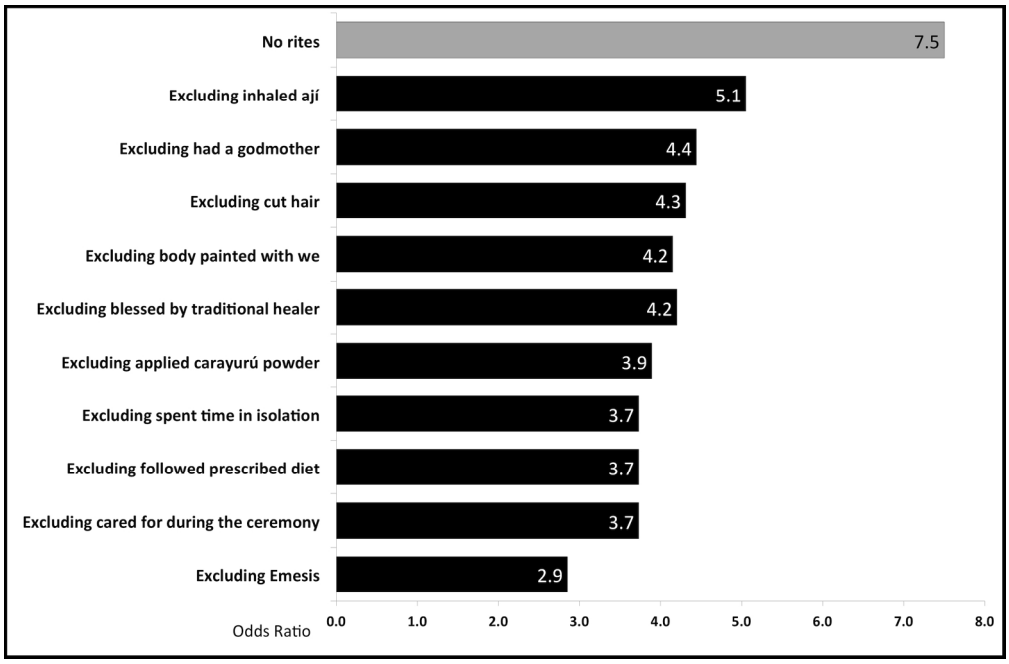
47. García-Pérez H, Harlow SD, Erdmann CA, Denman C. Pelvic pain and associated characteristics among women in northern Mexico. *Int Perspect Sex Reprod Health*. 2010;**36**:90-8.



Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)



Forest plot of individual initiation rites and risk of dysmenorrhoea
180x114mm (300 x 300 DPI)



Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)
180x117mm (300 x 300 DPI)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	"Cross-sectional studies" appears in title
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Structured abstract provided
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Abstract and para 1 and 3 of introduction (p3)
Objectives	3	State specific objectives, including any prespecified hypotheses	Abstract and para 2 Introduction (p3)
Methods			
Study design	4	Present key elements of study design early in the paper	Abstract, paras 1 and 3 of Introduction (p1), para 1 of Discussion (p7)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods (p3 and p4)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	First para of Methods, p3
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Paras 2-3 of Methods (p3 and p4), and para 2 of Discussion (p8)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Paras 2-3 of Methods (p3 and p4)
Bias	9	Describe any efforts to address potential sources of bias	Para 7 of Methods (p5)
Study size	10	Explain how the study size was arrived at	Para 2 of Discussion (p7), all available women were included.

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Abstract, paras 2, 3, 5, 6 of Methods (p3 and p4), para 5 Discussion (p8)
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Paras 5-6 of Methods (p4)
		(*b*) Describe any methods used to examine subgroups and interactions	Para 6 of Discussion (p8)
		(*c*) Explain how missing data were addressed	Para 1 of Results (p5)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Paras 5-6 of Methods (p4)
		(*e*) Describe any sensitivity analyses	Para 3 of Results (Figure 3) (p6)
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Para 1 of Results (p5), para 1 of methods (p3)
		(b) Give reasons for non-participation at each stage	Para 1 of Results (p5)
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Para 2 of Introduction (p3), para 1 of Methods (p3), para 1 of Results (p5)
		(b) Indicate number of participants with missing data for each variable of interest	Para 1 of Results (p5)
Outcome data	15*	Report numbers of outcome events or summary measures	Para 2-5 of Results (p5 and p6)
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 1 and 2
		(*b*) Report category boundaries when continuous variables were categorized	Tables 1 and 2
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not Applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Table 2 and Figure 2
Discussion			
Key results	18	Summarise key results with reference to study objectives	Paras 2, 4, 5 of Results (p5 and p6), para 5 of Discussion (p8)

Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Abstract, para 1 of Introduction (p3), para 7 of Methods (p5), paras 2 and 5 of Discussion (p7 and p8)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Abstact and Discussion
Generalisability	21	Discuss the generalisability (external validity) of the study results	Paras 2, 3, 5 and 7 of Discussion (p7 and p8)
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P9

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

CONVENIO PARA COMPARTIR INFORMACIÓN

ENTRE: La Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY, representada por su Junta Directiva.

Y: El Grupo de Estudios en Sistemas Tradicionales de Salud de la Facultad de Medicina de la Universidad del Rosario (GESTS) y el Centro de Estudios Médicos Interculturales (CEMI), representados por su director.

1. Preámbulo

El presente convenio reconoce y respeta el derecho a la autodeterminación de los pueblos indígenas de la zona de Yapú, en el marco de los cinco derechos fundamentales de los pueblos indígenas reconocidos por la Constitución Política de 1991, la Ley 21 de 1991 de la República de Colombia, aprobatoria del Convenio # 169 de la Organización Internacional del Trabajo, y su naturaleza jurídica de entidad de derecho público de carácter especial, que incluye la potestad para tomar decisiones sobre investigación en sus comunidades. Se considera que los beneficios a las comunidades, a cada región y al esfuerzo nacional se deben fortalecer por medio de la investigación, culturalmente sensible. La investigación tiene que facilitar la propiedad y el manejo por parte de las comunidades de la información sobre su salud y contribuir con la promoción de estilos de vida saludables, prácticas y planeación efectiva de programas, en el marco de sus Planes de Vida.

2. Propósito

El presente convenio define los términos para compartir información entre Asatrizy y el GESTS, en relación con los datos recogidos en el *Estudio epidemiológico para un programa de intervención en atención primaria de salud para la promoción y prevención de las enfermedades relacionadas con el ciclo reproductivo de las mujeres indígenas en comunidades del Vaupés*, (en adelante el Proyecto). El propósito del presente convenio es formalizar un acuerdo entre ASATRIZY y el GESTS, respecto de la ejecución del proyecto de investigación, incluyendo la propiedad y el manejo de todos los datos recogidos como parte del proyecto.

3. Antecedentes

La Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú está conformada por siete capitanías vecinas a los ríos Papurí, Yapú y Caño Colorado, en el departamento del Vaupés y tiene como propósito impulsar y liderar la ejecución del Plan de Vida promoviendo la cultura, los valores y las normas tradicionales de manera que permita el desarrollo integral y la conservación física y cultural de la comunidad.

El Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la Universidad del Rosario, reconocido formalmente por COLCIENCIAS desde el año 2002, tiene como objetivo aportar al estudio, conservación, recuperación y promoción de los sistemas médicos tradicionales para contribuir al mejoramiento de la salud humana.

El Centro de Estudios Médicos Interculturales, CEMI, es una organización no gubernamental colombiana, sin ánimo de lucro, cuyo objetivo es contribuir al desarrollo de una política intercultural de salud, mediante el estudio, la evaluación, el diseño y la aplicación de estrategias de atención en las que se amplía la noción del concepto salud-enfermedad, considerando los aspectos culturales y ambientales.

Integrantes del GESTS y del CEMI vienen acompañando a las comunidades indígenas de Yapú en su proceso de organización, diseño y ejecución del Plan de Vida, siempre procurando la protección de la diversidad biológica y la defensa de la cultura y los conocimientos tradicionales. En noviembre de 2007 Asatrizy y el CEMI firmaron un convenio de acompañamiento que tiene vigencia hasta junio de 2009, el cual incluye reglas claras sobre el manejo compartido de la información resultante del trabajo conjunto y que tienen vigencia para el presente convenio.

Asatrizy, después de tres años de trabajo comunitario, en mayo de 2007 estableció el Plan de Vida, uno de cuyos capítulos promueve la construcción de un modelo propio de atención de salud, basado en la defensa y promoción de la cultura y los conocimientos tradicionales, pero procurando una prudente y respetuosa articulación con el sistema occidental de salud.

Para esto Asatrizy ha pedido al Dr. Zuluaga su acompañamiento, de manera que se pueda trabajar conjuntamente, conscientes de que las comunidades están siendo afectadas por muchos problemas de salud que no siempre tienen solución con la medicina occidental y que se han perdido muchas tradiciones y prácticas culturales que antes mantenían la salud. Esto incluye el desarrollo de un programa de recuperación y promoción de conocimientos tradicionales y prácticas de autocuidado.

En la reunión de Junta Directiva de enero 11 de 2008 recibimos información sobre la propuesta de investigación que el CEMI propone realizar en nuestras comunidades, en el marco de los estudios de Maestría en Ciencias Médicas, Vertiente Epidemiología Aplicada, que el Dr. Zuluaga adelanta con la Universidad Autónoma de Guerrero (México) y el CIET, siendo aceptada de manera preliminar, por lo que se envió carta al Dr. Neil Andersson manifestando nuestro acuerdo.

4. Meta

Realizar un estudio epidemiológico para un programa de intervención en atención primaria de salud para la promoción y prevención de las enfermedades relacionadas con el ciclo reproductivo de las mujeres indígenas en comunidades de Asatrizy, Vaupés.

5. Objetivos

a. Fortalecer, recuperar y promover los conocimientos tradicionales y la cultura de las comunidades de Asatrizy.
b. Adelantar un estudio transversal con la participación de las mujeres pertenecientes a las siete comunidades de Asatrizy.
c. Estudiar la prevalencia de problemas de salud relacionados con el ciclo vital de la mujer.
d. Estudiar la frecuencia de prácticas tradicionales relacionadas con el cuidado de los ciclos vitales de la mujer.
e. Determinar las posibles asociaciones entre enfermedades propias de la mujer y la pérdida de las prácticas tradicionales y culturales de salud.
f. Divulgar los resultados del estudio a las mujeres participantes, miembros de las comunidades, líderes, agentes sanitarios y educativos y la Junta Directiva de Asatrizy.
g. A partir de los resultados, realizar un programa de intervención en autocuidado y atención primaria en salud para la promoción y prevención de enfermedades relacionadas con el ciclo vital de la mujer.

h. A partir de los resultados, incluir un proceso de formación específica en salud tradicional en el proceso de educación propia que adelanta Asatrizy.
i. Compartir los resultados del estudio con las entidades de carácter municipal, departamental y nacional que tienen responsabilidad en los programas de salud, educación y desarrollo adelantados en las comunidades de Asastrizy, de manera que los programas tengan mayor sensibilidad cultural.

6. Principios

a. El proyecto mejorará la capacidad y habilidades de miembros de la comunidad en investigación basada en la comunidad.
b. Las comunidades se involucrarán como socios en todos los aspectos de la investigación, desde el diseño hasta la implementación.
c. Se guardará el anonimato de los encuestados en todas las etapas y su identidad será protegida cuando los datos sean recogidos y los resultados presentados.
d. Asatrizy retiene la propiedad de los datos y será la primera en recibir los resultados.
e. Para proteger la identidad de los encuestados, el Gests guardará los datos en nombre de Asatrizy en un lugar seguro.
f. Todos los datos serán recogidos y guardados según lo establecido en este convenio.
g. Los datos de este proyecto sólo serán utilizados para alcanzar los objetivos y la meta establecida.

7. Responsabilidades

Las partes se comprometen a que el proyecto se desarrolle como sigue:

a. Asatrizy supervisará el proyecto a través de la Junta Directiva y la Coordinadora de Mujeres.
b. El Gests trabajará con un individuo identificado por Asatrizy para coordinar la comunicación entre las comunidades participantes.
c. El Gests vinculará a investigadores de la comunidad seleccionados por Asatrizy para acompañar la investigación, recoger los datos e interpretar los resultados que han de compartir con sus comunidades.
d. El Gests validará el instrumento de recolección con los investigadores seleccionados por Asatrizy, considerando los aspectos culturales, de traducción de lengua y de sensibilidad de género.
e. El Gests financiará según necesidad la reunión de mujeres de las siete comunidades para la realización y retroalimentación del proyecto.
f. Asatrizy acompañará, con por lo menos un representante, la gira para la realización de las encuestas y la recolección de todos los datos.
g. El Gests presentará los resultados a Asatrizy de manera apropiada y útil, y responderá ante solicitudes adicionales de análisis.
h. Los hallazgos serán presentados a los participantes de la comunidad y serán invitados a ofrecer retroalimentación/interpretación de los resultados. El Gests también asistirá en la presentación de los hallazgos a nivel comunitario, según solicitud.

8. Confidencialidad

Asatrizy y Gests se comprometen a salvaguardar la privacidad y seguridad de toda la información que contenga identificaciones personales y/o comunitarios. Se obtendrá consentimiento informado, culturalmente adecuado, según los requerimientos de la Junta

Directiva de Asatrizy, de la Unión de Mayores Kumuá Yoamará, de las mujeres encuestadas, previo a la recolección de la información personal.

9. Posterior divulgación

Asatrizy y Gests no divulgarán la información recolectada para ningún otro propósito a menos que acuerden lo contrario las dos partes y lo autoricen por escrito.

10. Modificaciones de éste convenio

Las modificaciones a este convenio se harán por escrito y firmadas por las partes.

En constancia las partes suscriben el presente convenio, en dos ejemplares del mismo tenor y valor, a los 18 días del mes de mayo de 2008.

Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la Universidad del Rosario
Centro de Estudios Médicos Interculturales (CEMI)

Germán Zuluaga R.
Director General
Investigador Principal

Carolina Amaya P.
Investigadora asociada

Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY

Efraín R. Mejía A.
Presidente

Gustavo Vargas B.
Vicepresidente

Benjamín Jaramillo G.
Secretario

Ramiro Ardila
Fiscal

Nelson C. Muñoz L.
Coord. Plan de vida

María C. Duque
Coord. Mujeres

David Ramírez
Suplente fiscal

BMJ open

INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2012-002012.R2
Article Type:	Research
Date Submitted by the Author:	14-Dec-2012
Complete List of Authors:	Zuluaga, German; Universidad del Rosario, Escuela de Medicina; Cemi, General Direction Andersson, Neil; Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Public health, Sexual health, Obstetrics and gynaecology
Keywords:	Intercultural , Dysmenorrhoea, Medicine tradicional, Initiation rites

INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Medicine, Traditional

Initiation rites

Word count: 2373

ABSTRACT

Objectives: Investigate the association between self reported dysmenorrhoea and patterns of female initiation rites at menarche among Amazonian indigenous peoples of Vaupés in Colombia..

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 2008.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with an association between traditional practices and women's health. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Article summary

Article focus

- Female initiation rites and dysmenorrhoea.
- Epidemiology and cultural safety.

Key messages

- There is an association between what women say about abandoning initiation rites and dysmenorrhoea.
- The study suggests an association between traditional practices and women's health.
- The study proposes the feasibility and usefulness of intercultural epidemiology.

Strengths and limitations of this study

- There are no epidemiological studies of indigenous initiation and dysmenorrhoea.
- The small numbers problem is recognized, even with all eligible women participating.

INTRODUCTIONThe Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[1,2] In collective reservations, the seven communities with very similar customs in a subsistence economy. They share traditional rituals around childbirth, management of the umbilicus, rites of sexual début, marriage, pregnancy, menopause and death but, like many traditional cultures, they have abandoned much of this with urbanisation and globalisation of culture.[3]

According to traditional wisdom, young women will be healthy if they complete initiation rites and follow traditional practices during menstruation. Young women in the region go to residential schools outside their communities. The school year follows a national standard, making it difficult for schoolgirls to participate in traditional rites.[4] This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[5] This research began with the express concern of community elders who, in the course of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, asked if loss of their cultural practices could affect women's reproductive health, particularly dysmenorrhoea.

Qualitative research methods, like unstructured conversations, are relatively easily adapted to address cultural issues like this. Cultural adaptation is less common in epidemiology,

which is often perceived as unreceptive to alternative epistemologies.[6] Yet intercultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated this possible association.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] The interviewer asked directly about pain and its severity, without asking about duration of pain, proportion of menstruations affected or activities that could not be completed due to the pain. Because pain perception is subjective, we used a well-established graphic approach showing faces with different grades of discomfort (Figure 1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Traditional healers described initiation rites at the onset of menarche, lasting three to five days, during which time the young women completed a number of discrete activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation; the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and

water or a plant precipitated emesis. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle the component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect. We thus documented each of the individual rites.

Instrument: A month of consultation with local healers (*payés*) clarified the main research question and a list of culturally appropriate questions. After approval of the questionnaire for semantic and cultural equivalence with the *payés,* the researchers piloted the questionnaire and pain images with 14 women of the same ethnic group living in Mitu (not part of the study), their pain report was assessed using the graphic approach showing faces with different grades of discomfort. The authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analysed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire inquired for current family planning, and if so, which is the method used

(plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, SD 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.4% (32/184 women interviewed) with secondary education. Few used family planning (11.1% based on 15/135 women of reproductive age) with an average of 4.9 children each (SD 2.7).

Table 1: Characteristics of the women included in the sample

Variable	Yes		No		Total
Mixed ethnicity	0	0.0%	185	100.0%	185
Born in this community	94	51.4%	89	48.6%	183
Knew her age	158	85.4%	27	14.6%	185
Menopausal	50	27.0%	135	73.0%	185
Had had children	139	75.1%	46	24.9%	185

Using contraceptive methods	15	11.1%	120	88.9%	135
Using contraceptive pills	0	0.0%	-	-	-
Using IUDs	2	13.3%	-	-	-
Using plants	1	6.7%	-	-	-
Tubal ligation	4	26.7%	-	-	-
Using other methods	8	53.3%	-	-	-
Any education level	133	71.9%	52	28.1%	185
Lives in a community wit airplane road	118	65.2%	63	34.8%	181
Reported dysmenorrhea	97	52.4%	88	47.6%	185
Rites completion					
All rites completed	32	17.3%	153	82.7%	185
No rites at all	14	7.6%	171	92.4%	185
Incomplete rite	139	75.1%	46	24.9%	185

The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation during menarche. Table 2 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 2: Exposure to different aspects of initiation rite and risk of dysmenorrhoea (odds ratio)

Initiation rite	**% of all women receiving this rite****	**Risk of dysmenorrhoea in each subgroup**				
		Receiving rite	Not receiving rite	aOR*	95% CI	
Emesis	38.4%	27/71	70/114	0.39*	0.21	0.70

Cared for during the ceremony	76.8%	69/142	28/43	0.51	0.25	1.02
Applied *carayurú* powder	84.3%	78/156	19/29	0.53	0.23	1.19
Spent time in isolation	71.9%	64/133	33/52	0.53	0.28	1.03
Followed prescribed diet	71.9%	64/133	33/52	0.53	0.28	1.03
Body painted with *we*	50.8%	44/94	53/91	0.63	0.35	1.12
Had a godmother	50.8%	45/94	50/88	0.70	0.39	1.25
Cut hair	68.6%	64/127	33/58	0.77	0.41	1.45
Inhaled *ají*	49.2%	45/91	52/94	0.79	0.44	1.41
Blessed by traditional healer	88.6%	85/164	12/21	0.81	0.32	2.04

* Adjusted for age and level of education in a stratified analysis..

** Total 185 women; no missing data

To understand the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites. Those who completed the 10 rites (8/32) contrasted sharply with those who completed some or no rites (89/153) (p-Fisher 0.001).

Table 3: Sensitivity analysis of initiation rites and dysmenorrhoea contrasting women who completed all rites and those who completed only one component rite.

		Frequencies					Risk of dysmenorrhoea		
	n	No		Yes		p-value	OR	95% CI	p-Fisher
None	46	14	30,4	32	69,6	0.001	7,5	1,95-28,7	0.001
Emesis	71	39	54,9	32	45,1	0.001	2,85	1,04-7,82	0.050
Cared for during the ceremony	142	110	77,5	32	22,5	0.001	3,73	1,59-8,78	0.001
Followed prescribed diet	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Spent time in isolation	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Applied *carayurú* powder	156	124	79,5	32	20,5	0.001	3,89	1,68-9,02	0.001
Blessed by traditional healer	164	132	80,5	32	19,5	0.001	4,20	1,83-9,66	0.001
Body painted with *we*	94	62	66,0	32	34,0	0.001	4,15	1,65-10,4	0.001
Cut hair	127	95	74,8	32	25,8	0.001	4,31	1,81-10,2	0.001
Had a godmother	94	62	66,0	32	34,0	0.001	4,44	1,77-11,1	0.001
Inhaled *ají*	91	59	64,8	32	35,2	0.001	5,05	1,99-12,77	0.001

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker

Faces Pain Rating Scale. Table 4 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014). It also contrasts those who did no rites with those who completed all rites (p= 0.0039).

Table 4: Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88
		Mantel-Haenszel chi square for linear trend = 10.16 p-value = 0.0014			
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2
		Mantel-Haenszel chi square for linear trend = 8.33; p-value = 0.0039			

DISCUSSION

Our results support the idea that abandoning traditional initiation rites, or adopting practices that go along with abandoning these rites, is a risk factor for dysmenorrhoea. Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect

of the other rites for those who did not abandon the initiation practices. The apparent lack of specific effects of each component rite supports the idea that synergy between all components completes the protective effect.

The average age of menarche of our sample was higher than typically reported in the literature,[28-33] possibly indicating a relatively low level of secular change.[34,35] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[36-40] Although the local definition (facial expressions) was useful for internal comparisons, it is of limited value in international comparisons.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised and has no easy solution.[41,42] As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation. Recall bias might have affected the results as some women had to remember rites that took place decades earlier; a social desirability bias (not wanting to be culturally different, wanting to avoid disapproval) might also have influenced the results. We have no additional information to clarify the directions of these biases.

Within these constraints and the stringent limits imposed by our population size, we tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue may require a randomised controlled trial where the differential support for the fulfilment of the rite among communities be contrasted with the occurrence of dysmenorrhoea.

Since the 1950s, public health programmes have contemplated primary, secondary and tertiary prevention. More recently, *primordial prevention* identified social, economic and cultural patterns that affect risks.[43] Within its limitations, our study is compatible with the

idea that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association.

Inter-cultural approaches have received little attention in the epidemiological literature, and these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

Without underestimating the remaining intercultural challenges, the difficulties of research in small populations and the limits of observational studies, we feel this study achieves a first step in culturally safe descriptive epidemiology of traditional medicine: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it generated evidence suggesting an effective traditional practice, without understanding how this works.

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men, healers) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCE LIST

1. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

2. Sarmiento I, Amaya C. *Plan de vida: unidos con un solo pensamiento para vivir bien*. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. Bogota, Colombia 2008.

3. Sarmiento I, Amaya C. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Bogotá, Colombia, 2008.

4. Rembeck GI, Gunnarsson RK. Improving pre- and postmenarcheal 12-year-old girls' attitudes toward menstruation. *Health Care Women Int*. 2004;**25**:680-98.

5. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

6. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

7. World Health Organization. *Engaging for Health. 11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

8.Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

9. García-Pérez H, Harlow SD, Erdmann CA, Denman C. Pelvic pain and associated characteristics among women in northern Mexico. *Int Perspect Sex Reprod Health*. 2010;**36**:90-8.

10. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva: WHO, 1983.

11. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva, (CH): WHO, 2002.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among Mexican pre-adolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management. *Obstet Gynecol* 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007. http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Leuraud K, Benichou J: Tests for monotonic trend from case control data: Cochran-Armitage-Mantel trend test, isotonic regression and single and multiple contrast tests. *Biometrical Journal* 2004;46:731-749

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud 2008. http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

29. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

30. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

31. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

32. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

33. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

34. Padez C. Social background and age at menarche in portuguese university students: a note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

35. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

36. Woods NF, Most A, Dery GK. Prevalence of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

37. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

38. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

39. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

40. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

41. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

42. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

43. Bonita R, Beaglehole R, Kjellström T, Basic Epidemiology, Second Edition World Health Organization, Geneva 2006 p103

INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA ~~DYSMENORRHOEA AND INITIATION RITES~~ AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Comment [GZR dic121]: ECh: "Title: Should be amended to..." >>Done

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Medicine, Traditional

Initiation rites

Word count: 2373

ABSTRACT

Objectives: Investigate the association between self reported dysmenorrhoea and patterns of female initiation rites at menarche among Amazonian indigenous peoples of Vaupés in Colombia. ~~Investigate the association between dysmenorrhoea and the decline of female initiation rites among Amazonian indigenous peoples of Vaupés in Colombia~~.

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 2008.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with an association between traditional practices and women's health ~~a protective effect of initiation rites~~. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Comment [GZR dic122]: ECh: "First sentence would be more accurate as…" >>Done

Comment [GZR dic123]: ECh: "give the age range of the participants" >>Done

Comment [GZR dic124]: ECh: "avoid any causal language" >>Done

Article summary

Article focus

- Female initiation rites and dysmenorrhoea.
- Epidemiology and cultural safety.

Key messages

- There is an association between what women say about abandoning initiation rites and dysmenorrhoea.
- The study suggests an association between ~~effectiveness of~~ traditional practices and women's health.
- The study proposes the feasibility and usefulness of intercultural epidemiology.

Strengths and limitations of this study

- There are no epidemiological studies of indigenous initiation and dysmenorrhoea.
- The small numbers problem is recognized, even with all eligible women participating.

INTRODUCTION

Comment [GZR dic125]: ECh: "the study design cannnot show more than an association with self reported dysmenorrhea"
>> Done

Comment [GZR dic126]: ECh: "Summary box: avoid any causal inferences."
>>Done

~~Qualitative research methods, like unstructured conversations, are relatively easily adapted to cultural contexts. This cultural adaptation is less common in epidemiology, which is often perceived as unreceptive to alternative epistemologies.[1] Yet inter cultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.~~

~~This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[2]~~ The Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[1,2] In collective reservations, the seven communities with very similar customs in a subsistence economy. They share traditional rituals around childbirth, management of the umbilicus, rites of sexual début, marriage, pregnancy, menopause and death but, like many traditional cultures, they have abandoned much of this with urbanisation and globalisation of culture.[3]

According to traditional wisdom, young women will be healthy if they complete initiation rites and follow traditional practices during menstruation. Young women in the region go to residential schools outside their communities. The school year follows a national standard, making it difficult for schoolgirls to participate in traditional rites.[4] This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[5] This research began with the express concern of community elders who, in the course of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, asked if loss of their cultural practices could affect women's reproductive health, particularly dysmenorrhoea.

Qualitative research methods, like unstructured conversations, are relatively easily adapted to address cultural issues like this. Cultural adaptation is less common in epidemiology, which is often perceived as unreceptive to alternative epistemologies.[6] Yet intercultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the

Comment [GZR dic127]: ECh: "The paper doesn't report whether initiation rites have declined overall in Colombia or even in this sample of women…"
>>Done

Comment [GZR dic128]: ECh: "describe the initiation rites here…"
>>Because the level of detail does not fit here, we opted to enumerate the component rites in the methods section

Comment [GZR dic129]: ECh: "state more clearly that elders posed the question…"
>>Done

Comment [GZR dic1210]: ECh: "the mention of qualitative research"
>> We consider this mention is necessary in order to explain the importance of intercultural epidemiology. The text has been moved to the third paragraph.

links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated this possible association.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] The interviewer asked directly about pain and its severity, without asking about duration of pain, proportion of menstruations affected or activities that could not be completed due to the pain. Because pain perception is subjective, we used a well-established graphic approach showing faces with different grades of discomfort (Figure 1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Traditional healers described initiation rites at the onset of menarche, lasting three to five days, during which time the young women completed a number of discrete activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation; the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and water or a plant precipitated emesis. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle the component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect. We thus documented each of the individual rites.

Instrument: A month of consultation with local healers (*payés*) clarified the main research question and a list of culturally appropriate questions. After approval of the questionnaire for

Comment [GZR dic1211]: ECh: "state briefly, in the last sentence of the introduction, that this was a retrospective survey using a questionnaire"
>> Done

Comment [GZR dic1212]: ECh: "women were asked about pelvic pain during menstruation - but occurring when and how often?..."
>>Done

semantic and cultural equivalence with the *payés,* the researchers piloted the questionnaire and pain images with 14 women of the same ethnic group living in Mitu (not part of the study), their pain report was assessed using the graphic approach showing faces with different grades of discomfort. The authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Comment [GZR dic1213]: ECh: "…The questionnaire was piloted, but were these images piloted too?"
>>Done

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analysed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire inquired for current family planning, and if so, which is the method used (plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into

account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

Comment [GZR dic1214]: ECh: "Please add a new table 1…" >>Done

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, SD 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.4% (32/184 women interviewed) with secondary education. Few used family planning (11.1% based on 15/135 women of reproductive age) with an average of 4.9 children each (SD 2.7).

Table 1: Characteristics of the women included in the sample

Variable	Yes		No		Total
Mixed ethnicity	0	0.0%	185	100.0%	185
Born in this community	94	51.4%	89	48.6%	183
Knew her age	158	85.4%	27	14.6%	185
Menopausal	50	27.0%	135	73.0%	185
Had had children	139	75.1%	46	24.9%	185
Using contraceptive methods	15	11.1%	120	88.9%	135
Using contraceptive pills	0	0.0%	-	-	-
Using IUDs	2	13.3%	-	-	-
Using plants	1	6.7%	-	-	-
Tubal ligation	4	26.7%	-	-	-
Using other methods	8	53.3%	-	-	-

Any education level	133	71.9%	52	28.1%	185
Lives in a community wit airplane road	118	65.2%	63	34.8%	181
Reported dysmenorrhea	97	52.4%	88	47.6%	185
Rites completion	-	-	-	-	-
All rites completed	32	17.3%	153	82.7%	185
No rites at all	14	7.6%	171	92.4%	185
Incomplete rite	139	75.1%	46	24.9%	185

The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation during menarche. Table 2 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 2: Exposure to different aspects of initiation rite and risk of dysmenorrhoea (odds ratio)

Initiation rite	**% of all women receiving this rite****	**Risk of dysmenorrhoea in each subgroup**				
		Receiving rite	Not receiving rite	aOR*	95% CI	
Emesis	38.4%	27/71	70/114	0.39*	0.21	0.70
Cared for during the ceremony	76.8%	69/142	28/43	0.51	0.25	1.02
Applied *carayurú* powder	84.3%	78/156	19/29	0.53	0.23	1.19
Spent time in isolation	71.9%	64/133	33/52	0.53	0.28	1.03
Followed prescribed diet	71.9%	64/133	33/52	0.53	0.28	1.03
Body painted with *we*	50.8%	44/94	53/91	0.63	0.35	1.12
Had a godmother	50.8%	45/94	50/88	0.70	0.39	1.25

Cut hair	68.6%	64/127	33/58	0.77	0.41	1.45
Inhaled *ají*	49.2%	45/91	52/94	0.79	0.44	1.41
Blessed by traditional healer	88.6%	85/164	12/21	0.81	0.32	2.04

* Adjusted for age and level of education in a stratified analysis..

** Total 185 women; no missing data

To understand the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites. Those who completed the 10 rites (8/32) contrasted sharply with those who completed some or no rites (89/153) (p-Fisher 0.001).

Table 3: Sensitivity analysis of initiation rites and dysmenorrhoea contrasting women who completed all rites and those who completed only one component rite.

Comment [GZR dic1215]: ECh: "also add a table to show the adjusted/ sensitivity analyses" >>Done

		Frequencies					Risk of dysmenorrhoea		
	n	No		Yes		p-value	OR	95% CI	p-Fisher
None	46	14	30,4	32	69,6	0.001	7,5	1,95-28,7	0.001
Emesis	71	39	54,9	32	45,1	0.001	2,85	1,04-7,82	0.050
Cared for during the ceremony	142	110	77,5	32	22,5	0.001	3,73	1,59-8,78	0.001
Followed prescribed diet	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Spent time in isolation	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Applied *carayurú* powder	156	124	79,5	32	20,5	0.001	3,89	1,68-9,02	0.001
Blessed by traditional healer	164	132	80,5	32	19,5	0.001	4,20	1,83-9,66	0.001
Body painted with *we*	94	62	66,0	32	34,0	0.001	4,15	1,65-10,4	0.001
Cut hair	127	95	74,8	32	25,8	0.001	4,31	1,81-10,2	0.001
Had a godmother	94	62	66,0	32	34,0	0.001	4,44	1,77-11,1	0.001
Inhaled *ají*	91	59	64,8	32	35,2	0.001	5,05	1,99-12,77	0.001

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker Faces Pain Rating Scale. Table 4 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014). It also contrasts those who did no rites with those who completed all rites (p= 0.0039).

Table 4: Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea

	0	1	2	3	4 y 5
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88
		Mantel-Haenszel chi square for linear trend = 10.16 p-value = 0.0014			
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2
		Mantel-Haenszel chi square for linear trend = 8.33; p-value = 0.0039			

DISCUSSION

Comment [GZR dic1216]: ECh: "state principal findings first:…" >>Done.

Our results support the idea that abandoning traditional initiation rites, or adopting practices that go along with abandoning these rites, is a risk factor for dysmenorrhoea. Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect of the other rites for those who did not abandon the initiation practices. The apparent lack of specific effects of each component rite supports the idea that synergy between all components completes the protective effect.

The average age of menarche of our sample was higher than typically reported in the literature,[28-33] possibly indicating a relatively low level of secular change.[34,35] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[36-40] Although the local definition (facial expressions) was useful for internal

comparisons, it is of limited value in international comparisons.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised and has no easy solution.[41,42] As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation. Recall bias might have affected the results as some women had to remember rites that took place decades earlier; a social desirability bias (not wanting to be culturally different, wanting to avoid disapproval) might also have influenced the results. We have no additional information to clarify the directions of these biases.

Within these constraints and the stringent limits imposed by our population size, we tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue may require a randomised controlled trial where the differential support for the fulfilment of the rite among communities be contrasted with the occurrence of dysmenorrhoea.

Since the 1950s, public health programmes have contemplated primary, secondary and tertiary prevention. More recently, *primordial prevention* identified social, economic and cultural patterns that affect risks.[43] Within its limitations, our study is compatible with the idea that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association.

Inter-cultural approaches have received little attention in the epidemiological literature, and

Comment [GZR dic1217]: ECh: “discuss the subgroup analyses with caution, as the numbers are very small and the overall study design is relatively weak”
>>Done

Comment [ISC18]: ECh: “recall bias (some of the women had to remember rites that took place decades earlier) and social desirability bias…”
>>Done

Comment [ISC19]: ECh: “presumably it wasn't possible to conduct a prospective study - say why not”
>>Done
>>We believe it can be a second step in the research process.

these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

Without underestimating the remaining intercultural challenges, the difficulties of research in small populations and the limits of observational studies, we feel this study achieves a first step in culturally safe descriptive epidemiology of traditional medicine: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it generated evidence suggesting an effective traditional practice, without understanding how this works.

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men, healers) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCE LIST

1. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

2. Sarmiento I, Amaya C. *Plan de vida: unidos con un solo pensamiento para vivir bien*. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. Bogota, Colombia 2008.

3. Sarmiento I, Amaya C. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Bogotá, Colombia, 2008.

4. Rembeck GI, Gunnarsson RK. Improving pre- and postmenarcheal 12-year-old girls' attitudes toward menstruation. *Health Care Women Int*. 2004;**25**:680-98.

5. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

6. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

7. World Health Organization. *Engaging for Health.□11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

8.Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

9. García-Pérez H, Harlow SD, Erdmann CA, Denman C. Pelvic pain and associated characteristics among women in northern Mexico. *Int Perspect Sex Reprod Health*. 2010;**36**:90-8.

10. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva: WHO, 1983.

11. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva, (CH): WHO, 2002.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among Mexican pre-adolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management. *Obstet Gynecol* 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007. http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Leuraud K, Benichou J: Tests for monotonic trend from case control data: Cochran-Armitage-Mantel trend test, isotonic regression and single and multiple contrast tests. *Biometrical Journal* 2004;46:731-749

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud 2008. http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

29. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

30. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

31. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

32. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

33. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

34. Padez C. Social background and age at menarche in portuguese university students: a note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

35. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

36. Woods NF, Most A, Dery GK. Prevalence of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

37. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

38. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

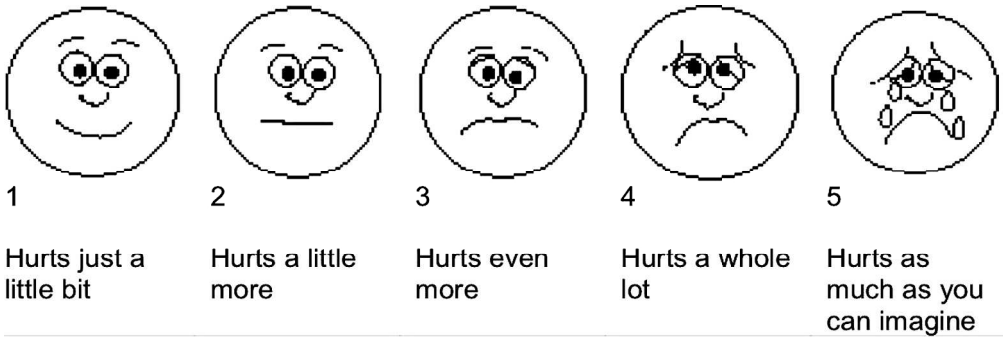
39. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

40. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

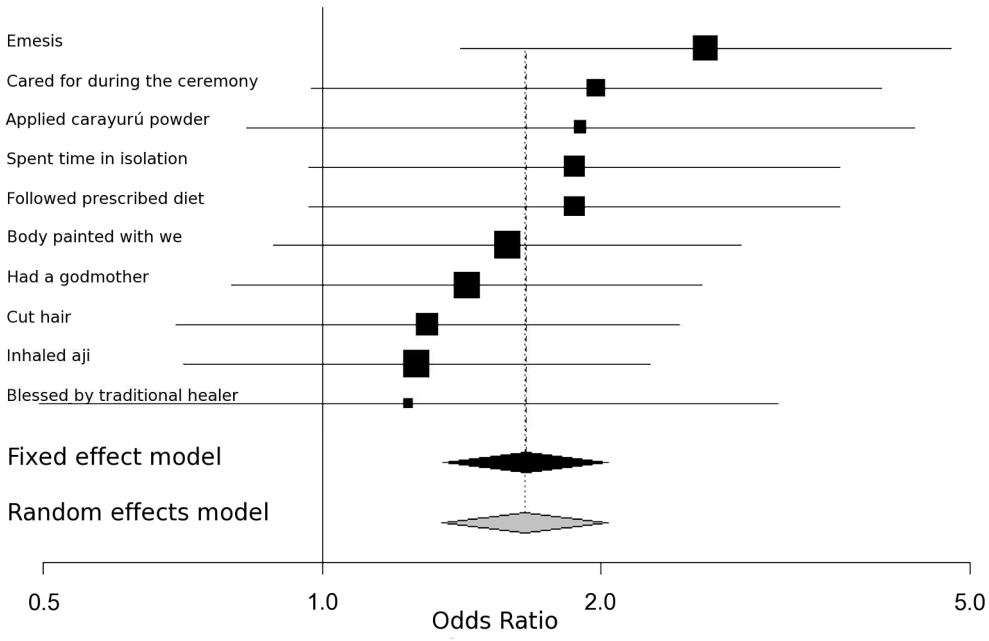
41. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

42. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

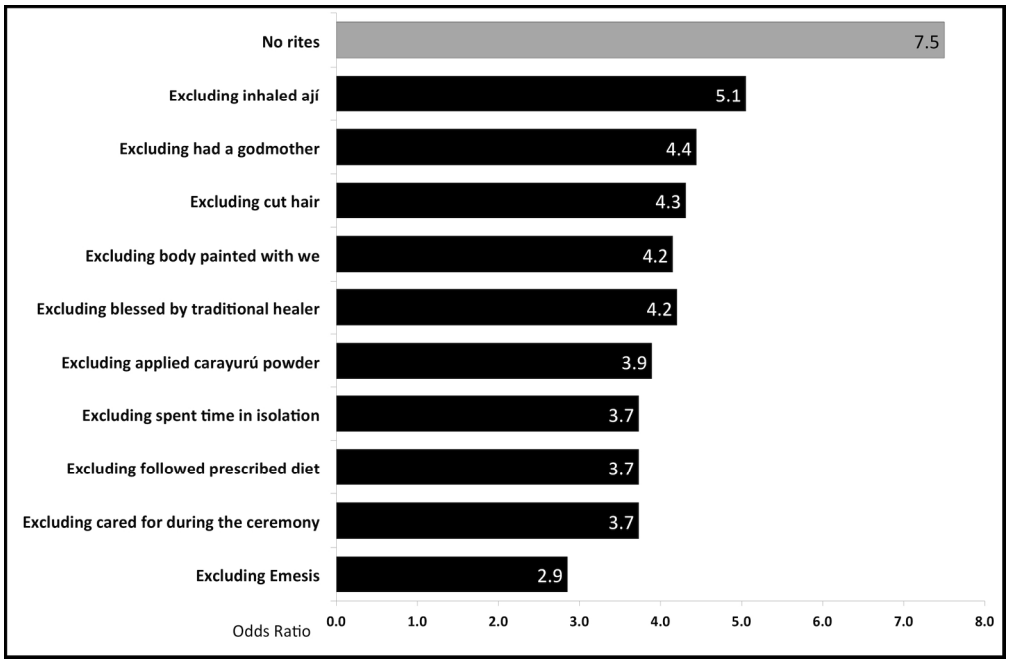
43. Bonita R, Beaglehole R, Kjellström T, Basic Epidemiology, Second Edition World Health Organization, Geneva 2006 p103



Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)



Forest plot of individual initiation rites and risk of dysmenorrhoea
180x114mm (300 x 300 DPI)



Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)
180x117mm (300 x 300 DPI)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	"Cross-sectional studies" appears in title
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Structured abstract provided
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Abstract and para 1 and 3 of introduction (p3)
Objectives	3	State specific objectives, including any prespecified hypotheses	Abstract and para 2 Introduction (p3)
Methods			
Study design	4	Present key elements of study design early in the paper	Abstract, paras 1 and 3 of Introduction (p1), para 3 of Discussion (p11)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods (p3 and p4)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	First para of Methods, p3
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Paras 2-3 of Methods (p4), and para 2 of Discussion (p10)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Paras 2-3 of Methods (p4)
Bias	9	Describe any efforts to address potential sources of bias	Para 7 of Methods (p5)
Study size	10	Explain how the study size was arrived at	Para 3 of Discussion (p10), all available women were included.

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Abstract, paras 2, 3, 5, 6 of Methods (p4 and p5), para 5 Discussion (p10)
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Paras 5-6 of Methods (p5)
		(*b*) Describe any methods used to examine subgroups and interactions	Para 5 of Discussion (p10)
		(*c*) Explain how missing data were addressed	Para 2 of Results (p7)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Paras 5-6 of Methods (p5)
		(*e*) Describe any sensitivity analyses	Para 3 of Results (Figure 3 and Table 3) (p8)
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Para 1 of Results (p6), para 1 of methods (p4)
		(b) Give reasons for non-participation at each stage	Para 1 of Results (p6)
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Para 2 of Introduction (p3), para 1 of Methods (p4), para 1 of Results (p6), and Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Para 1 of Results (p6)
Outcome data	15*	Report numbers of outcome events or summary measures	Para 2-5 of Results (p6 and p7)
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 2, 3 and 4
		(*b*) Report category boundaries when continuous variables were categorized	Tables 2 and 4
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not Applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Table 3 and 4 and Figure 2
Discussion			
Key results	18	Summarise key results with reference to study objectives	Paras 2, 4, 5 of Results (p6 and p7), para 5 of Discussion (p10)

Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Abstract, para 1 of Introduction (p3), para 7 of Methods (p6), paras 1 to 5 of Discussion (p9 and p10)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Abstact and Discussion
Generalisability	21	Discuss the generalisability (external validity) of the study results	Paras 2, 3, 5 and 7 of Discussion (p10)
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P12

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

CONVENIO PARA COMPARTIR INFORMACIÓN

ENTRE: La Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY, representada por su Junta Directiva.

Y: El Grupo de Estudios en Sistemas Tradicionales de Salud de la Facultad de Medicina de la Universidad del Rosario (GESTS) y el Centro de Estudios Médicos Interculturales (CEMI), representados por su director.

1. Preámbulo

El presente convenio reconoce y respeta el derecho a la autodeterminación de los pueblos indígenas de la zona de Yapú, en el marco de los cinco derechos fundamentales de los pueblos indígenas reconocidos por la Constitución Política de 1991, la Ley 21 de 1991 de la República de Colombia, aprobatoria del Convenio # 169 de la Organización Internacional del Trabajo, y su naturaleza jurídica de entidad de derecho público de carácter especial, que incluye la potestad para tomar decisiones sobre investigación en sus comunidades. Se considera que los beneficios a las comunidades, a cada región y al esfuerzo nacional se deben fortalecer por medio de la investigación, culturalmente sensible. La investigación tiene que facilitar la propiedad y el manejo por parte de las comunidades de la información sobre su salud y contribuir con la promoción de estilos de vida saludables, prácticas y planeación efectiva de programas, en el marco de sus Planes de Vida.

2. Propósito

El presente convenio define los términos para compartir información entre Asatrizy y el GESTS, en relación con los datos recogidos en el *Estudio epidemiológico para un programa de intervención en atención primaria de salud para la promoción y prevención de las enfermedades relacionadas con el ciclo reproductivo de las mujeres indígenas en comunidades del Vaupés*, (en adelante el Proyecto). El propósito del presente convenio es formalizar un acuerdo entre ASATRIZY y el GESTS, respecto de la ejecución del proyecto de investigación, incluyendo la propiedad y el manejo de todos los datos recogidos como parte del proyecto.

3. Antecedentes

La Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú está conformada por siete capitanías vecinas a los ríos Papurí, Yapú y Caño Colorado, en el departamento del Vaupés y tiene como propósito impulsar y liderar la ejecución del Plan de Vida promoviendo la cultura, los valores y las normas tradicionales de manera que permita el desarrollo integral y la conservación física y cultural de la comunidad.

El Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la Universidad del Rosario, reconocido formalmente por COLCIENCIAS desde el año 2002, tiene como objetivo aportar al estudio, conservación, recuperación y promoción de los sistemas médicos tradicionales para contribuir al mejoramiento de la salud humana.

El Centro de Estudios Médicos Interculturales, CEMI, es una organización no gubernamental colombiana, sin ánimo de lucro, cuyo objetivo es contribuir al desarrollo de una política intercultural de salud, mediante el estudio, la evaluación, el diseño y la aplicación de estrategias de atención en las que se amplía la noción del concepto salud-enfermedad, considerando los aspectos culturales y ambientales.

Integrantes del GESTS y del CEMI vienen acompañando a las comunidades indígenas de Yapú en su proceso de organización, diseño y ejecución del Plan de Vida, siempre procurando la protección de la diversidad biológica y la defensa de la cultura y los conocimientos tradicionales. En noviembre de 2007 Asatrizy y el CEMI firmaron un convenio de acompañamiento que tiene vigencia hasta junio de 2009, el cual incluye reglas claras sobre el manejo compartido de la información resultante del trabajo conjunto y que tienen vigencia para el presente convenio.

Asatrizy, después de tres años de trabajo comunitario, en mayo de 2007 estableció el Plan de Vida, uno de cuyos capítulos promueve la construcción de un modelo propio de atención de salud, basado en la defensa y promoción de la cultura y los conocimientos tradicionales, pero procurando una prudente y respetuosa articulación con el sistema occidental de salud.

Para esto Asatrizy ha pedido al Dr. Zuluaga su acompañamiento, de manera que se pueda trabajar conjuntamente, conscientes de que las comunidades están siendo afectadas por muchos problemas de salud que no siempre tienen solución con la medicina occidental y que se han perdido muchas tradiciones y prácticas culturales que antes mantenían la salud. Esto incluye el desarrollo de un programa de recuperación y promoción de conocimientos tradicionales y prácticas de autocuidado.

En la reunión de Junta Directiva de enero 11 de 2008 recibimos información sobre la propuesta de investigación que el CEMI propone realizar en nuestras comunidades, en el marco de los estudios de Maestría en Ciencias Médicas, Vertiente Epidemiología Aplicada, que el Dr. Zuluaga adelanta con la Universidad Autónoma de Guerrero (México) y el CIET, siendo aceptada de manera preliminar, por lo que se envió carta al Dr. Neil Andersson manifestando nuestro acuerdo.

4. Meta

Realizar un estudio epidemiológico para un programa de intervención en atención primaria de salud para la promoción y prevención de las enfermedades relacionadas con el ciclo reproductivo de las mujeres indígenas en comunidades de Asatrizy, Vaupés.

5. Objetivos

a. Fortalecer, recuperar y promover los conocimientos tradicionales y la cultura de las comunidades de Asatrizy.
b. Adelantar un estudio transversal con la participación de las mujeres pertenecientes a las siete comunidades de Asatrizy.
c. Estudiar la prevalencia de problemas de salud relacionados con el ciclo vital de la mujer.
d. Estudiar la frecuencia de prácticas tradicionales relacionadas con el cuidado de los ciclos vitales de la mujer.
e. Determinar las posibles asociaciones entre enfermedades propias de la mujer y la pérdida de las prácticas tradicionales y culturales de salud.
f. Divulgar los resultados del estudio a las mujeres participantes, miembros de las comunidades, líderes, agentes sanitarios y educativos y la Junta Directiva de Asatrizy.
g. A partir de los resultados, realizar un programa de intervención en autocuidado y atención primaria en salud para la promoción y prevención de enfermedades relacionadas con el ciclo vital de la mujer.

h. A partir de los resultados, incluir un proceso de formación específica en salud tradicional en el proceso de educación propia que adelanta Asatrizy.
i. Compartir los resultados del estudio con las entidades de carácter municipal, departamental y nacional que tienen responsabilidad en los programas de salud, educación y desarrollo adelantados en las comunidades de Asastrizy, de manera que los programas tengan mayor sensibilidad cultural.

6. Principios

a. El proyecto mejorará la capacidad y habilidades de miembros de la comunidad en investigación basada en la comunidad.
b. Las comunidades se involucrarán como socios en todos los aspectos de la investigación, desde el diseño hasta la implementación.
c. Se guardará el anonimato de los encuestados en todas las etapas y su identidad será protegida cuando los datos sean recogidos y los resultados presentados.
d. Asatrizy retiene la propiedad de los datos y será la primera en recibir los resultados.
e. Para proteger la identidad de los encuestados, el Gests guardará los datos en nombre de Asatrizy en un lugar seguro.
f. Todos los datos serán recogidos y guardados según lo establecido en este convenio.
g. Los datos de este proyecto sólo serán utilizados para alcanzar los objetivos y la meta establecida.

7. Responsabilidades

Las partes se comprometen a que el proyecto se desarrolle como sigue:

a. Asatrizy supervisará el proyecto a través de la Junta Directiva y la Coordinadora de Mujeres.
b. El Gests trabajará con un individuo identificado por Asatrizy para coordinar la comunicación entre las comunidades participantes.
c. El Gests vinculará a investigadores de la comunidad seleccionados por Asatrizy para acompañar la investigación, recoger los datos e interpretar los resultados que han de compartir con sus comunidades.
d. El Gests validará el instrumento de recolección con los investigadores seleccionados por Asatrizy, considerando los aspectos culturales, de traducción de lengua y de sensibilidad de género.
e. El Gests financiará según necesidad la reunión de mujeres de las siete comunidades para la realización y retroalimentación del proyecto.
f. Asatrizy acompañará, con por lo menos un representante, la gira para la realización de las encuestas y la recolección de todos los datos.
g. El Gests presentará los resultados a Asatrizy de manera apropiada y útil, y responderá ante solicitudes adicionales de análisis.
h. Los hallazgos serán presentados a los participantes de la comunidad y serán invitados a ofrecer retroalimentación/interpretación de los resultados. El Gests también asistirá en la presentación de los hallazgos a nivel comunitario, según solicitud.

8. Confidencialidad

Asatrizy y Gests se comprometen a salvaguardar la privacidad y seguridad de toda la información que contenga identificaciones personales y/o comunitarios. Se obtendrá consentimiento informado, culturalmente adecuado, según los requerimientos de la Junta

Directiva de Asatrizy, de la Unión de Mayores Kumuá Yoamará, de las mujeres encuestadas, previo a la recolección de la información personal.

9. Posterior divulgación

Asatrizy y Gests no divulgarán la información recolectada para ningún otro propósito a menos que acuerden lo contrario las dos partes y lo autoricen por escrito.

10. Modificaciones de éste convenio

Las modificaciones a este convenio se harán por escrito y firmadas por las partes.

En constancia las partes suscriben el presente convenio, en dos ejemplares del mismo tenor y valor, a los 18 días del mes de mayo de 2008.

Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la Universidad del Rosario
Centro de Estudios Médicos Interculturales (CEMI)

Germán Zuluaga R.
Director General
Investigador Principal

Carolina Amaya P.
Investigadora asociada

Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY

Efraín R. Mejía A.
Presidente

Gustavo Vargas B.
Vicepresidente

Benjamín Jaramillo G.
Secretario

Ramiro Ardila
Fiscal

Nelson C. Muñoz L.
Coord. Plan de vida

María C. Duque
Coord. Mujeres

David Ramírez
Suplente fiscal

BMJ open

INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Journal:	*BMJ Open*
Manuscript ID:	bmjopen-2012-002012.R3
Article Type:	Research
Date Submitted by the Author:	29-Dec-2012
Complete List of Authors:	Zuluaga, German; Universidad del Rosario, Escuela de Medicina; Cemi, General Direction Andersson, Neil; Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales
Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Public health, Sexual health, Obstetrics and gynaecology
Keywords:	Intercultural , Dysmenorrhoea, Tradicional medicine, Initiation rites

INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Traditional medicine

Initiation rites

Word count: 2440

ABSTRACT

Objectives: Investigate the association between self reported dysmenorrhoea and patterns of female initiation rites at menarche among Amazonian indigenous peoples of Vaupés in Colombia.

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 2008.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with an association between traditional practices and women's health. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Article summary

Article focus

- Female initiation rites and dysmenorrhoea.
- Epidemiology and cultural safety.

Key messages

- There is an association between what women say about abandoning initiation rites and dysmenorrhoea.
- The study suggests an association between traditional practices and women's health.
- The study proposes the feasibility and usefulness of intercultural epidemiology.

Strengths and limitations of this study

- There are no epidemiological studies of indigenous initiation and dysmenorrhoea.
- The small numbers problem is recognized, even with all eligible women participating.

INTRODUCTION

The Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[1,2] In collective reservations, the seven communities with very similar customs in a subsistence economy. They share traditional rituals around childbirth, management of the umbilicus, rites of sexual début, marriage, pregnancy, menopause and death but, like many traditional cultures, they have abandoned much of this with urbanisation and globalisation of culture.[3]

Initiation rites at the onset of menarche last three to five days, involving a number of discrete activities: each initiate has a god-mother (*madrina*) and a mentor; she spends 3-5 days in isolation on a strict diet; she receives a blessing or prayer from the traditional healer; she applies powdered *carayurú*, a vegetable stain (*Arrhabidea chica*), to her skin; her hair is cut and her body painted with *we*, another vegetable stain (*Bignoniaceae sp.*); she inhales *ají*, a hot spice mix (*Capsicum spp.*); and undergoes water- or plant-precipitated emesis.

According to traditional wisdom, young women will be healthy if they complete initiation rites and follow traditional practices during menstruation. Young women in the region go to residential schools outside their communities. The school year follows a national standard,

making it difficult for schoolgirls to participate in traditional rites.[4] This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[5] We were unable to confirm a decline or otherwise of initiation rituals from published sources in Colombia. Our research began with the express concern of community elders who, in the course of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, asked if loss of their cultural practices could affect women's reproductive health, particularly dysmenorrhoea.

Cultural adaptation is less common in epidemiology than it is in some qualitative approaches, [6] yet intercultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated this possible association.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They did not specify a period of recall or a frequency of problems. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] The interviewer asked directly about pain and its severity, without asking about duration of pain, proportion of menstruations affected or activities that could not be completed due to the pain. Because pain perception is subjective, we used a well-established graphic approach showing faces with different grades of discomfort (Figure

1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Initiation rites at the onset of menarche, lasting three to five days, during which time the young women reported one, several or all component rites: emesis, care during the ceremony, *carayurú* powder, isolation, prescribed diet, body paint with *we*, godmother, cut hair, inhaled *ají*, and blessed by traditional healer. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect. We thus documented each of the individual rites.

Instrument: A month of consultation with local healers (*payés*) clarified the main research question and a list of culturally appropriate questions. After approval of the questionnaire for semantic and cultural equivalence with the *payés,* the researchers piloted the questionnaire and pain images with 14 women of the same ethnic group living in Mitu (not part of the study), they reported pain using the graphic approach showing faces with different grades of discomfort. The authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analysed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate

exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire inquired for current family planning, and if so, which is the method used (plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, SD 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.4% (32/184 women interviewed) with secondary education. Few used family planning (11.1% based on 15/135 women of reproductive age) with an average of 4.9 children each (SD 2.7).

Table 1: Characteristics of the women included in the sample

Variable	Yes		No		Total
Mixed ethnicity	0	0.0%	185	100.0%	185

Born in this community	94	51.4%	89	48.6%	183
Knew her age	158	85.4%	27	14.6%	185
Menopausal	50	27.0%	135	73.0%	185
Had had children	139	75.1%	46	24.9%	185
Using contraceptive methods	15	11.1%	120	88.9%	135
Using contraceptive pills	0	0.0%	-	-	-
Using IUDs	2	13.3%	-	-	-
Using plants	1	6.7%	-	-	-
Tubal ligation	4	26.7%	-	-	-
Using other methods	8	53.3%	-	-	-
Any education level	133	71.9%	52	28.1%	185
Lives in a community with airstrip	118	65.2%	63	34.8%	181
Reported dysmenorrhea	97	52.4%	88	47.6%	185
Rites completion					
All rites completed	32	17.3%	153	82.7%	185
No rites at all	14	7.6%	171	92.4%	185
Incomplete rite	139	75.1%	46	24.9%	185

The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation during menarche. Table 2 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhoea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 2: Exposure to different aspects of initiation rite and risk of dysmenorrhoea (odds ratio)

Initiation rite	% of all women receiving this rite**	Risk of dysmenorrhoea in each subgroup				
		Receiving rite	Not receiving rite	aOR*	95% CI	
Emesis	38.4%	27/71	70/114	0.39*	0.21	0.7
Cared for during the ceremony	76.8%	69/142	28/43	0.51	0.25	1.02
Applied *carayurú* powder	84.3%	78/156	19/29	0.53	0.23	1.19
Spent time in isolation	71.9%	64/133	33/52	0.53	0.28	1.03
Followed prescribed diet	71.9%	64/133	33/52	0.53	0.28	1.03
Body painted with *we*	50.8%	44/94	53/91	0.63	0.35	1.12
Had a godmother	50.8%	45/94	50/88	0.7	0.39	1.25
Cut hair	68.6%	64/127	33/58	0.77	0.41	1.45
Inhaled *ají*	49.2%	45/91	52/94	0.79	0.44	1.41
Blessed by traditional healer	88.6%	85/164	12/21	0.81	0.32	2.04

* Adjusted for age and level of education in a stratified analysis.

** Total 185 women; no missing data

To test the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites. Those who completed the 10 rites (8/32) contrasted sharply with those who completed some or no rites (89/153) (p-Fisher 0.001).

Table 3: Sensitivity analysis of initiation rites and dysmenorrhoea contrasting women who completed all rites and those who completed only one component rite.

		Frequencies					Risk of dysmenorrhoea		
	n	No		Yes		p-value	OR	95% CI	p-Fisher
None	46	14	30,4	32	69,6	0.001	7,5	1,95-28,7	0.001
Emesis	71	39	54,9	32	45,1	0.001	2,85	1,04-7,82	0.050
Cared for during the ceremony	142	110	77,5	32	22,5	0.001	3,73	1,59-8,78	0.001
Followed prescribed diet	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Spent time in isolation	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Applied *carayurú* powder	156	124	79,5	32	20,5	0.001	3,89	1,68-9,02	0.001
Blessed by traditional healer	164	132	80,5	32	19,5	0.001	4,20	1,83-9,66	0.001
Body painted with *we*	94	62	66,0	32	34,0	0.001	4,15	1,65-10,4	0.001
Cut hair	127	95	74,8	32	25,8	0.001	4,31	1,81-10,2	0.001
Had a godmother	94	62	66,0	32	34,0	0.001	4,44	1,77-11,1	0.001
Inhaled *ají*	91	59	64,8	32	35,2	0.001	5,05	1,99-12,77	0.001

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker Faces Pain Rating Scale. Table 4 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014). It also contrasts those who did no rites with those who completed all rites (p= 0.0039).

Table 4: Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88
		Mantel-Haenszel chi square for trend = 10.16 p = 0.0014			
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2
		Mantel-Haenszel chi square for trend = 8.33; p= 0.0039			

DISCUSSION

Our results show that women who reported having no initiation rite were more likely to report dysmenorrhoea than women who said they had such a rite. Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect of the other rites for those who did not abandon the initiation practices. The apparent lack of specific effects of each component rite supports the idea that synergy between all components completes the

protective effect.

The average age of menarche of our sample was higher than typically reported in the literature,[28-33] possibly indicating a relatively low level of secular change.[34,35] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[36-40] Although the local definition (facial expressions) was useful for internal comparisons, it is of limited value in international comparisons.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised and has no easy solution.[41,42] As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation. Recall bias might have affected the results as some women had to remember rites that took place decades earlier; a social desirability bias (not wanting to be culturally different, wanting to avoid disapproval) might also have influenced the results. We have no additional information to clarify the directions of these biases.

Within these constraints and the stringent limits imposed by our population size, we tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue may require a randomised controlled trial where the differential support for the fulfilment of the rite among communities be contrasted with the occurrence of dysmenorrhoea. One problem with prospective studies in this setting is that it would take many years to accumulate the numbers necessary to make the case.

Since the 1950s, public health programmes have contemplated primary, secondary and tertiary prevention. More recently, *primordial prevention* identified social, economic and cultural patterns that affect risks.[43] Within its limitations, our study is compatible with the

idea that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association.

Inter-cultural approaches have received little attention in the epidemiological literature, and these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

Without underestimating the remaining intercultural challenges, the difficulties of research in small populations and the limits of observational studies, we feel this study achieves a first step in culturally safe descriptive epidemiology of traditional medicine: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it showed an association between self reported participation in initiation rites and dysmenorrhea.

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men, healers) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCES

1. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

2. Sarmiento I, Amaya C. *Plan de vida: unidos con un solo pensamiento para vivir bien*. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. Bogota, Colombia 2008.

3. Sarmiento I, Amaya C. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Bogotá, Colombia, 2008.

4. Rembeck GI, Gunnarsson RK. Improving pre- and postmenarcheal 12-year-old girls' attitudes toward menstruation. *Health Care Women Int*. 2004;**25**:680-98.

5. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

6. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

7. World Health Organization. *Engaging for Health. 11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

8.Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

9. García-Pérez H, Harlow SD, Erdmann CA, et al. Pelvic pain and associated characteristics among women in northern Mexico. *Int Perspect Sex Reprod Health*. 2010;**36**:90-8.

10. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva: WHO, 1983.

11. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva, (CH): WHO, 2002.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among Mexican pre-adolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management. *Obstet Gynecol* 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007. http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Leuraud K, Benichou J: Tests for monotonic trend from case control data: Cochran-Armitage-Mantel trend test, isotonic regression and single and multiple contrast tests. *Biometrical Journal* 2004;46:731-749

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud 2008. http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

29. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

30. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

31. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

32. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

33. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

34. Padez C. Social background and age at menarche in portuguese university students: a note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

35. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

36. Woods NF, Most A, Dery GK. Prevalence of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

37. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

38. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

39. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

40. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

41. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

42. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

43. Bonita R, Beaglehole R, Kjellström T, Basic Epidemiology, Second Edition World Health Organization, Geneva 2006 p103

INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA AMONG INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY

Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57 3132625103 and 57 1 8777040.

Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744 488 0012 and 52 744 487 7230.

Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario, Bogotá, Colombia.

Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de Enfermedades Tropicales, Acapulco, México.

Keywords:

Intercultural

Dysmenorrhoea

Traditional medicine

Initiation rites

Word count: 2440

ABSTRACT

Objectives: Investigate the association between self reported dysmenorrhoea and patterns of female initiation rites at menarche among Amazonian indigenous peoples of Vaupés in Colombia.

Design: Cross-sectional study of all women in seven indigenous communities. Questionnaire administered in local language documented female initiation rites and experience of dysmenorrhoea. Analysis examined ten initiation components separately, then together, comparing women who underwent all rites, some rites and no rites.

Settings: Seven indigenous communities belonging to the Tukano language group in the Great Eastern Reservation of Vaupés (Colombia) in 2008.

Participants: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Primary and secondary outcome measures: The analysis rested on pelvic pain to define dysmenorrhoea as main outcome. Women were also asked about other disorders present during menstruation or the precedent days, and about the interval between menstruation and its duration.

Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning. Women who completed less than the full complement of rites had higher risk than those who completed all rites. Those who did not complete all rites reported increased severity of dysmenorrhoea (p=0.00014).

Conclusions: Our results are compatible with an association between traditional practices and women's health. We could exclude indirect associations with age, education, parity and use of family planning as explanations for the association. The study indicates feasibility, possible utility and limits of inter-cultural epidemiology in small groups.

Article summary

Article focus

- Female initiation rites and dysmenorrhoea.
- Epidemiology and cultural safety.

Key messages

- There is an association between what women say about abandoning initiation rites and dysmenorrhoea.
- The study suggests an association between traditional practices and women's health.
- The study proposes the feasibility and usefulness of intercultural epidemiology.

Strengths and limitations of this study

- There are no epidemiological studies of indigenous initiation and dysmenorrhoea.
- The small numbers problem is recognized, even with all eligible women participating.

INTRODUCTION

The Tatuyo, Bará, Carapana, Tuyuca y Tukano ethnicities in Tukano language group live between the Papurí and Yapú rivers in the Great Eastern Reservation of Vaupés.[1,2] In collective reservations, the seven communities with very similar customs in a subsistence economy. They share traditional rituals around childbirth, management of the umbilicus, rites of sexual début, marriage, pregnancy, menopause and death but, like many traditional cultures, they have abandoned much of this with urbanisation and globalisation of culture.[3]

Initiation rites at the onset of menarche last three to five days, involving a number of discrete activities: each initiate has a god-mother (*madrina*) and a mentor; she spends 3-5 days in isolation on a strict diet; she receives a blessing or prayer from the traditional healer; she applies powdered *carayurú*, a vegetable stain (*Arrhabidea chica*), to her skin; her hair is cut and her body painted with *we*, another vegetable stain (*Bignoniaceae sp.*); she inhales *ají*, a hot spice mix (*Capsicum spp.*); and undergoes water- or plant-precipitated emesis.

According to traditional wisdom, young women will be healthy if they complete initiation rites and follow traditional practices during menstruation. Young women in the region go to residential schools outside their communities. The school year follows a national standard,

making it difficult for schoolgirls to participate in traditional rites.[4] This loss of culture is a concern for Amazon indigenous communities, where every year people have less to do with traditional medical practices.[5] We were unable to confirm a decline or otherwise of initiation rituals from published sources in Colombia. Our research began with the express concern of community elders who, in the course of a decade long partnership with the traditional health systems group at Universidad del Rosario in Colombia, asked if loss of their cultural practices could affect women's reproductive health, particularly dysmenorrhoea.

Cultural adaptation is less common in epidemiology than it is in some qualitative approaches, [6] yet intercultural epidemiology can be useful to identify potential health benefits of traditional health practices, many of which are being lost as globalization erodes indigenous cultures.

Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an interesting case in point as the World Health Organization calls to explore possible contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15] Better documented risk factors are diet, exercise, psychological or emotional episodes, and use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated this possible association.

METHODS

Study population: All women over the age of 13 years living in the seven communities in Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years (mean 32,5; SD 15,6).

Outcome: Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness, headache, bodily pains, and problems in the days prior to menstruation. They did not specify a period of recall or a frequency of problems. They also asked about the interval between menstruation and duration of menstruation. The analysis rested on pelvic pain to define dysmenorrhoea.[21-23] The interviewer asked directly about pain and its severity, without asking about duration of pain, proportion of menstruations affected or activities that could not be completed due to the pain. Because pain perception is subjective, we used a well-established graphic approach showing faces with different grades of discomfort (Figure

1).[24] Respondents simply pointed to the face that reflected their experience during menstruation.

Exposure: Initiation rites at the onset of menarche, lasting three to five days, during which time the young women reported one, several or all component rites: emesis, care during the ceremony, *carayurú* powder, isolation, prescribed diet, body paint with *we*, godmother, cut hair, inhaled *ají*, and blessed by traditional healer. The questionnaire documented exposure to each component rite (yes/no) separately. Without understanding the exact workings of the initiation rites, we followed the WHO guideline to handle component activities as a "black box"[25]: we do not always have to understand exactly how a traditional therapy works to measure its effect. We thus documented each of the individual rites.

Instrument: A month of consultation with local healers (*payés*) clarified the main research question and a list of culturally appropriate questions. After approval of the questionnaire for semantic and cultural equivalence with the *payés,* the researchers piloted the questionnaire and pain images with 14 women of the same ethnic group living in Mitu (not part of the study), they reported pain using the graphic approach showing faces with different grades of discomfort. The authorities in each community invited all women – by cultural definition, the first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and the right to decline to participate or to leave out any question. No eligible woman declined to participate. Interviewers administered a 37-question instrument through a translator during December 2008.

Analysis: Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a Windows-like interface with R. Bivariate analysis with each of the 10 component activities examined the relationship of each component rite on its own with dysmenorrhoea. We also analysed complete and incomplete initiation using sequential stratification by age of the woman, community of origin (some had more access to Western ways), education, parity, family planning and menopause. We analysed trend using the Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with the resulting sparse numbers comparisons.

Without any prior basis for weighting importance of different activities in the initiation, we calculated the average effect across the ten components as though each was a separate

exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2). Compared with occurrence among women who completed all ten rites of initiation, a sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.

Control of biases: Involvement of healers and elders in the design guaranteed cultural fit. The questionnaire inquired for current family planning, and if so, which is the method used (plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase pain. Use of Western contraceptive methods also coincides with Western acculturation. We stratified by contraceptive use to separate between the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from interviewing only women who did not go to nearby towns for work, we conducted the study in December when most return to their homes. We took age, menopause and education into account by stratification to limit the differential influence of these on responses.

Ethical aspects: The CIET ethical review committee at the Universidad Autónoma de Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the proposal. The leadership of each community signed formal agreements for data management and sharing with all participants present, after the researchers had explained to all the nature of the study, how data would be used, confidentiality, and rights to decline participation.[27]

RESULTS

A total of 185 women participated, representing 70.6% of the 262 women over the age of 12 years identified in the 2006 census. The 77 women excluded had either migrated from the area or they had not completed two menstruations. Of 158 women who knew their age in years, the average was 32.5 years (mode 19 years, SD 15.6). Respondents reported low levels of education, 28.3% (52/184) with no schooling and only 17.4% (32/184 women interviewed) with secondary education. Few used family planning (11.1% based on 15/135 women of reproductive age) with an average of 4.9 children each (SD 2.7).

Table 1: Characteristics of the women included in the sample

Variable	Yes		No		Total
Mixed ethnicity	0	0.0%	185	100.0%	185

Born in this community	94	51.4%	89	48.6%	183
Knew her age	158	85.4%	27	14.6%	185
Menopausal	50	27.0%	135	73.0%	185
Had had children	139	75.1%	46	24.9%	185
Using contraceptive methods	15	11.1%	120	88.9%	135
Using contraceptive pills	0	0.0%	-	-	-
Using IUDs	2	13.3%	-	-	-
Using plants	1	6.7%	-	-	-
Tubal ligation	4	26.7%	-	-	-
Using other methods	8	53.3%	-	-	-
Any education level	133	71.9%	52	28.1%	185
Lives in a community with airstrip	118	65.2%	63	34.8%	181
Reported dysmenorrhea	97	52.4%	88	47.6%	185
Rites completion					
All rites completed	32	17.3%	153	82.7%	185
No rites at all	14	7.6%	171	92.4%	185
Incomplete rite	139	75.1%	46	24.9%	185

The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation during menarche. Table 2 shows the proportion involved in each of ten activities identified by traditional healers as the initiation rites. Considering each rite separately, only emesis retained a significant association on its own with dysmenorrhoea, after taking into account age of the woman, community of origin (some had more access to Western ways), parity, family planning by sequential stratification and adjusting for menopause and education. The Forest plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).

Table 2: Exposure to different aspects of initiation rite and risk of dysmenorrhoea (odds ratio)

Initiation rite	% of all women receiving this rite**	Risk of dysmenorrhoea in each subgroup				
		Receiving rite	Not receiving rite	aOR*	95% CI	
Emesis	38.4%	27/71	70/114	0.39*	0.21	0.7
Cared for during the ceremony	76.8%	69/142	28/43	0.51	0.25	1.02
Applied *carayurú* powder	84.3%	78/156	19/29	0.53	0.23	1.19
Spent time in isolation	71.9%	64/133	33/52	0.53	0.28	1.03
Followed prescribed diet	71.9%	64/133	33/52	0.53	0.28	1.03
Body painted with *we*	50.8%	44/94	53/91	0.63	0.35	1.12
Had a godmother	50.8%	45/94	50/88	0.7	0.39	1.25
Cut hair	68.6%	64/127	33/58	0.77	0.41	1.45
Inhaled *ají*	49.2%	45/91	52/94	0.79	0.44	1.41
Blessed by traditional healer	88.6%	85/164	12/21	0.81	0.32	2.04

* Adjusted for age and level of education in a stratified analysis.

** Total 185 women; no missing data

To test the role of each rite in relation to dysmenorrhoea, a sensitivity analysis compared dysmenorrhoea rates among women who did all ten rites (n=32) with women who participated in less than the ten, dropping each rite in turn. Figure 3 shows the unadjusted odds of dysmenorrhoea for all rites compared with failing to do specific rites, and those who did no rites. Those who completed the 10 rites (8/32) contrasted sharply with those who completed some or no rites (89/153) (p-Fisher 0.001).

Table 3: Sensitivity analysis of initiation rites and dysmenorrhoea contrasting women who completed all rites and those who completed only one component rite.

		Frequencies					Risk of dysmenorrhoea		
	n	No		Yes		p-value	OR	95% CI	p-Fisher
None	46	14	30,4	32	69,6	0.001	7,5	1,95-28,7	0.001
Emesis	71	39	54,9	32	45,1	0.001	2,85	1,04-7,82	0.050
Cared for during the ceremony	142	110	77,5	32	22,5	0.001	3,73	1,59-8,78	0.001
Followed prescribed diet	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Spent time in isolation	133	101	75,9	32	24,1	0.001	3,73	1,58-8,85	0.001
Applied *carayurú* powder	156	124	79,5	32	20,5	0.001	3,89	1,68-9,02	0.001
Blessed by traditional healer	164	132	80,5	32	19,5	0.001	4,20	1,83-9,66	0.001
Body painted with *we*	94	62	66,0	32	34,0	0.001	4,15	1,65-10,4	0.001
Cut hair	127	95	74,8	32	25,8	0.001	4,31	1,81-10,2	0.001
Had a godmother	94	62	66,0	32	34,0	0.001	4,44	1,77-11,1	0.001
Inhaled *ají*	91	59	64,8	32	35,2	0.001	5,05	1,99-12,77	0.001

Most respondents with dysmenorrhoea (92/97) reported severity using the Wong-Baker Faces Pain Rating Scale. Table 4 shows a statistically significant increase across five levels of severity for those who completed all rites compared with those who did any or no rites (p=0.0014). It also contrasts those who did no rites with those who completed all rites (p= 0.0039).

Table 4: Completion of initiation rites and reported intensity of dysmenorrhoea

	No dysmenorrhoea	Intensity of dysmenorrhoea			
	0	**1**	**2**	**3**	**4 y 5**
Incomplete or no rites	64	18	20	19	27
All rites completed	24	2	4	1	1
Total	88	20	24	20	28
OR		3.94	3.49	6.76	6.92
95%CI		1.72 - 9.00	1.41 - 8.64	1.84 - 24.93	1.17 - 40.88
		Mantel-Haenszel chi square for trend = 10.16 p = 0.0014			
No rites at all	4	1	3	3	2
All rites completed	24	2	4	1	1
Total	28	3	7	4	3
OR		6.75	6.93	9.38	5.64
IC 95%		1.72 - 26.42	1.77 - 27.17	1.82 - 48.41	0.57 - 55.87
P-Fisher		0.01	0.01	0.02	0.2
		Mantel-Haenszel chi square for trend = 8.33; p= 0.0039			

DISCUSSION

Our results show that women who reported having no initiation rite were more likely to report dysmenorrhoea than women who said they had such a rite. ~~Our results support the idea that abandoning traditional initiation rites, or adopting practices that go along with abandoning these rites, is a risk factor for dysmenorrhoea.~~ Emesis was the single strongest protective rite on its own, but sensitivity analysis showed a consistent effect of the other rites for those who

Comment [ISC1]: Richard Sands:

We suggest:

"Our results show that women who reported having no initiation rite were more likely to report dysmenorrhoea than women who said they had such a rite."

>>Done

did not abandon the initiation practices. The apparent lack of specific effects of each component rite supports the idea that synergy between all components completes the protective effect.

The average age of menarche of our sample was higher than typically reported in the literature,[28-33] possibly indicating a relatively low level of secular change.[34,35] That one half of the women reported dysmenorrhoea (97/185) is lower than reported in international studies.[36-40] Although the local definition (facial expressions) was useful for internal comparisons, it is of limited value in international comparisons.

This study faced several common challenges in inter-cultural epidemiology. Even with all eligible women participating, the small numbers problem is well recognised and has no easy solution.[41,42] As anticipated, we found it difficult to untangle issues like use of contraceptives and reporting of age, given the effect of acculturation on these. Despite this interdependence of exposures, we believe we were able to show an independent effect of initiation rites.

Cultural issues probably reduced the effectiveness of the study and reduced the numbers further. The 14.6% (27/185) of women who could not give their age in calendar years is testimony to their distance from Western culture. Analysing only those who mention an age included a cultural filter, limiting our conclusions to those with some measure of Western acculturation. Recall bias might have affected the results as some women had to remember rites that took place decades earlier; a social desirability bias (not wanting to be culturally different, wanting to avoid disapproval) might also have influenced the results. We have no additional information to clarify the directions of these biases.

Within these constraints and the stringent limits imposed by our population size, we tried to take account of other acculturation issues, beyond initiation rites, by stratifying for education, age, parity, community of residence (some had greater access to modern towns) and use of family planning. The lower risk associated with initiation rites might still be due to unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue may require a randomised controlled trial where the differential support for the fulfilment of the rite among communities be contrasted with the occurrence of dysmenorrhoea. One problem with prospective studies in this setting is that it would take many years to accumulate the numbers necessary to make the case.

Since the 1950s, public health programmes have contemplated primary, secondary and

tertiary prevention. More recently, *primordial prevention* identified social, economic and cultural patterns that affect risks.[43] Within its limitations, our study is compatible with the idea that primary or primordial prevention of dysmenorrhoea might be possible for indigenous women who are increasingly in contact with Western ways.

CONCLUSIONS

Without adding insight into exact mechanisms, this cross-sectional study shows an association between abandoning initiation rites and dysmenorrhoea. No one of the rites on its own explains this association.

Inter-cultural approaches have received little attention in the epidemiological literature, and these need further investment. In this study, the indigenous leaders of the seven communities requested the study and set the research question; they specified the cultural exposures of interest; they participated in the design and testing of instruments; they led interpretation of results; and they are the primary research users, sharing the results with their communities in support of traditional health practices.

Without underestimating the remaining intercultural challenges, the difficulties of research in small populations and the limits of observational studies, we feel this study achieves a first step in culturally safe descriptive epidemiology of traditional medicine: a longer term dialogue led to the research question and design; the indigenous leaders defined the exposure of interest; the ethical review process fitted with indigenous ethical concepts; it showed an association between self reported participation in initiation rites and dysmenorrhea~~it generated evidence suggesting an effective traditional practice, without understanding how this works~~.

Comment [ISC2]: Richard Sands:

We suggest:

"it showed an association between self reported participation in initiation rites and dysmenorrhea"

>>Done

ACKNOWLEDGMENTS

Field work was financed by The Research Fund of Universidad del Rosario. Benedicto Mejía and Efraín Mejía, along with other *payés* (wise men, healers) from the seven communities participated in formulation of research questions, design, application of the instrument and interpretation of results. Alicia Jaramillo and Guillermina Ferrer translated the questions during the application of the instrument. Carolina Amaya and Natalia Reinoso carried out the pilot study and the research instrument application in the seven communities. Iván Sarmiento helped with data analysis, tables and figures elaboration and revision of citations and bibliographic references. Andrés Cañón and Sebastián Luna collaborated with the systematic review of cultural risk factors for dysmenorrhea.

COMPETING INTERESTS

We, the authors, declare that there are no conflicts of interest in this study regarding the Indigenous communities that took part, the recognised rights of the Indigenous Peoples, or the financing institutions.

FUNDING

Fieldwork was financed by The Research Fund of Universidad del Rosario. Germán Zuluaga, MD, MSc carried out the research project as part fulfilment of the requirements of MSc (Epidemiology) at the Universidad Autónoma de Guerrero.

FIGURE LEGENDS

Figure 1: Wong-Baker Faces Pain Rating Scale

Figure 2: Forest plot of individual initiation rites and risk of dysmenorrhoea

Figure 3: Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)

REFERENCES

1. Dirección de Etnias del Ministerio del Interior y de Justicia. *Resolución no. 0006 de 26 de enero de 2005, por medio de la cual se inscribe en el registro de asociaciones de autoridades tradicionales y/o cabildos la constitución de la asociación de autoridades tradicionales indígenas de la zona de Yapú - ASATRIZY*. Bogotá (CO): Min. Int. Just, 2005.

2. Sarmiento I, Amaya C. *Plan de vida: unidos con un solo pensamiento para vivir bien*. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. Bogota, Colombia 2008.

3. Sarmiento I, Amaya C. Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú. *Historia y origen del proceso de un Nuevo despertar*. Bogotá, Colombia, 2008.

4. Rembeck GI, Gunnarsson RK. Improving pre- and postmenarcheal 12-year-old girls' attitudes toward menstruation. *Health Care Women Int*. 2004;**25**:680-98.

5. Piñeros-Petersen M, Ruiz-Salguero M. Aspectos demográficos en comunidades indígenas de tres regiones de Colombia. *Salud Pública Mex* 1998;**40**:324-329.

6. Cameron M, Andersson N, and Ledogar RJ. Culturally safe epidemiology: oxymoron or scientific imperative. *Pimatisiwin: Journal of Aboriginal and Indigenous Community Health* 2010;**8**(2):89-116.

7. World Health Organization. *Engaging for Health. 11th General Program of Work 2006-2015, a Global Health Agenda*. Geneva (CH): WHO, 2006. (Working paper GPW/2006-2015). Available at: http://whqlibdoc.who.int/publications/2006/GPW_eng.pdf. Accessed October 15, 2008.

8.Rodríguez J. *Descripción de la mortalidad por departamentos: Colombia año 2000*. Bogotá (CO): Pontificia Universidad Javeriana, Cendex. (Working Paper ASS /DT 016-05). Available at: http://www.cendex.org.co/pdf/DT016-05.pdf. Accessed January 15, 2008.

9. García-Pérez H, Harlow SD, Erdmann CA, Denman C. Pelvic pain and associated characteristics among women in northern Mexico. *Int Perspect Sex Reprod Health*. 2010;**36**:90-8.

10. World Health Organization. *Traditional Medicine and Health Coverage*. Geneva: WHO,

1983.

11. World Health Organization. *WHO Traditional Medicine Strategy: 2002-2005*. Geneva, (CH): WHO, 2002.

12. Garg S, Sharma N, Sahay R. Socio-cultural aspects of menstruation in an urban slum in Delhi, India. *Reprod Health Matters* 2001;**9**:16-25.

13. Avasarala AK, Panchangam S. Dysmenorrhoea in different settings: are the rural and urban adolescent girls perceiving and managing the dysmenorrhoea problem differently? *Indian J Community Med* 2008;**33**:246-249.

14. Goldstein-Ferber S, Granot M. The association between somatization and perceived ability: roles in dysmenorrhea among israeli arab adolescents. *Psychosom Med* 2006;**68**:136-142.

15. Marván ML, Vacio A, García-Yañez G, *et al*. Attitudes toward menarche among Mexican pre-adolescents. *Women Health* 2007;**46**:7-23.

16. Latthe P, Mignini L, Gray R, *et al*. Factors predisposing women to chronic pelvic pain: systematic review. *BMJ* 2006;**332**:749-755.

17. Patel A, Tanksale V, Sahasrabhojanee M, *et al*. The burden and determinants of dysmenorrhoea: a population-based survey of 2262 women in Goa, India. *BJOG* 2006;**113**:453-463.

18. Balbi C, Musone R, Menditto A, et al. Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *Eur J Obstet Gynecol Reprod Biol* 2000;**91**:143-148.

19. Proctor ML, Murphy PA. Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database Syst Rev* 2001;**(3)**:CD002124.

20. Parazzini F, Tozzi L, Mezzopane R, *et al*. Cigarette smoking, alcohol consumption, and risk of primary dysmenorrhea. *Epidemiology* 1994;**5**:469-472.

21. Mazza D. Women´s Health in General Practice. Oxford: Butterworth Heinemann, 2004.

22. Deb Sh, Raine-Fenning N. Dysmenorrhoea. Obstetrics, *Gynaecology and Reproductive Medicine* 2008;**18**:294-299.

23. Dawood MY. Primary dysmenorrhoea: advances in pathogenesis and management.

Obstet Gynecol 2006;**108**:428-441.

24. Wong D, Whaley L. *Clinical handbook of pediatric nursing*. 2nd ed. Saint Louis (MO): Mosby Company, 1986. Quoted by: National Institutes of Health, NIH Pain Consortium. Pain intensity scales – Wong-Baker faces pain rating scale [NIH Pain Consortium Web site]. July 17, 2007. http://painconsortium.nih.gov/pain_scales/Wong-Baker_Faces.pdf (accessed 24 April 2012).

25. World Health Organization. *General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine*. Geneva (CH): WHO, 2000. (Working paper WHO/EDM/TRM/2000.1)

26. Leuraud K, Benichou J: Tests for monotonic trend from case control data: Cochran-Armitage-Mantel trend test, isotonic regression and single and multiple contrast tests. *Biometrical Journal* 2004;46:731-749

27. Grupo de Estudios en Sistemas Tradicionales de Salud. Principios éticos para estudios médicos aplicados a los sistemas tradicionales de salud 2008. http://www.cemi.org.co/images/PRINCIPIOS_ETICOS_GESTS_CEMI.pdf (accessed 14 Jun 2010).

28. Vera Y, Hidalgo G, Gollo O, *et al*. Edad de la menarquia y su relación con el estrato social en cinco estados venezolanos. *Acta Cient Estud* 2009;**7**:130-135.

29. Ulate G. Edad de la menarquia en el Valle Central de Costa Rica y factores asociados a su aparición. *Rev Costarric Cienc Med* 1995;**16**:37-41.

30. Fonseca J, Aguilar O. Edad de la Menarquia en San Pedro Sula. *Rev Med Hondur* 1991;**59**: 4-7.

31. Hernández I, Unanue N, Gaete X, *et al*. Edad de la menarquia y su relación con el nivel socioeconómico e índice de masa corporal. *Rev Med Chil* 2007;**135**:1429-1436.

32. Sharma N, Vaid S, Manhas A. Age at menarche in two caste groups (brahmins and rajputs) from rural areas of Jammu. *Anthropologist* 2006;**8**:55-7.

33. Romans SE, Martin JM, Gendall K, *et al*. Age of menarche: the role of some psychosocial factors. *Psychol Med* 2003;**33**:933–939.

34. Padez C. Social background and age at menarche in portuguese university students: a

note on the secular changes in Portugal. *Am J Hum Biol* 2003;**15**:415-427.

35. Tanner JM. *Growth at Adolescence*. 2nd ed. Oxford: Blackwell, 1962. Quoted by: Korah L. Knowledge and perceptions regarding menstruation among adolescent girls: a research study. *Nurs J India* 1991;**82**:205-209.

36. Woods NF, Most A, Dery GK. Prevalence of perimenstrual symptoms. *Am J Public Health* 1982;**72**:1257-1264.

37. Klein JR, Litt IF. Epidemiology of adolescent dysmenorrhea. *Pediatrics* 1981;**68**:661-664.

38. Wilson CA, Keye WRJ. A survey of adolescent dysmenorrhea and premenstrual symptom frequency, a model program for prevention, detection, and treatment. *J Adolesc Health Care*. 1989;**10**:317-322.

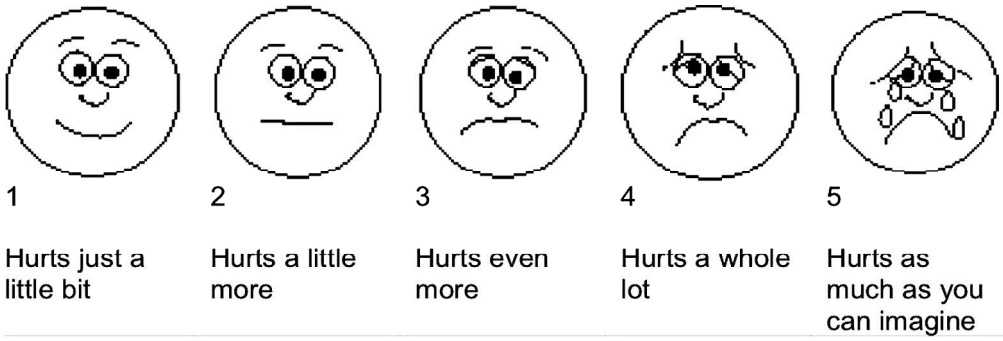
39. Jamieson D, Steege J. Prevalence of dysmenorrhoea, dyspareunia, pelvic pain and irritable bowle syndrome in primary care practices. *Obstet Gynecol* 1996;**87**:55-58.

40. Latthe P, Latthe M, Say L, *et al*. WHO systematic review of prevalence of chronic pelvic pain: a neglected reproductive health morbidity. *BMC Public Health* 2006;**6**:177.

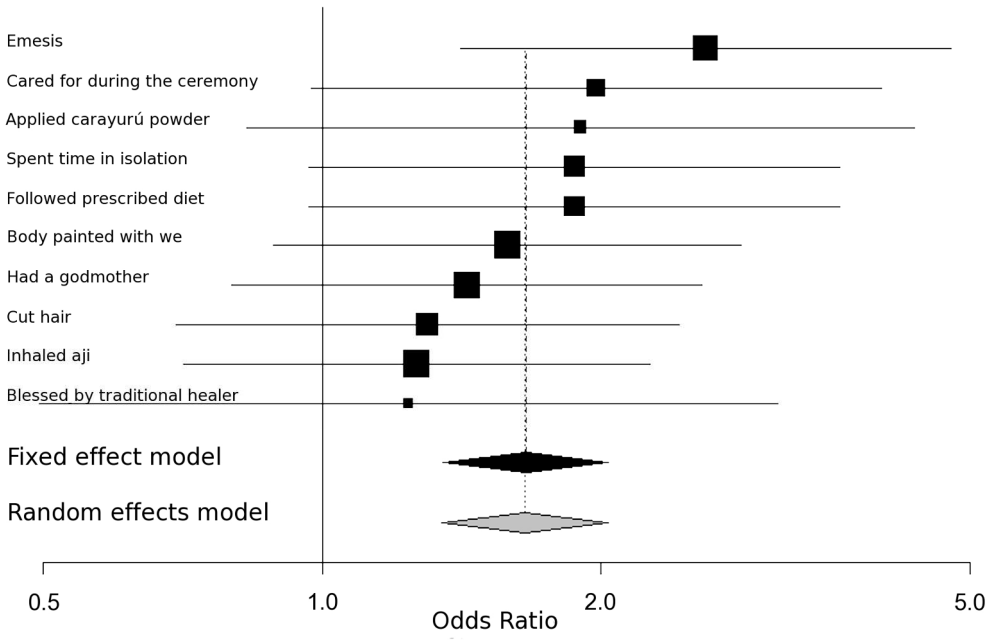
41. Andresen EM, Diehr PH, Luke DA. Public health surveillance of low-frequency populations. *Annu Rev Public Health* 2004;**25**:25-52.

42. Monasta L, Andersson N, Ledogar RJ, *et al*. Minority health and small numbers epidemiology: a case study of living conditions and health of children in five foreign Roma camps in Italy. *Am J Public Health* 2008;**98**:2035-2041.

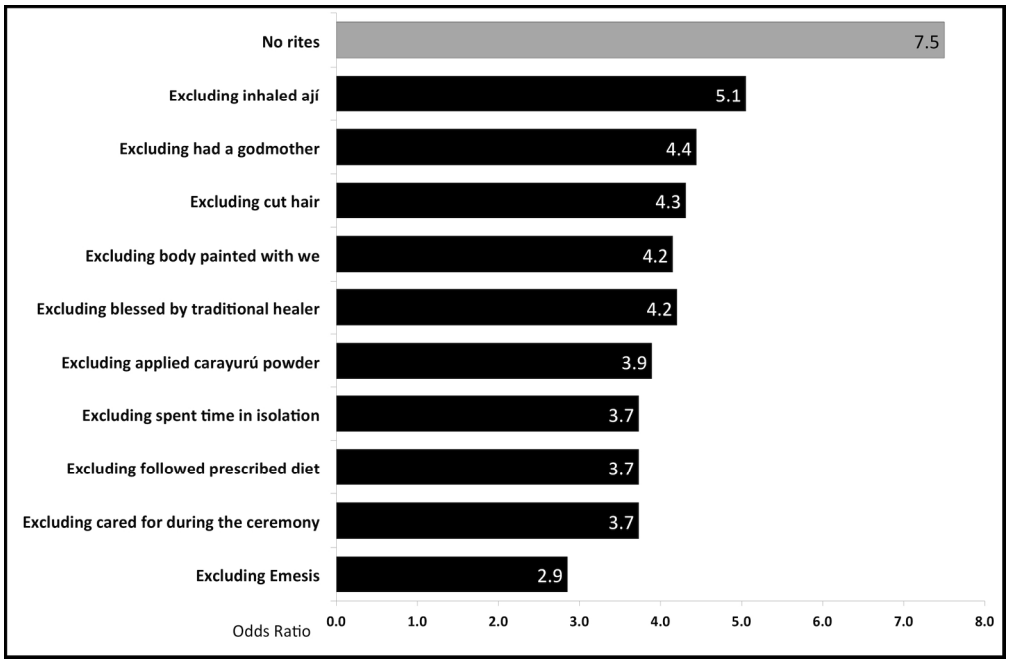
43. Bonita R, Beaglehole R, Kjellström T, Basic Epidemiology, Second Edition World Health Organization, Geneva 2006 p103



Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)



Forest plot of individual initiation rites and risk of dysmenorrhoea
180x114mm (300 x 300 DPI)



Sensitivity analysis compared dysmenorrhoea risk among women who did all ten rites (n=32) compared with women who did not do at least one rite, and those who did no rite (listing shows excluded rites)
180x117mm (300 x 300 DPI)

STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	"Cross-sectional studies" appears in title
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	Structured abstract provided
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Abstract and para 1 and 3 of introduction (p3)
Objectives	3	State specific objectives, including any prespecified hypotheses	Abstract and para 2 Introduction (p3)
Methods			
Study design	4	Present key elements of study design early in the paper	Abstract, paras 1 and 3 of Introduction (p1), para 3 of Discussion (p11)
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods (p3 and p4)
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	First para of Methods, p3
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Paras 2-3 of Methods (p4), and para 2 of Discussion (p10)
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Paras 2-3 of Methods (p4)
Bias	9	Describe any efforts to address potential sources of bias	Para 7 of Methods (p5)
Study size	10	Explain how the study size was arrived at	Para 3 of Discussion (p10), all available women were included.

Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Abstract, paras 2, 3, 5, 6 of Methods (p4 and p5), para 5 Discussion (p10)
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	Paras 5-6 of Methods (p5)
		(*b*) Describe any methods used to examine subgroups and interactions	Para 5 of Discussion (p10)
		(*c*) Explain how missing data were addressed	Para 2 of Results (p7)
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	Paras 5-6 of Methods (p5)
		(*e*) Describe any sensitivity analyses	Para 3 of Results (Figure 3 and Table 3) (p8)
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	Para 1 of Results (p6), para 1 of methods (p4)
		(b) Give reasons for non-participation at each stage	Para 1 of Results (p6)
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	Para 2 of Introduction (p3), para 1 of Methods (p4), para 1 of Results (p6), and Table 1
		(b) Indicate number of participants with missing data for each variable of interest	Para 1 of Results (p6)
Outcome data	15*	Report numbers of outcome events or summary measures	Para 2-5 of Results (p6 and p7)
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Tables 2, 3 and 4
		(*b*) Report category boundaries when continuous variables were categorized	Tables 2 and 4
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not Applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Table 3 and 4 and Figure 2
Discussion			
Key results	18	Summarise key results with reference to study objectives	Paras 2, 4, 5 of Results (p6 and p7), para 5 of Discussion (p10)

Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Abstract, para 1 of Introduction (p3), para 7 of Methods (p6), paras 1 to 5 of Discussion (p9 and p10)
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Abstact and Discussion
Generalisability	21	Discuss the generalisability (external validity) of the study results	Paras 2, 3, 5 and 7 of Discussion (p10)
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P12

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.