



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

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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.

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3 • Epidemiology and cultural safety.
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5 Key messages

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7 • Association between abandoning initiation rites and dysmenorrhoea.
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9 • Suggests an effective traditional practice.
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11 • Suggests feasibility and usefulness of intercultural epidemiology.
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13 Strengths and limitations of this study

- 14
15 • No epidemiological studies of indigenous initiation and dysmenorrhoea.
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17 • Even with all eligible women participating the small numbers problem is recognized.
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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 Tatujo, 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.

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3 **Exposure:** Traditional healers described initiation rites at the onset of menarche, lasting
4 three to five days, during which time the young women completed a number of discrete
5 activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation;
6 the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she
7 received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a
8 vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with we, another
9 vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and
10 water or a plant precipitated emesis. The questionnaire documented exposure to each
11 component rite (yes/no) separately. Without understanding the exact workings of the
12 initiation rites, we followed the WHO guideline to handle the component activities as a “black
13 box”[25]: we do not always have to understand exactly how a traditional therapy works to
14 measure its effect.
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21 **Instrument:** A month of consultation with local healers clarified the main research question
22 and a list of culturally appropriate questions. After piloting, the authorities in each community
23 invited all women – by cultural definition, the first menstruation identifies the woman as an
24 adult -- to the communal hall (*maloka*) where the researchers explained the instrument,
25 issues of confidentiality and the right to decline to participate or to leave out any question. No
26 eligible woman declined to participate. Interviewers administered a 37-question instrument
27 through a translator during December 2008.
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32 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
33 8 (Community Information and Epidemiological Technologies, New York), public domain
34 software that provides a Windows-like interface with R. Bivariate analysis with each of the 10
35 component activities examined the relationship of each component rite on its own with
36 dysmenorrhoea. We also analyzed complete and incomplete initiation using sequential
37 stratification by age of the woman, community of origin (some had more access to Western
38 ways), education, parity, family planning and menopause. We analysed trend using the
39 Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios
40 (ORa) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation
41 of confidence with the resulting sparse numbers comparisons.
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48 Without any prior basis for weighting importance of different activities in the initiation, we
49 calculated the average effect across the ten components as though each was a separate
50 exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2).
51 Compared with occurrence among women who completed all ten rites of initiation, a
52 sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.
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3 **Control of biases:** Involvement of healers and elders in the design guaranteed cultural fit.
4 The questionnaire documented type of family planning (none, plants, pill, injection, condom,
5 pessary, surgery, partner-managed contraception), and duration of use of each method, as
6 this could affect dysmenorrhoea; hormonal pills can diminish pain and IUDs can increase
7 pain. Use of Western contraceptive methods also coincides with Western acculturation. We
8 stratified by contraceptive use to separate between the effect of the contraceptive and the
9 initiation rites. To avoid an acculturation bias from interviewing only women who did not go to
10 nearby towns for work, we conducted the study in December when most return to their
11 homes. We took age, menopause and education into account by stratification to limit the
12 differential influence of these on responses.
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18 **Ethical aspects:** The CIET ethical review committee at the Universidad Autónoma de
19 Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the
20 proposal. The leadership of each community signed formal agreements for data
21 management and sharing with all participants present, after the researchers had explained to
22 all the nature of the study, how data would be used, confidentiality, and rights to decline
23 participation.[27]
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30 RESULTS

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32 A total of 185 women participated, representing 70.6% of the 262 women over the age of 12
33 years identified in the 2006 census. The 77 women excluded had either migrated from the
34 area or they had not completed two menstruations. Of 158 women who knew their age in
35 years, the average was 32.5 years (mode 19 years, sd 15.6). Respondents reported low
36 levels of education, 28.3% (52/184) with no schooling and only 17.3% (32/185) with
37 secondary education. Few used family planning (11.1% based on 15/135) with an average of
38 4.9 children each (sd 2.7).
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43 The average age of menarche was 13.8 years (sd 1.16). Some 52% (97/185) reported
44 dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation
45 during menarche. Table 1 shows the proportion involved in each of ten activities identified by
46 traditional healers as the initiation rites. Considering each rite separately, only emesis
47 retained a significant association on its own with dysmenorrhea, after taking into account age
48 of the woman, community of origin (some had more access to Western ways), parity, family
49 planning by sequential stratification and adjusting for menopause and education. The Forest
50 plot (Figure 2) shows dysmenorrhoea associated with each component rite compared with
51 women who did no rites. The average effect size was OR 1.66 (95%CI 1.35-2.04).
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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 <i>carayurú</i> 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 <i>we</i>	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 <i>ají</i>	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
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
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

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3 distance from Western culture. Analysing only those who mention an age included a cultural
4 filter, limiting our conclusions to those with some measure of Western acculturation.
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6 The average age of menarche of our sample was higher than typically reported in the
7 literature,[32-37] possibly indicating a relatively low level of secular change.[38, 39] That one
8 half of the women reported dysmenorrhoea (97/185) is lower than reported in international
9 studies.[40-44] Although the local definition (facial expressions) was useful for internal
10 comparisons, it is of limited value in international comparisons.
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14 We tried to take account of other acculturation issues, beyond initiation rites, by stratifying for
15 education, age, parity, community of residence (some had greater access to modern towns)
16 and use of family planning. The lower risk associated with initiation rites might still be due to
17 unmeasured lifestyle issues associated with maintaining initiation rites. Resolving this
18 requires a randomised controlled trial that supports initiation rites in some communities and
19 not in others, measuring decrease in dysmenorrhoea as the outcome.
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24 Since the 1950s, public health programmes have contemplated primary, secondary and
25 tertiary prevention.[45] More recently, *primordial prevention* identified social, economic and
26 cultural patterns that affect risks.[46] Albeit with limitations, our study suggests that primary
27 or primordial prevention of dysmenorrhoea might be possible for indigenous women who are
28 increasingly in contact with Western ways.
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34 CONCLUSIONS

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

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DATA SHARING

Asatrízy, Gestis 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)

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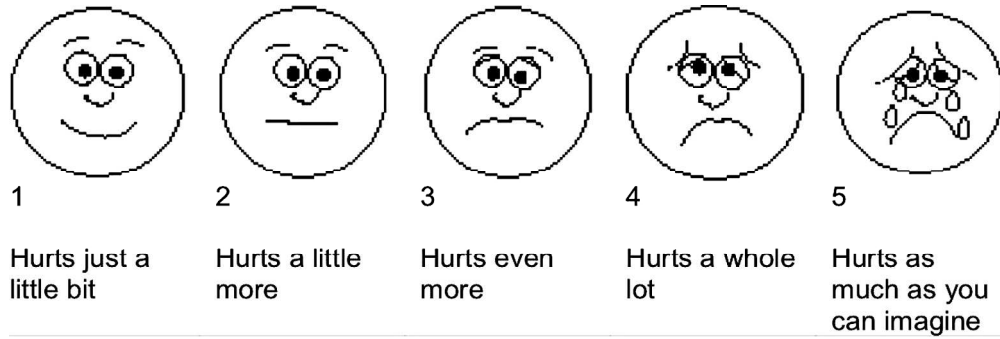
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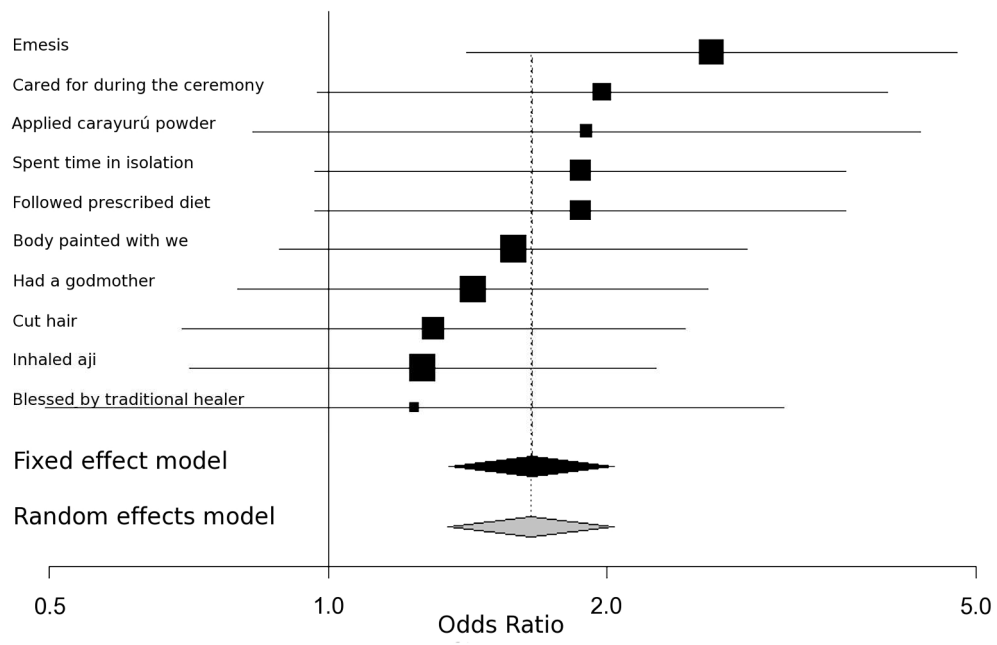


Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)

peer review only

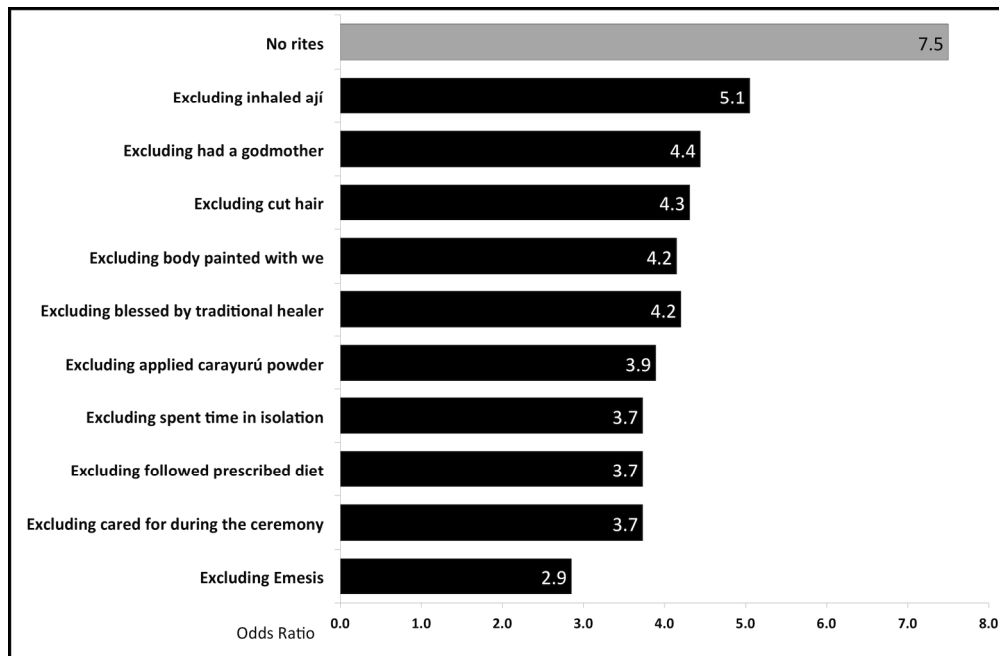
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Forest plot of individual initiation rites and risk of dysmenorrhoea
180x114mm (300 x 300 DPI)

Review only



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)

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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	Abstract 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 Asatriza 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.

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4 Integrantes del GESTS y del CEMI vienen acompañando a las comunidades indígenas de Yapú
5 en su proceso de organización, diseño y ejecución del Plan de Vida, siempre procurando la
6 protección de la diversidad biológica y la defensa de la cultura y los conocimientos
7 tradicionales. En noviembre de 2007 Asatrizy y el CEMI firmaron un convenio de
8 acompañamiento que tiene vigencia hasta junio de 2009, el cual incluye reglas claras sobre el
9 manejo compartido de la información resultante del trabajo conjunto y que tienen vigencia para
10 el presente convenio.
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13 Asatrizy, después de tres años de trabajo comunitario, en mayo de 2007 estableció el Plan de
14 Vida, uno de cuyos capítulos promueve la construcción de un modelo propio de atención de
15 salud, basado en la defensa y promoción de la cultura y los conocimientos tradicionales, pero
16 procurando una prudente y respetuosa articulación con el sistema occidental de salud.
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19 Para esto Asatrizy ha pedido al Dr. Zuluaga su acompañamiento, de manera que se pueda
20 trabajar conjuntamente, conscientes de que las comunidades están siendo afectadas por
21 muchos problemas de salud que no siempre tienen solución con la medicina occidental y que
22 se han perdido muchas tradiciones y prácticas culturales que antes mantenían la salud. Esto
23 incluye el desarrollo de un programa de recuperación y promoción de conocimientos
24 tradicionales y prácticas de autocuidado.
25

26 En la reunión de Junta Directiva de enero 11 de 2008 recibimos información sobre la propuesta
27 de investigación que el CEMI propone realizar en nuestras comunidades, en el marco de los
28 estudios de Maestría en Ciencias Médicas, Vertiente Epidemiología Aplicada, que el Dr.
29 Zuluaga adelanta con la Universidad Autónoma de Guerrero (México) y el CIET, siendo
30 aceptada de manera preliminar, por lo que se envió carta al Dr. Neil Andersson manifestando
31 nuestro acuerdo.
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33 34 **4. Meta**

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36 Realizar un estudio epidemiológico para un programa de intervención en atención primaria de
37 salud para la promoción y prevención de las enfermedades relacionadas con el ciclo
38 reproductivo de las mujeres indígenas en comunidades de Asatrizy, Vaupés.
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40 41 **5. Objetivos**

- 42 a. Fortalecer, recuperar y promover los conocimientos tradicionales y la cultura de las
43 comunidades de Asatrizy.
- 44 b. Adelantar un estudio transversal con la participación de las mujeres pertenecientes a las
45 siete comunidades de Asatrizy.
- 46 c. Estudiar la prevalencia de problemas de salud relacionados con el ciclo vital de la mujer.
- 47 d. Estudiar la frecuencia de prácticas tradicionales relacionadas con el cuidado de los
48 ciclos vitales de la mujer.
- 49 e. Determinar las posibles asociaciones entre enfermedades propias de la mujer y la
50 pérdida de las prácticas tradicionales y culturales de salud.
- 51 f. Divulgar los resultados del estudio a las mujeres participantes, miembros de las
52 comunidades, líderes, agentes sanitarios y educativos y la Junta Directiva de Asatrizy.
- 53 g. A partir de los resultados, realizar un programa de intervención en autocuidado y
54 atención primaria en salud para la promoción y prevención de enfermedades
55 relacionadas con el ciclo vital de la mujer.
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- 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 Asatrizy, de manera que los programas tengan mayor sensibilidad cultural.

10 11 **6. Principios**

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- 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.

27 28 **7. Responsabilidades**

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

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- 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.

53 54 **8. Confidencialidad**

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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

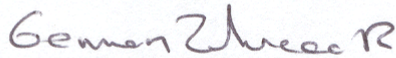
Asatrizy y Gests no divulgarán la información recolectada para ningún otro propósito a menos que acuerden lo contrario las dos partes y lo autoricen por escrito.

10. Modificaciones de éste convenio

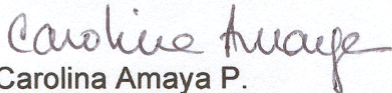
Las modificaciones a este convenio se harán por escrito y firmadas por las partes.

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

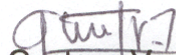


Carolina Amaya P.
Investigadora asociada

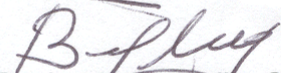
Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY



Efraín R. Mejía A.
Presidente



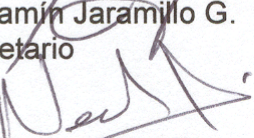
Gustavo Vargas B.
Vicepresidente



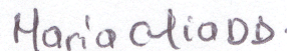
Benjamín Jaramillo G.
Secretario



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:	<i>BMJ Open</i>
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

SCHOLARONE™
Manuscripts

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5 **DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE**
6 **COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY**
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10 Germán Zuluaga, calle 12 no. 3A-21 (Cota – Colombia, SA), gzuluaga@cemi.org.co, 57
11 3132625103 and 57 1 8777040.
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16 Neil Andersson, Centro de Investigación de Enfermedades Tropicales (CIET), Universidad
17 Autónoma de Guerrero, Calle Pino, El Roble, Acapulco México, andersson@ciet.org, 52 744
18 488 0012 and 52 744 487 7230.
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21 Germán Zuluaga, Escuela de Medicina y Ciencias de la Salud, Universidad del Rosario,
22 Bogotá, Colombia.
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26 Neil Andersson, Universidad Autónoma de Guerrero, Centro de Investigación de
27 Enfermedades Tropicales, Acapulco, México.
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32 Keywords:

33 Intercultural

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36 Dysmenorrhoea

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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

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5 (Figure 1).[24] Respondents simply pointed to the face that reflected their experience during
6 menstruation.
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8 **Exposure:** Traditional healers described initiation rites at the onset of menarche, lasting
9 three to five days, during which time the young women completed a number of discrete
10 activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation;
11 the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she
12 received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a
13 vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another
14 vegetable stain (*Bignoniaceae sp.*); she inhaled *ají*, a hot spice mix (*Capsicum spp.*); and
15 water or a plant precipitated emesis. The questionnaire documented exposure to each
16 component rite (yes/no) separately. Without understanding the exact workings of the
17 initiation rites, we followed the WHO guideline to handle the component activities as a “black
18 box”[25]: we do not always have to understand exactly how a traditional therapy works to
19 measure its effect.
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22 **Instrument:** A month of consultation with local healers (*payés*) clarified the main research
23 question and a list of culturally appropriate questions. After approval of the questionnaire for
24 semantic and cultural equivalence with the *payés*, the researchers piloted it with 14 women
25 of the same ethnic group living in Mitu (not part of the study). The authorities in each
26 community invited all women – by cultural definition, the first menstruation identifies the
27 woman as an adult -- to the communal hall (*maloka*) where the researchers explained the
28 instrument, issues of confidentiality and the right to decline to participate or to leave out any
29 question. No eligible woman declined to participate. Interviewers administered a 37-question
30 instrument through a translator during December 2008.
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33 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
34 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software
35 that provides a Windows-like interface with R. Bivariate analysis with each of the 10
36 component activities examined the relationship of each component rite on its own with
37 dysmenorrhoea. We also analysed complete and incomplete initiation using sequential
38 stratification by age of the woman, community of origin (some had more access to Western
39 ways), education, parity, family planning and menopause. We analysed trend using the
40 Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios
41 (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation
42 of confidence with the resulting sparse numbers comparisons.
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5 Without any prior basis for weighting importance of different activities in the initiation, we
6 calculated the average effect across the ten components as though each was a separate
7 exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2).
8 Compared with occurrence among women who completed all ten rites of initiation, a
9 sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.
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13 **Control of biases:** Involvement of healers and elders in the design guaranteed cultural fit.
14 The questionnaire inquired for current family planning, and if so, which is the method used
15 (plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and
16 duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can
17 diminish pain and IUDs can increase pain. Use of Western contraceptive methods also
18 coincides with Western acculturation. We stratified by contraceptive use to separate between
19 the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from
20 interviewing only women who did not go to nearby towns for work, we conducted the study in
21 December when most return to their homes. We took age, menopause and education into
22 account by stratification to limit the differential influence of these on responses.
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29 **Ethical aspects:** The CIET ethical review committee at the Universidad Autónoma de
30 Guerrero and Research Fund at the Universidad del Rosario in Colombia both approved the
31 proposal. The leadership of each community signed formal agreements for data
32 management and sharing with all participants present, after the researchers had explained to
33 all the nature of the study, how data would be used, confidentiality, and rights to decline
34 participation.[27]
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40 RESULTS

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42 A total of 185 women participated, representing 70.6% of the 262 women over the age of 12
43 years identified in the 2006 census. The 77 women excluded had either migrated from the
44 area or they had not completed two menstruations. Of 158 women who knew their age in
45 years, the average was 32.5 years (mode 19 years, sd 15.6). Respondents reported low
46 levels of education, 28.3% (52/184) with no schooling and only 17.4% (32/184 women
47 interviewed) with secondary education. Few used family planning (11.1% based on 15/135
48 women of reproductive age) with an average of 4.9 children each (SD 2.7).
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51 The average age of menarche was 13.8 years (SD 1.16). Some 52% (97/185) reported
52 dysmenorrhoea and 88.6% (164/185) reported undergoing at least some rite of initiation
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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 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 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 <i>carayurú</i> 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 <i>we</i>	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 <i>ají</i>	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
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.

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5 This study faced several common challenges in inter-cultural epidemiology. Even with all
6 eligible women participating, the small numbers problem is well recognised[28-31] and has
7 no easy solution. As anticipated, we found it difficult to untangle issues like use of
8 contraceptives and reporting of age, given the effect of acculturation on these. Despite this
9 interdependence of exposures, we believe we were able to show an independent effect of
10 initiation rites.
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14 Inter-cultural approaches have received little attention in the epidemiological literature, and
15 these need further investment. In this study, the indigenous leaders of the seven
16 communities requested the study and set the research question; they specified the cultural
17 exposures of interest; they participated in the design and testing of instruments; they led the
18 interpretation of results; and they are the primary research users, sharing the results with
19 their communities in support of traditional health practices.
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24 In these important dynamics, the research was culturally safe. Even so, cultural issues
25 probably reduced the effectiveness of the study and reduced the numbers further. The 14.6%
26 (27/185) of women who could not give their age in calendar years is testimony to their
27 distance from Western culture. Analysing only those who mention an age included a cultural
28 filter, limiting our conclusions to those with some measure of Western acculturation.
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32 The average age of menarche of our sample was higher than typically reported in the
33 literature,[32-37] possibly indicating a relatively low level of secular change.[38, 39] That one
34 half of the women reported dysmenorrhoea (97/185) is lower than reported in international
35 studies.[40-44] Although the local definition (facial expressions) was useful for internal
36 comparisons, it is of limited value in international comparisons.
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40 We tried to take account of other acculturation issues, beyond initiation rites, by stratifying for
41 education, age, parity, community of residence (some had greater access to modern towns)
42 and use of family planning. The lower risk associated with initiation rites might still be due to
43 unmeasured lifestyle issues associated with maintaining initiation rites. Resolving this
44 requires a randomised controlled trial that supports initiation rites in some communities and
45 not in others, measuring decrease in dysmenorrhoea as the outcome.
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50 Since the 1950s, public health programmes have contemplated primary, secondary and
51 tertiary prevention.[45] More recently, *primordial prevention* identified social, economic and
52 cultural patterns that affect risks.[46, 47] Albeit with limitations, our study suggests that
53 primary or primordial prevention of dysmenorrhoea might be possible for indigenous women
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5 who are increasingly in contact with Western ways.
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8 9 **CONCLUSIONS**

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

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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)

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8 **INSIGHTS FROM INTER-CULTURAL EPIDEMIOLOGY: A CROSS-SECTIONAL STUDY**
9 **OF DYSMENORRHOEA AND INITIATION RITES AMONG INDIGENOUS WOMEN OF THE**
10 **COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY**
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34 Intercultural

35 Dysmenorrhoea

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37 Initiation rites
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43 Word count: 2133
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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.

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~~ suggests feasibility and usefulness of ~~an~~ intercultural epidemiology.

Strengths and limitations of this study

- ~~There are n~~No epidemiological studies of indigenous initiation and dysmenorrhoea.
- ~~The small numbers problem is recognized, e~~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 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

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8 (Figure 1).[24] Respondents simply pointed to the face that reflected their experience during
9 menstruation.
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11 **Exposure:** Traditional healers described initiation rites at the onset of menarche, lasting
12 three to five days, during which time the young women completed a number of discrete
13 activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation;
14 the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she
15 received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a
16 vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another
17 vegetable stain (*Bignoniaceae sp.*); she inhaled ají, a hot spice mix (*Capsicum spp.*); and
18 water or a plant precipitated emesis. The questionnaire documented exposure to each
19 component rite (yes/no) separately. Without understanding the exact workings of the
20 initiation rites, we followed the WHO guideline to handle the component activities as a “black
21 box”[25]: we do not always have to understand exactly how a traditional therapy works to
22 measure its effect.
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28 **Instrument:** A month of consultation with local healers (*payés*) clarified the main research
29 question and a list of culturally appropriate questions. After approval of the questionnaire for
30 semantic and cultural equivalence with the *payés*, the researchers piloted it with 14 women
31 of the same ethnic group living in Mitu (not part of the study). The authorities in each
32 community invited all women – by cultural definition, the first menstruation identifies the
33 woman as an adult -- to the communal hall (*maloka*) where the researchers explained the
34 instrument, issues of confidentiality and the right to decline to participate or to leave out any
35 question. No eligible woman declined to participate. Interviewers administered a 37-question
36 instrument through a translator during December 2008.
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40 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
41 8 (Community Information and Epidemiological Technologies, New YorkCentro de
42 Investigación de Enfermedades Tropicales, Mexico), public domain software that provides a
43 Windows-like interface with R. Bivariate analysis with each of the 10 component activities
44 examined the relationship of each component rite on its own with dysmenorrhoea. We also
45 analysed complete and incomplete initiation using sequential stratification by age of the
46 woman, community of origin (some had more access to Western ways), education, parity,
47 family planning and menopause. We analysed trend using the Mantel extension of the
48 Mantel-Haenszel test.[26] We report results as adjusted odds ratios (aOR) with 95%
49 confidence intervals. The two-tailed Fisher exact test served for estimation of confidence with
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>>Clarified in the text

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% (32/184 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).

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 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 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			
		SiReceiving rite	Not receivin g rite	aOR*	95% CI
Emesis	38.4%	27/71	70/114	<u>2.59</u> <u>0.39</u> *	<u>1.42</u> <u>0.21</u> <u>4.75</u> <u>0.70</u>
Cared for during the ceremony	76.8%	69/142	28/43	<u>1.97</u> <u>0.51</u>	<u>0.98</u> <u>0.25</u> <u>3.99</u> <u>1.02</u>
Applied <i>carayurú</i> powder	84.3%	78/156	19/29	<u>1.9</u> <u>0.53</u>	<u>0.84</u> <u>0.23</u> <u>4.32</u> <u>1.19</u>
Spent time in isolation	71.9%	64/133	33/52	<u>1.87</u> <u>0.53</u>	<u>0.97</u> <u>0.28</u> <u>3.64</u> <u>1.03</u>
Followed prescribed diet	71.9%	64/133	33/52	<u>1.87</u> <u>0.53</u>	<u>0.97</u> <u>0.28</u> <u>3.64</u> <u>1.03</u>
Body painted with we	50.8%	44/94	53/91	<u>1.58</u> <u>0.63</u>	<u>0.89</u> <u>0.35</u> <u>2.83</u> <u>1.12</u>
Had a godmother	50.8%	45/94	50/88	<u>1.43</u> <u>0.70</u>	<u>0.8</u> <u>0.39</u> <u>2.57</u> <u>1.25</u>
Cut hair	68.6%	64/127	33/58	<u>1.3</u> <u>0.77</u>	<u>0.69</u> <u>0.41</u> <u>2.43</u> <u>1.45</u>
Inhaled <i>aji</i>	49.2%	45/91	52/94	<u>1.27</u> <u>0.79</u>	<u>0.71</u> <u>0.44</u> <u>2.26</u> <u>1.41</u>
Blessed by traditional healer	88.6%	85/164	12/21	<u>0.81</u>	<u>0.49</u> <u>0.32</u> <u>3.4</u> <u>2.04</u>

* 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 dysmenorrhoea 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 dysmenorrhoea 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
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, suggesting that severity is also associated with rites.

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8 specific effects of each component rite supports the idea that synergy between all
9 components completes the protective effect.
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11 This study faced several common challenges in inter-cultural epidemiology. Even with all
12 eligible women participating, the small numbers problem is well recognised[28-31] and has
13 no easy solution. As anticipated, we found it difficult to untangle issues like use of
14 contraceptives and reporting of age, given the effect of acculturation on these. Despite this
15 interdependence of exposures, we believe we were able to show an independent effect of
16 initiation rites.
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19 Inter-cultural approaches have received little attention in the epidemiological literature, and
20 these need further investment. In this study, the indigenous leaders of the seven
21 communities requested the study and set the research question; they specified the cultural
22 exposures of interest; they participated in the design and testing of instruments; they led the
23 interpretation of results; and they are the primary research users, sharing the results with
24 their communities in support of traditional health practices.
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28 In these important dynamics, the research was culturally safe. Even so, cultural issues
29 probably reduced the effectiveness of the study and reduced the numbers further. The 14.6%
30 (27/185) of women who could not give their age in calendar years is testimony to their
31 distance from Western culture. Analysing only those who mention an age included a cultural
32 filter, limiting our conclusions to those with some measure of Western acculturation.
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35 The average age of menarche of our sample was higher than typically reported in the
36 literature,[32-37] possibly indicating a relatively low level of secular change.[38, 39] That one
37 half of the women reported dysmenorrhoea (97/185) is lower than reported in international
38 studies.[40-44] Although the local definition (facial expressions) was useful for internal
39 comparisons, it is of limited value in international comparisons.
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42 We tried to take account of other acculturation issues, beyond initiation rites, by stratifying for
43 education, age, parity, community of residence (some had greater access to modern towns)
44 and use of family planning. The lower risk associated with initiation rites might still be due to
45 unmeasured lifestyle issues associated with maintaining initiation rites. Resolving this
46 requires a randomised controlled trial that supports initiation rites in some communities and
47 not in others, measuring decrease in dysmenorrhoea as the outcome.
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50 Since the 1950s, public health programmes have contemplated primary, secondary and
51 tertiary prevention.[45] More recently, *primordial prevention* identified social, economic and
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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)

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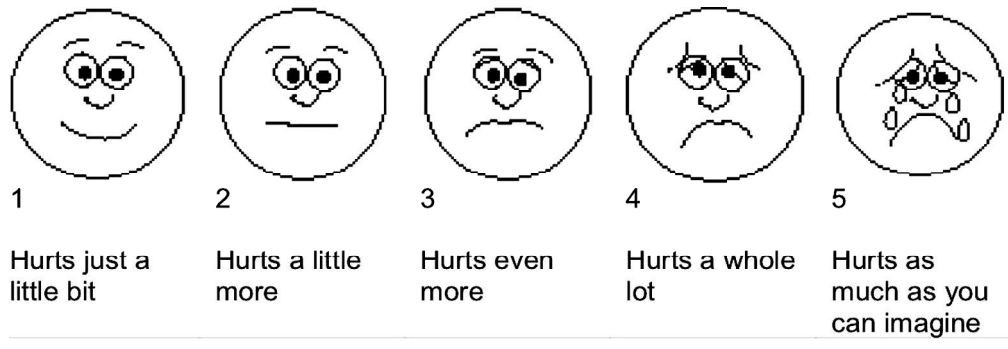
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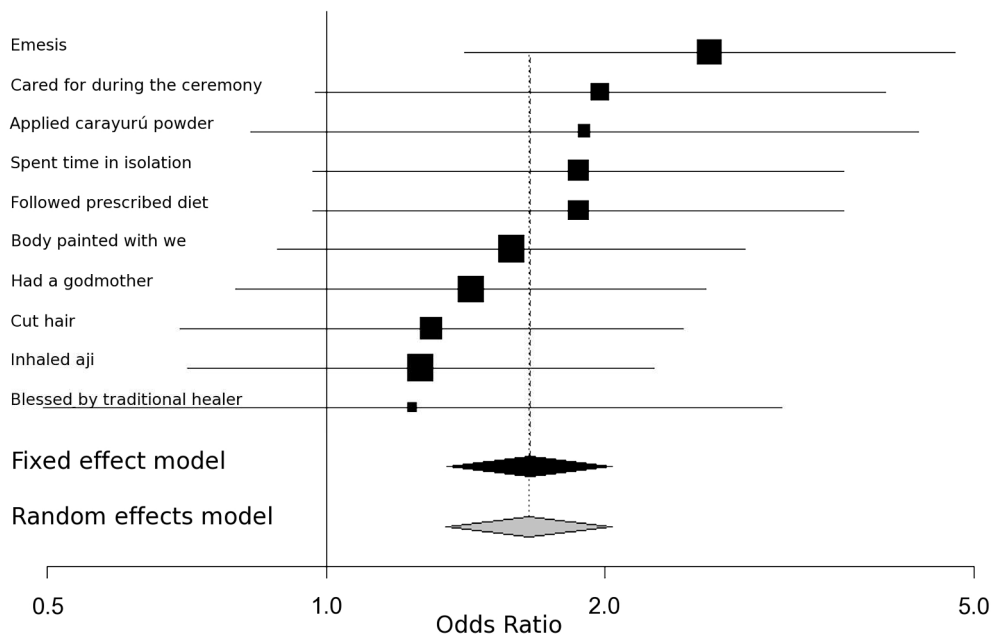
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Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)

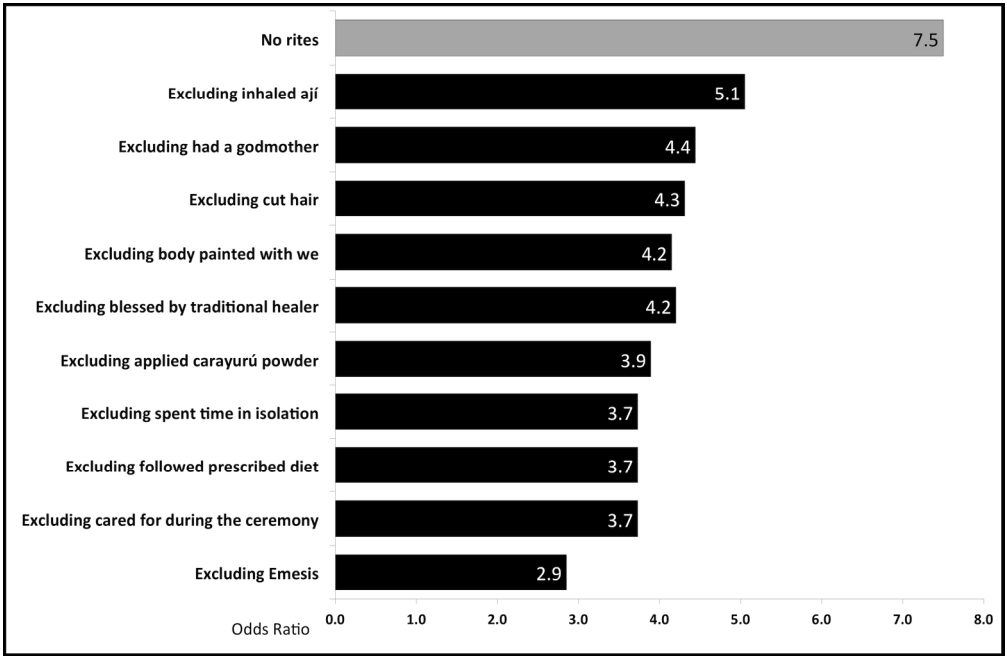
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Forest plot of individual initiation rites and risk of dysmenorrhoea
180x114mm (300 x 300 DPI)

Review only

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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	Abstract 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 Asatriza 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.

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4 Integrantes del GESTS y del CEMI vienen acompañando a las comunidades indígenas de Yapú
5 en su proceso de organización, diseño y ejecución del Plan de Vida, siempre procurando la
6 protección de la diversidad biológica y la defensa de la cultura y los conocimientos
7 tradicionales. En noviembre de 2007 Asatrizy y el CEMI firmaron un convenio de
8 acompañamiento que tiene vigencia hasta junio de 2009, el cual incluye reglas claras sobre el
9 manejo compartido de la información resultante del trabajo conjunto y que tienen vigencia para
10 el presente convenio.
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12
13 Asatrizy, después de tres años de trabajo comunitario, en mayo de 2007 estableció el Plan de
14 Vida, uno de cuyos capítulos promueve la construcción de un modelo propio de atención de
15 salud, basado en la defensa y promoción de la cultura y los conocimientos tradicionales, pero
16 procurando una prudente y respetuosa articulación con el sistema occidental de salud.
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19 Para esto Asatrizy ha pedido al Dr. Zuluaga su acompañamiento, de manera que se pueda
20 trabajar conjuntamente, conscientes de que las comunidades están siendo afectadas por
21 muchos problemas de salud que no siempre tienen solución con la medicina occidental y que
22 se han perdido muchas tradiciones y prácticas culturales que antes mantenían la salud. Esto
23 incluye el desarrollo de un programa de recuperación y promoción de conocimientos
24 tradicionales y prácticas de autocuidado.
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26 En la reunión de Junta Directiva de enero 11 de 2008 recibimos información sobre la propuesta
27 de investigación que el CEMI propone realizar en nuestras comunidades, en el marco de los
28 estudios de Maestría en Ciencias Médicas, Vertiente Epidemiología Aplicada, que el Dr.
29 Zuluaga adelanta con la Universidad Autónoma de Guerrero (México) y el CIET, siendo
30 aceptada de manera preliminar, por lo que se envió carta al Dr. Neil Andersson manifestando
31 nuestro acuerdo.
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33 34 **4. Meta**

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36 Realizar un estudio epidemiológico para un programa de intervención en atención primaria de
37 salud para la promoción y prevención de las enfermedades relacionadas con el ciclo
38 reproductivo de las mujeres indígenas en comunidades de Asatrizy, Vaupés.
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40 41 **5. Objetivos**

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

1 Directiva de Asatrizy, de la Unión de Mayores Kumuá Yoamará, de las mujeres encuestadas,
2 previo a la recolección de la información personal.
3

4 9. Posterior divulgación


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6 Asatrizy y Gests no divulgarán la información recolectada para ningún otro propósito a menos
7 que acuerden lo contrario las dos partes y lo autoricen por escrito.
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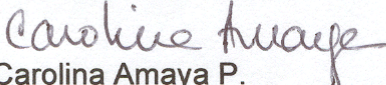
9 10. Modificaciones de éste convenio

10 Las modificaciones a este convenio se harán por escrito y firmadas por las partes.
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13 En constancia las partes suscriben el presente convenio, en dos ejemplares del mismo tenor y
14 valor, a los 18 días del mes de mayo de 2008.
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17 Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la
18 Universidad del Rosario
19 Centro de Estudios Médicos Interculturales (CEMI)
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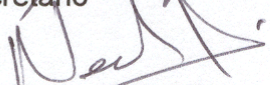
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25 Investigador Principal
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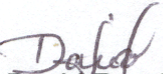
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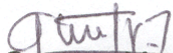
33 Asociación de Autoridades Tradicionales Indígenas de la Zona de Yapú, ASATRIZY
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36 Efraín R. Mejía A.
37 Presidente
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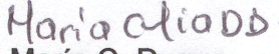
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40 Benjamín Jaramillo G.
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46 Coord. Plan de vida
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50 David Ramírez
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Gustavo Vargas B.
Vicepresidente


Ramiro Ardila
Fiscal


María C. Duque
Coord. Mujeres



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

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Keywords:	Intercultural , Dysmenorrhoea, Medicine tradicional, Initiation rites

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

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5 which is often perceived as unreceptive to alternative epistemologies.[6] Yet intercultural
6 epidemiology can be useful to identify potential health benefits of traditional health practices,
7 many of which are being lost as globalization erodes indigenous cultures.
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10 Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western
11 medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an
12 interesting case in point as the World Health Organization calls to explore possible
13 contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the
14 links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15]
15 Better documented risk factors are diet, exercise, psychological or emotional episodes, and
16 use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous
17 initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated
18 this possible association.
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24 METHODS

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26 **Study population:** All women over the age of 13 years living in the seven communities in
27 Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years
28 (mean 32,5; SD 15,6).
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31 **Outcome:** Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness,
32 headache, bodily pains, and problems in the days prior to menstruation. They also asked
33 about the interval between menstruation and duration of menstruation. The analysis rested
34 on pelvic pain to define dysmenorrhoea.[21-23] The interviewer asked directly about pain and
35 its severity, without asking about duration of pain, proportion of menstruations affected or
36 activities that could not be completed due to the pain. Because pain perception is subjective,
37 we used a well-established graphic approach showing faces with different grades of
38 discomfort (Figure 1).[24] Respondents simply pointed to the face that reflected their
39 experience during menstruation.
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45 **Exposure:** Traditional healers described initiation rites at the onset of menarche, lasting
46 three to five days, during which time the young women completed a number of discrete
47 activities: each initiate had a god-mother (*madrina*); each had a mentor during the initiation;
48 the initiate spent 3-5 days away from others; she received a diet limited to specific foods; she
49 received a blessing or prayer from the traditional healer; she applied powdered *carayurú*, a
50 vegetable stain (*Arrhabidea chica*); her hair was cut; her body was painted with *we*, another
51 vegetable stain (*Bignoniaceae sp.*); she inhaled *ají*, a hot spice mix (*Capsicum spp.*); and
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5 water or a plant precipitated emesis. The questionnaire documented exposure to each
6 component rite (yes/no) separately. Without understanding the exact workings of the initiation
7 rites, we followed the WHO guideline to handle the component activities as a “black box”[25]:
8 we do not always have to understand exactly how a traditional therapy works to measure its
9 effect. We thus documented each of the individual rites.
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13 **Instrument:** A month of consultation with local healers (*payés*) clarified the main research
14 question and a list of culturally appropriate questions. After approval of the questionnaire for
15 semantic and cultural equivalence with the *payés*, the researchers piloted the questionnaire
16 and pain images with 14 women of the same ethnic group living in Mitu (not part of the
17 study), their pain report was assessed using the graphic approach showing faces with
18 different grades of discomfort. The authorities in each community invited all women – by
19 cultural definition, the first menstruation identifies the woman as an adult -- to the communal
20 hall (*maloka*) where the researchers explained the instrument, issues of confidentiality and
21 the right to decline to participate or to leave out any question. No eligible woman declined to
22 participate. Interviewers administered a 37-question instrument through a translator during
23 December 2008.
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31 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
32 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software
33 that provides a Windows-like interface with R. Bivariate analysis with each of the 10
34 component activities examined the relationship of each component rite on its own with
35 dysmenorrhoea. We also analysed complete and incomplete initiation using sequential
36 stratification by age of the woman, community of origin (some had more access to Western
37 ways), education, parity, family planning and menopause. We analysed trend using the
38 Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios
39 (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation
40 of confidence with the resulting sparse numbers comparisons.
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46 Without any prior basis for weighting importance of different activities in the initiation, we
47 calculated the average effect across the ten components as though each was a separate
48 exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2).
49 Compared with occurrence among women who completed all ten rites of initiation, a
50 sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.
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54 **Control of biases:** Involvement of healers and elders in the design guaranteed cultural fit.
55 The questionnaire inquired for current family planning, and if so, which is the method used
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(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 <i>carayurú</i> 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 <i>we</i>	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 <i>aji</i>	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.

	n	Frequencies					Risk of dysmenorrhoea		
		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 <i>carayurú</i> 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 <i>we</i>	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 <i>aji</i>	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

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5 of the other rites for those who did not abandon the initiation practices. The apparent lack of
6 specific effects of each component rite supports the idea that synergy between all
7 components completes the protective effect.
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10 The average age of menarche of our sample was higher than typically reported in the
11 literature,[28-33] possibly indicating a relatively low level of secular change.[34,35] That one
12 half of the women reported dysmenorrhoea (97/185) is lower than reported in international
13 studies.[36-40] Although the local definition (facial expressions) was useful for internal
14 comparisons, it is of limited value in international comparisons.
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18 This study faced several common challenges in inter-cultural epidemiology. Even with all
19 eligible women participating, the small numbers problem is well recognised and has no easy
20 solution.[41,42] As anticipated, we found it difficult to untangle issues like use of
21 contraceptives and reporting of age, given the effect of acculturation on these. Despite this
22 interdependence of exposures, we believe we were able to show an independent effect of
23 initiation rites.
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28 Cultural issues probably reduced the effectiveness of the study and reduced the numbers
29 further. The 14.6% (27/185) of women who could not give their age in calendar years is
30 testimony to their distance from Western culture. Analysing only those who mention an age
31 included a cultural filter, limiting our conclusions to those with some measure of Western
32 acculturation. Recall bias might have affected the results as some women had to remember
33 rites that took place decades earlier; a social desirability bias (not wanting to be culturally
34 different, wanting to avoid disapproval) might also have influenced the results. We have no
35 additional information to clarify the directions of these biases.
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41 Within these constraints and the stringent limits imposed by our population size, we tried to
42 take account of other acculturation issues, beyond initiation rites, by stratifying for education,
43 age, parity, community of residence (some had greater access to modern towns) and use of
44 family planning. The lower risk associated with initiation rites might still be due to
45 unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue
46 may require a randomised controlled trial where the differential support for the fulfilment of
47 the rite among communities be contrasted with the occurrence of dysmenorrhoea.
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52 Since the 1950s, public health programmes have contemplated primary, secondary and
53 tertiary prevention. More recently, *primordial prevention* identified social, economic and
54 cultural patterns that affect risks.[43] Within its limitations, our study is compatible with the
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5 idea that primary or primordial prevention of dysmenorrhoea might be possible for indigenous
6 women who are increasingly in contact with Western ways.
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8 **CONCLUSIONS**

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10 Without adding insight into exact mechanisms, this cross-sectional study shows an
11 association between abandoning initiation rites and dysmenorrhoea. No one of the rites on
12 its own explains this association.
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15 Inter-cultural approaches have received little attention in the epidemiological literature, and
16 these need further investment. In this study, the indigenous leaders of the seven
17 communities requested the study and set the research question; they specified the cultural
18 exposures of interest; they participated in the design and testing of instruments; they led
19 interpretation of results; and they are the primary research users, sharing the results with
20 their communities in support of traditional health practices.
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23 Without underestimating the remaining intercultural challenges, the difficulties of research in
24 small populations and the limits of observational studies, we feel this study achieves a first
25 step in culturally safe descriptive epidemiology of traditional medicine: a longer term dialogue
26 led to the research question and design; the indigenous leaders defined the exposure of
27 interest; the ethical review process fitted with indigenous ethical concepts; it generated
28 evidence suggesting an effective traditional practice, without understanding how this works.
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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.

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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)

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8 **INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA**
9 **~~DYSMENORRHOEA AND INITIATION RITES~~ AMONG INDIGENOUS WOMEN OF THE**
10 **COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY**
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33 Keywords:

34 Intercultural

35 Dysmenorrhoea

36 Medicine, Traditional

37 Initiation rites
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43 **Word count: 2373**
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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.~~

Comment [GZR dic122]: ECh: "First sentence would be more accurate as..."
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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).~~

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

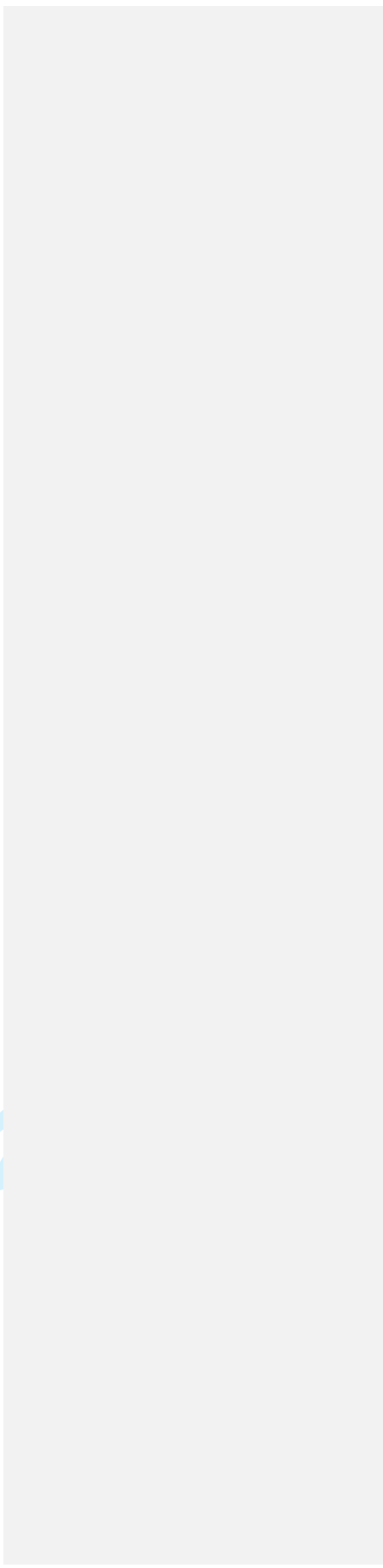
Results: Only 17.3% (32/185) completed all initiation rites and 52.4% (97/185) reported dysmenorrhoea. Women not completing the rites were more likely to report dysmenorrhoea than those who did so (p=0.01 Fisher exact), taking into account age, education, community, parity, and use of family planning.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

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For peer review only



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.

Comment [GZR dic125]: ECh: "the study design cannot show more than an association with self reported dysmenorrhea"
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Comment [GZR dic126]: ECh: "Summary box: avoid any causal inferences."
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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 Tatuayo, 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

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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.

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

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.

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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

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

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20 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
21 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software
22 that provides a Windows-like interface with R. Bivariate analysis with each of the 10
23 component activities examined the relationship of each component rite on its own with
24 dysmenorrhoea. We also analysed complete and incomplete initiation using sequential
25 stratification by age of the woman, community of origin (some had more access to Western
26 ways), education, parity, family planning and menopause. We analysed trend using the
27 Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios
28 (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation
29 of confidence with the resulting sparse numbers comparisons.

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

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

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

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

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 0.70
Cared for during the ceremony	76.8%	69/142	28/43	0.51	0.25 1.02
Applied <i>carayurú</i> 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 <i>aji</i>	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

	n	Frequencies				Risk of dysmenorrhoea			
		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 <i>carayurú</i> 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 <i>we</i>	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 <i>aji</i>	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

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

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8 comparisons, it is of limited value in international comparisons.

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

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

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

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

44 45 46 **CONCLUSIONS**

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

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

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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.

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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.

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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)

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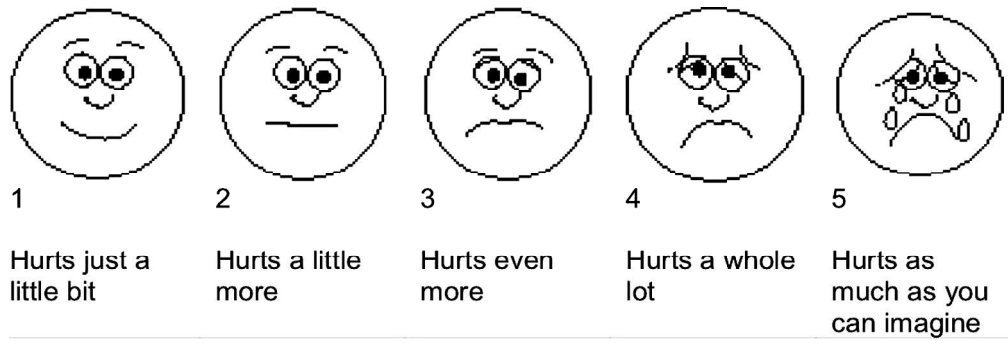
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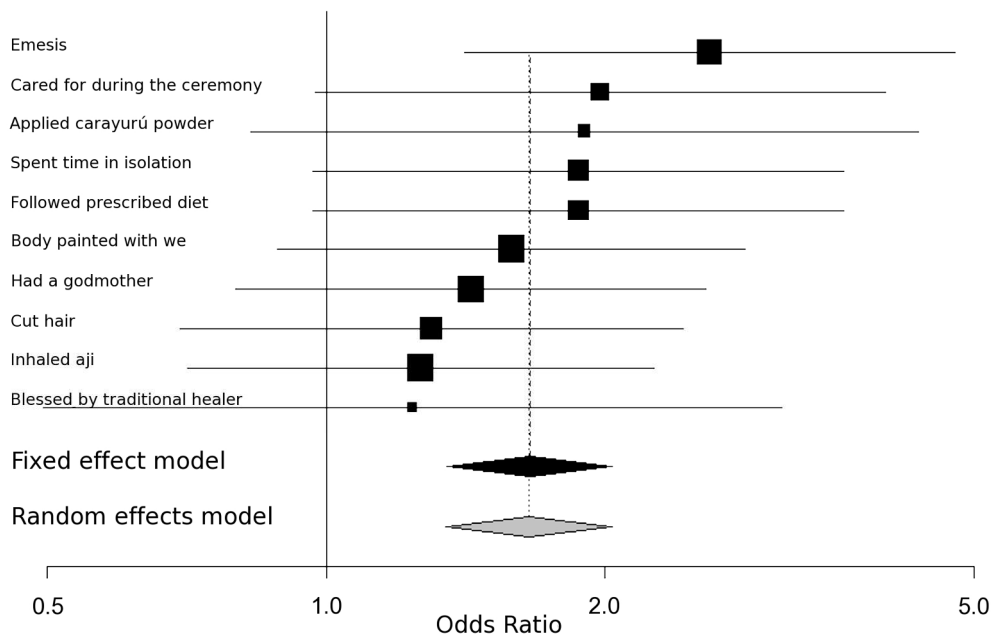
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Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)

peer review only

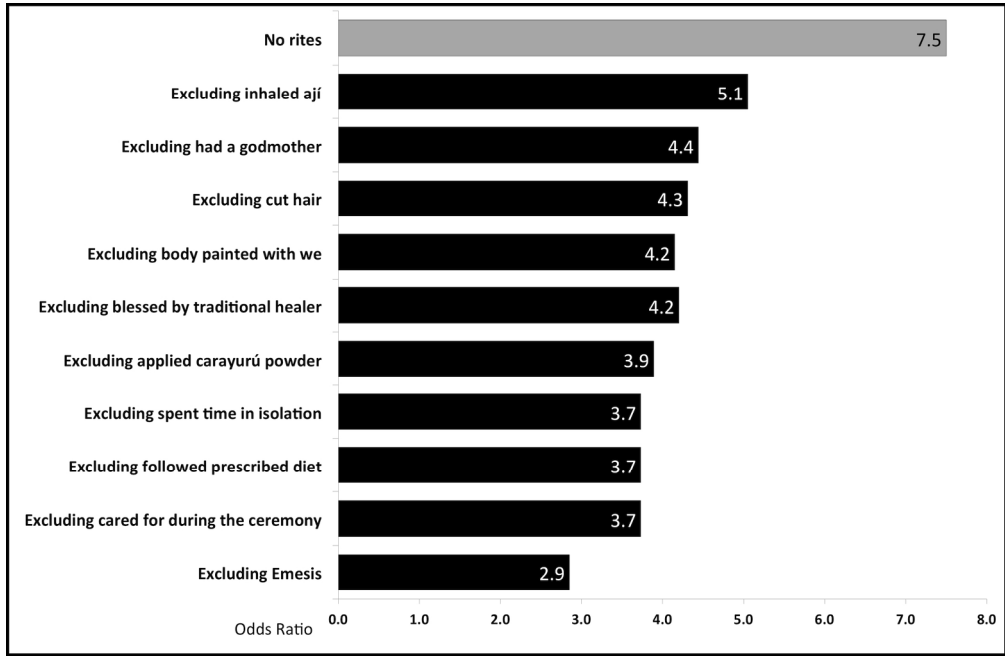


Forest plot of individual initiation rites and risk of dysmenorrhoea
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Review only

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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	Abstract 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.

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4 Integrantes del GESTS y del CEMI vienen acompañando a las comunidades indígenas de Yapú
5 en su proceso de organización, diseño y ejecución del Plan de Vida, siempre procurando la
6 protección de la diversidad biológica y la defensa de la cultura y los conocimientos
7 tradicionales. En noviembre de 2007 Asatrizy y el CEMI firmaron un convenio de
8 acompañamiento que tiene vigencia hasta junio de 2009, el cual incluye reglas claras sobre el
9 manejo compartido de la información resultante del trabajo conjunto y que tienen vigencia para
10 el presente convenio.
11

12
13 Asatrizy, después de tres años de trabajo comunitario, en mayo de 2007 estableció el Plan de
14 Vida, uno de cuyos capítulos promueve la construcción de un modelo propio de atención de
15 salud, basado en la defensa y promoción de la cultura y los conocimientos tradicionales, pero
16 procurando una prudente y respetuosa articulación con el sistema occidental de salud.
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18
19 Para esto Asatrizy ha pedido al Dr. Zuluaga su acompañamiento, de manera que se pueda
20 trabajar conjuntamente, conscientes de que las comunidades están siendo afectadas por
21 muchos problemas de salud que no siempre tienen solución con la medicina occidental y que
22 se han perdido muchas tradiciones y prácticas culturales que antes mantenían la salud. Esto
23 incluye el desarrollo de un programa de recuperación y promoción de conocimientos
24 tradicionales y prácticas de autocuidado.
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26 En la reunión de Junta Directiva de enero 11 de 2008 recibimos información sobre la propuesta
27 de investigación que el CEMI propone realizar en nuestras comunidades, en el marco de los
28 estudios de Maestría en Ciencias Médicas, Vertiente Epidemiología Aplicada, que el Dr.
29 Zuluaga adelanta con la Universidad Autónoma de Guerrero (México) y el CIET, siendo
30 aceptada de manera preliminar, por lo que se envió carta al Dr. Neil Andersson manifestando
31 nuestro acuerdo.
32

33 34 **4. Meta**

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36 Realizar un estudio epidemiológico para un programa de intervención en atención primaria de
37 salud para la promoción y prevención de las enfermedades relacionadas con el ciclo
38 reproductivo de las mujeres indígenas en comunidades de Asatrizy, Vaupés.
39

40 41 **5. Objetivos**

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

1 Directiva de Asatrizy, de la Unión de Mayores Kumuá Yoamará, de las mujeres encuestadas,
2 previo a la recolección de la información personal.
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4 9. Posterior divulgación


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6 Asatrizy y Gests no divulgarán la información recolectada para ningún otro propósito a menos
7 que acuerden lo contrario las dos partes y lo autoricen por escrito.
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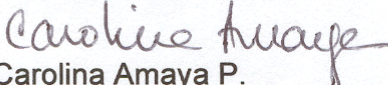
9 10. Modificaciones de éste convenio

10 Las modificaciones a este convenio se harán por escrito y firmadas por las partes.
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12
13 En constancia las partes suscriben el presente convenio, en dos ejemplares del mismo tenor y
14 valor, a los 18 días del mes de mayo de 2008.
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17 Grupo de Estudios en Sistemas Tradicionales de Salud de la facultad de medicina de la
18 Universidad del Rosario
19 Centro de Estudios Médicos Interculturales (CEMI)
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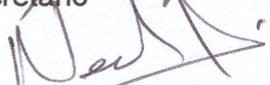
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24 Director General
25 Investigador Principal
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29 Carolina Amaya P.
30 Investigadora asociada
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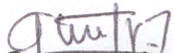
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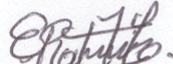
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37 Presidente
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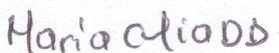
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40 Benjamín Jaramillo G.
41 Secretario
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45 Nelson C. Muñoz L.
46 Coord. Plan de vida
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50 David Ramírez
51 Suplente fiscal
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Gustavo Vargas B.
Vicepresidente


Ramiro Ardila
Fiscal


María C. Duque
Coord. Mujeres



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

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Primary Subject Heading:	Epidemiology
Secondary Subject Heading:	Public health, Sexual health, Obstetrics and gynaecology
Keywords:	Intercultural , Dysmenorrhoea, Tradicional medicine, Initiation rites

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5 **INITIATION RITES AT MENARCHE AND SELF REPORTED DYSMENORRHEA AMONG**
6 **INDIGENOUS WOMEN OF THE COLOMBIAN AMAZON: A CROSS-SECTIONAL STUDY**
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27 Enfermedades Tropicales, Acapulco, México.
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32 Keywords:

33 Intercultural

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35 Dysmenorrhoea

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37 Traditional medicine

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39 Initiation rites
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44 Word count: 2440
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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 Tatujo, 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,

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5 making it difficult for schoolgirls to participate in traditional rites.[4] This loss of culture is a
6 concern for Amazon indigenous communities, where every year people have less to do with
7 traditional medical practices.[5] We were unable to confirm a decline or otherwise of initiation
8 rituals from published sources in Colombia. Our research began with the express concern of
9 community elders who, in the course of a decade long partnership with the traditional health
10 systems group at Universidad del Rosario in Colombia, asked if loss of their cultural
11 practices could affect women's reproductive health, particularly dysmenorrhoea.
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16 Cultural adaptation is less common in epidemiology than it is in some qualitative approaches,
17 [6] yet intercultural epidemiology can be useful to identify potential health benefits of
18 traditional health practices, many of which are being lost as globalization erodes indigenous
19 cultures.
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22 Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western
23 medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an
24 interesting case in point as the World Health Organization calls to explore possible
25 contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the
26 links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15]
27 Better documented risk factors are diet, exercise, psychological or emotional episodes, and
28 use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous
29 initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated
30 this possible association.
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37 METHODS

38 **Study population:** All women over the age of 13 years living in the seven communities in
39 Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years
40 (mean 32,5; SD 15,6).
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44 **Outcome:** Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness,
45 headache, bodily pains, and problems in the days prior to menstruation. They did not specify
46 a period of recall or a frequency of problems. They also asked about the interval between
47 menstruation and duration of menstruation. The analysis rested on pelvic pain to define
48 dysmenorrhoea.[21-23] The interviewer asked directly about pain and its severity, without
49 asking about duration of pain, proportion of menstruations affected or activities that could not
50 be completed due to the pain. Because pain perception is subjective, we used a well-
51 established graphic approach showing faces with different grades of discomfort (Figure
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5 1).[24] Respondents simply pointed to the face that reflected their experience during
6 menstruation.
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8 **Exposure:** Initiation rites at the onset of menarche, lasting three to five days, during which
9 time the young women reported one, several or all component rites: emesis, care during the
10 ceremony, *carayurú* powder, isolation, prescribed diet, body paint with *we*, godmother, cut
11 hair, inhaled *aji*, and blessed by traditional healer. The questionnaire documented exposure
12 to each component rite (yes/no) separately. Without understanding the exact workings of the
13 initiation rites, we followed the WHO guideline to handle component activities as a “black
14 box”[25]: we do not always have to understand exactly how a traditional therapy works to
15 measure its effect. We thus documented each of the individual rites.
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21 **Instrument:** A month of consultation with local healers (*payés*) clarified the main research
22 question and a list of culturally appropriate questions. After approval of the questionnaire for
23 semantic and cultural equivalence with the *payés*, the researchers piloted the questionnaire
24 and pain images with 14 women of the same ethnic group living in Mitu (not part of the
25 study), they reported pain using the graphic approach showing faces with different grades of
26 discomfort. The authorities in each community invited all women – by cultural definition, the
27 first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where
28 the researchers explained the instrument, issues of confidentiality and the right to decline to
29 participate or to leave out any question. No eligible woman declined to participate.
30 Interviewers administered a 37-question instrument through a translator during December
31 2008.
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38 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
39 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software
40 that provides a Windows-like interface with R. Bivariate analysis with each of the 10
41 component activities examined the relationship of each component rite on its own with
42 dysmenorrhoea. We also analysed complete and incomplete initiation using sequential
43 stratification by age of the woman, community of origin (some had more access to Western
44 ways), education, parity, family planning and menopause. We analysed trend using the
45 Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios
46 (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation
47 of confidence with the resulting sparse numbers comparisons.
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54 Without any prior basis for weighting importance of different activities in the initiation, we
55 calculated the average effect across the ten components as though each was a separate
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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 <i>carayurú</i> 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 <i>we</i>	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 <i>aji</i>	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.

	n	Frequencies					Risk of dysmenorrhoea		
		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 <i>carayurú</i> 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 <i>we</i>	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 <i>aji</i>	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

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5 protective effect.

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

12
13 This study faced several common challenges in inter-cultural epidemiology. Even with all
14 eligible women participating, the small numbers problem is well recognised and has no easy
15 solution.[41,42] As anticipated, we found it difficult to untangle issues like use of
16 contraceptives and reporting of age, given the effect of acculturation on these. Despite this
17 interdependence of exposures, we believe we were able to show an independent effect of
18 initiation rites.

19
20 Cultural issues probably reduced the effectiveness of the study and reduced the numbers
21 further. The 14.6% (27/185) of women who could not give their age in calendar years is
22 testimony to their distance from Western culture. Analysing only those who mention an age
23 included a cultural filter, limiting our conclusions to those with some measure of Western
24 acculturation. Recall bias might have affected the results as some women had to remember
25 rites that took place decades earlier; a social desirability bias (not wanting to be culturally
26 different, wanting to avoid disapproval) might also have influenced the results. We have no
27 additional information to clarify the directions of these biases.

28
29 Within these constraints and the stringent limits imposed by our population size, we tried to
30 take account of other acculturation issues, beyond initiation rites, by stratifying for education,
31 age, parity, community of residence (some had greater access to modern towns) and use of
32 family planning. The lower risk associated with initiation rites might still be due to
33 unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue
34 may require a randomised controlled trial where the differential support for the fulfilment of
35 the rite among communities be contrasted with the occurrence of dysmenorrhoea. One
36 problem with prospective studies in this setting is that it would take many years to
37 accumulate the numbers necessary to make the case.

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39 Since the 1950s, public health programmes have contemplated primary, secondary and
40 tertiary prevention. More recently, *primordial prevention* identified social, economic and
41 cultural patterns that affect risks.[43] Within its limitations, our study is compatible with the
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5 idea that primary or primordial prevention of dysmenorrhoea might be possible for indigenous
6 women who are increasingly in contact with Western ways.
7

8 **CONCLUSIONS**

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10 Without adding insight into exact mechanisms, this cross-sectional study shows an
11 association between abandoning initiation rites and dysmenorrhoea. No one of the rites on
12 its own explains this association.
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15 Inter-cultural approaches have received little attention in the epidemiological literature, and
16 these need further investment. In this study, the indigenous leaders of the seven
17 communities requested the study and set the research question; they specified the cultural
18 exposures of interest; they participated in the design and testing of instruments; they led
19 interpretation of results; and they are the primary research users, sharing the results with
20 their communities in support of traditional health practices.
21
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23 Without underestimating the remaining intercultural challenges, the difficulties of research in
24 small populations and the limits of observational studies, we feel this study achieves a first
25 step in culturally safe descriptive epidemiology of traditional medicine: a longer term dialogue
26 led to the research question and design; the indigenous leaders defined the exposure of
27 interest; the ethical review process fitted with indigenous ethical concepts; it showed an
28 association between self reported participation in initiation rites and dysmenorrhea.
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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.

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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)

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

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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,

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8 making it difficult for schoolgirls to participate in traditional rites.[4] This loss of culture is a
9 concern for Amazon indigenous communities, where every year people have less to do with
10 traditional medical practices.[5] We were unable to confirm a decline or otherwise of initiation
11 rituals from published sources in Colombia. Our research began with the express concern of
12 community elders who, in the course of a decade long partnership with the traditional health
13 systems group at Universidad del Rosario in Colombia, asked if loss of their cultural
14 practices could affect women's reproductive health, particularly dysmenorrhoea.
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18 Cultural adaptation is less common in epidemiology than it is in some qualitative approaches,
19 [6] yet intercultural epidemiology can be useful to identify potential health benefits of
20 traditional health practices, many of which are being lost as globalization erodes indigenous
21 cultures.
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24 Problems related to women's reproductive cycle are increasing worldwide.[7-9] Western
25 medicine has few satisfactory solutions to offer women with dysmenorrhoea, offering an
26 interesting case in point as the World Health Organization calls to explore possible
27 contributions of traditional medicine.[10,11] A sparse epidemiological literature addresses the
28 links with dysmenorrhoea and cultural influences,[12, 13] ethnicity and religiosity.[14, 15]
29 Better documented risk factors are diet, exercise, psychological or emotional episodes, and
30 use of alcohol and tobacco.[16-20] We found no epidemiological studies of indigenous
31 initiation rites and dysmenorrhoea. A retrospective survey using a questionnaire evaluated
32 this possible association.
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36 METHODS

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38 **Study population:** All women over the age of 13 years living in the seven communities in
39 Vaupés, who had experienced at least two menstruations (n=185), aged 13 to 88 years
40 (mean 32,5; SD 15,6).
41

42 **Outcome:** Interviewers asked if, during menstruation, women suffered pelvic pain, dizziness,
43 headache, bodily pains, and problems in the days prior to menstruation. They did not specify
44 a period of recall or a frequency of problems. They also asked about the interval between
45 menstruation and duration of menstruation. The analysis rested on pelvic pain to define
46 dysmenorrhoea.[21-23] The interviewer asked directly about pain and its severity, without
47 asking about duration of pain, proportion of menstruations affected or activities that could not
48 be completed due to the pain. Because pain perception is subjective, we used a well-
49 established graphic approach showing faces with different grades of discomfort (Figure
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8 1).[24] Respondents simply pointed to the face that reflected their experience during
9 menstruation.
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11 **Exposure:** Initiation rites at the onset of menarche, lasting three to five days, during which
12 time the young women reported one, several or all component rites: emesis, care during the
13 ceremony, *carayurú* powder, isolation, prescribed diet, body paint with *we*, godmother, cut
14 hair, inhaled *ají*, and blessed by traditional healer. The questionnaire documented exposure
15 to each component rite (yes/no) separately. Without understanding the exact workings of the
16 initiation rites, we followed the WHO guideline to handle component activities as a “black
17 box”[25]: we do not always have to understand exactly how a traditional therapy works to
18 measure its effect. We thus documented each of the individual rites.
19

20 **Instrument:** A month of consultation with local healers (*payés*) clarified the main research
21 question and a list of culturally appropriate questions. After approval of the questionnaire for
22 semantic and cultural equivalence with the *payés*, the researchers piloted the questionnaire
23 and pain images with 14 women of the same ethnic group living in Mitu (not part of the
24 study), they reported pain using the graphic approach showing faces with different grades of
25 discomfort. The authorities in each community invited all women – by cultural definition, the
26 first menstruation identifies the woman as an adult -- to the communal hall (*maloka*) where
27 the researchers explained the instrument, issues of confidentiality and the right to decline to
28 participate or to leave out any question. No eligible woman declined to participate.
29 Interviewers administered a 37-question instrument through a translator during December
30 2008.
31

32 **Analysis:** Epi-data 3.1 served for manual data capture analysis relied on CIETmap 2.0 beta
33 8 (Centro de Investigación de Enfermedades Tropicales, Mexico), public domain software
34 that provides a Windows-like interface with R. Bivariate analysis with each of the 10
35 component activities examined the relationship of each component rite on its own with
36 dysmenorrhoea. We also analysed complete and incomplete initiation using sequential
37 stratification by age of the woman, community of origin (some had more access to Western
38 ways), education, parity, family planning and menopause. We analysed trend using the
39 Mantel extension of the Mantel-Haenszel test.[26] We report results as adjusted odds ratios
40 (aOR) with 95% confidence intervals. The two-tailed Fisher exact test served for estimation
41 of confidence with the resulting sparse numbers comparisons.
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43 Without any prior basis for weighting importance of different activities in the initiation, we
44 calculated the average effect across the ten components as though each was a separate
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8 exposure; this relied on Meta, an R program. A Forest plot summarises this (Figure 2).
9 Compared with occurrence among women who completed all ten rites of initiation, a
10 sensitivity analysis dropped each initiation rite in turn to test relevance of each in initiation.
11

12 **Control of biases:** Involvement of healers and elders in the design guaranteed cultural fit.
13 The questionnaire inquired for current family planning, and if so, which is the method used
14 (plants, pill, injection, condom, pessary, surgery, partner-managed contraception), and
15 duration of use of each method, as this could affect dysmenorrhoea; hormonal pills can
16 diminish pain and IUDs can increase pain. Use of Western contraceptive methods also
17 coincides with Western acculturation. We stratified by contraceptive use to separate between
18 the effect of the contraceptive and the initiation rites. To avoid an acculturation bias from
19 interviewing only women who did not go to nearby towns for work, we conducted the study in
20 December when most return to their homes. We took age, menopause and education into
21 account by stratification to limit the differential influence of these on responses.
22

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

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

	n	Frequencies				Risk of dysmenorrhoea			
		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 <i>carayurú</i> 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 <i>we</i>	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 <i>aji</i>	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
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

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8 did not abandon the initiation practices. The apparent lack of specific effects of each
9 component rite supports the idea that synergy between all components completes the
10 protective effect.
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12 The average age of menarche of our sample was higher than typically reported in the
13 literature,[28-33] possibly indicating a relatively low level of secular change.[34,35] That one
14 half of the women reported dysmenorrhoea (97/185) is lower than reported in international
15 studies.[36-40] Although the local definition (facial expressions) was useful for internal
16 comparisons, it is of limited value in international comparisons.
17

18 This study faced several common challenges in inter-cultural epidemiology. Even with all
19 eligible women participating, the small numbers problem is well recognised and has no easy
20 solution.[41,42] As anticipated, we found it difficult to untangle issues like use of
21 contraceptives and reporting of age, given the effect of acculturation on these. Despite this
22 interdependence of exposures, we believe we were able to show an independent effect of
23 initiation rites.
24

25 Cultural issues probably reduced the effectiveness of the study and reduced the numbers
26 further. The 14.6% (27/185) of women who could not give their age in calendar years is
27 testimony to their distance from Western culture. Analysing only those who mention an age
28 included a cultural filter, limiting our conclusions to those with some measure of Western
29 acculturation. Recall bias might have affected the results as some women had to remember
30 rites that took place decades earlier; a social desirability bias (not wanting to be culturally
31 different, wanting to avoid disapproval) might also have influenced the results. We have no
32 additional information to clarify the directions of these biases.
33

34 Within these constraints and the stringent limits imposed by our population size, we tried to
35 take account of other acculturation issues, beyond initiation rites, by stratifying for education,
36 age, parity, community of residence (some had greater access to modern towns) and use of
37 family planning. The lower risk associated with initiation rites might still be due to
38 unmeasured lifestyle issues associated with maintaining initiation rites. Solving this issue
39 may require a randomised controlled trial where the differential support for the fulfilment of
40 the rite among communities be contrasted with the occurrence of dysmenorrhoea. One
41 problem with prospective studies in this setting is that it would take many years to
42 accumulate the numbers necessary to make the case.
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44 Since the 1950s, public health programmes have contemplated primary, secondary and
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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 ~~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

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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.

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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)

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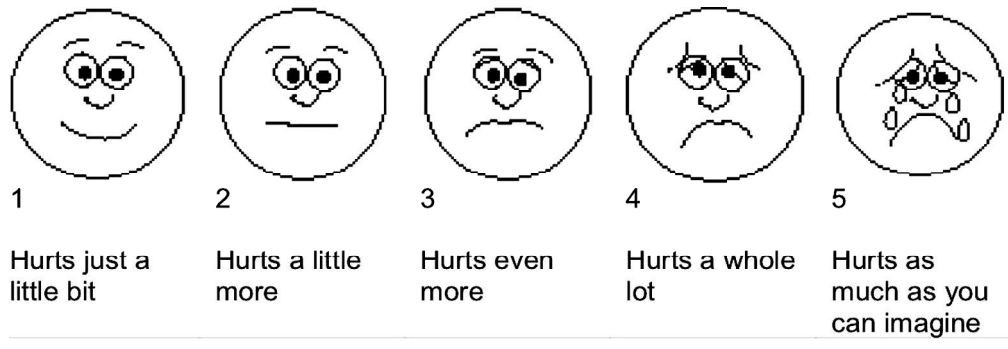
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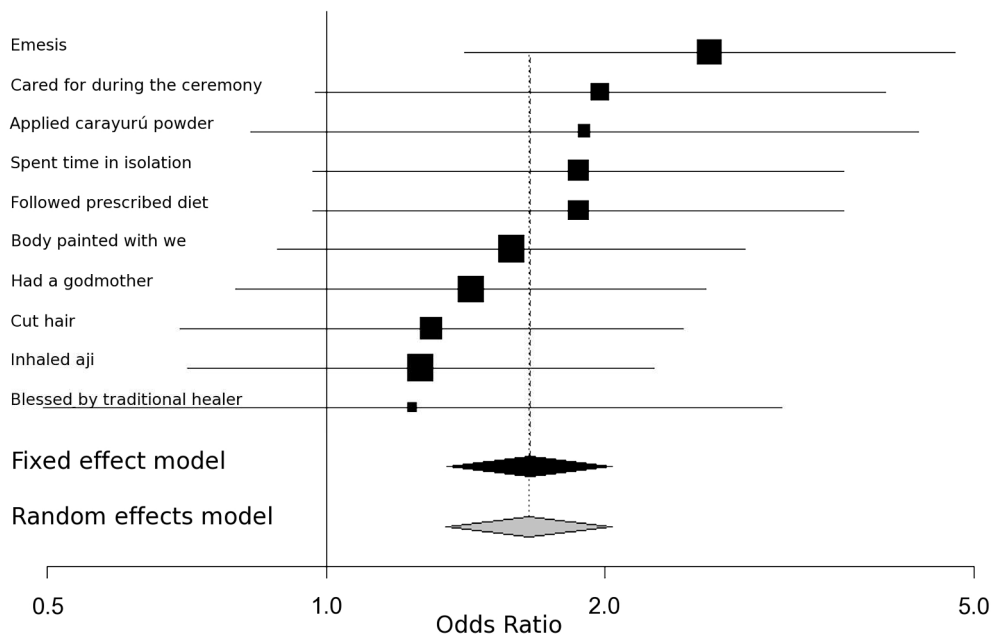
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Wong-Baker Faces Pain Rating Scale
180x59mm (300 x 300 DPI)

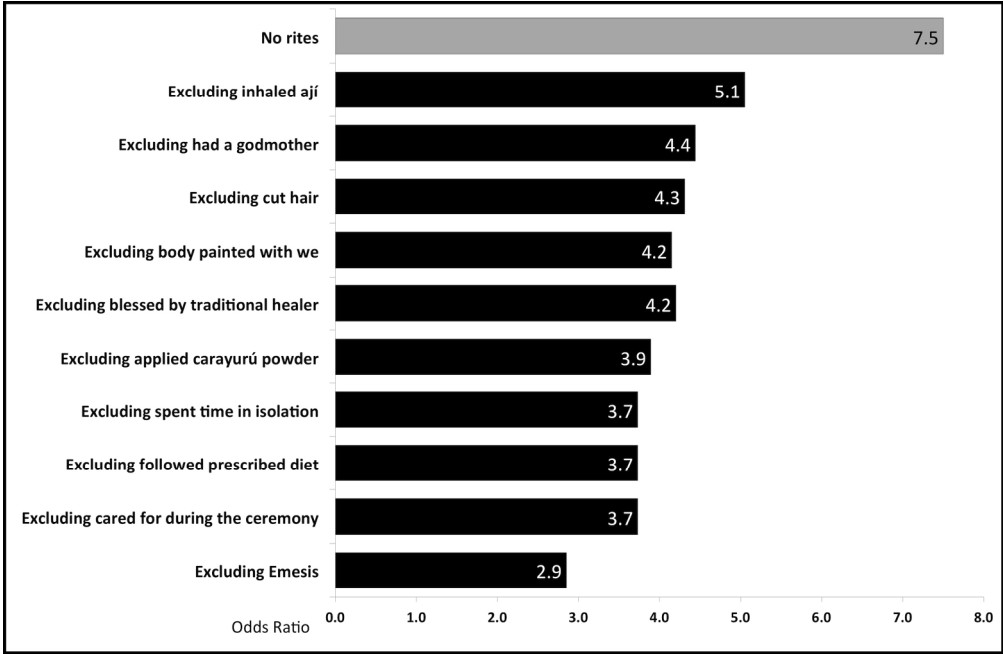
peer review only



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

Review only

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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	Abstract 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.