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Swaddling and Acute Respiratory Infections

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Abstract: In Turkey and China the ancient practice of swaddling is still commonly practiced. Both countries have extremely high rates of pneumonia, especially during the neonatal period. Preliminary evidence on the possibility that swaddling may interfere with normal respiratory function and thereby predispose to pneumonia was gathered in a teaching health center in Ankara. Babies who had been swaddled for at least three months were four times more likely to have developed pneumonia (confirmed radiologically) and upper respiratory infections than babies who were unswaddled. These preliminary findings were highly significant and are being followed up by further studies. (*Am J Public Health* 1990; 80:873–875.)

Introduction

The ancient practice of swaddling has almost disappeared in most countries of the world. A national sample survey in Turkey, however, showed that 93 percent of mothers swaddle their children.[1] In China also, most babies are tightly swaddled from birth through the first several months of life.[2] Since these two countries include over one-fifth of the children of the world, the number of swaddled babies is substantial.

In both countries pneumonia is the first cause of death among children, with particularly high incidence among neonates. In Turkey about 50,000 infant deaths occur annually due to pneumonia.[3] In China over 300,000 child deaths per year are attributed to pneumonia with a child mortality rate twice as high as the second highest cause of death.[4] Forty percent of these deaths are under one month of age.

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In trying to explain this extremely high incidence of pneumonia we focused on the possibility that swaddling might interfere with normal respiratory function and lung expansion. No studies have been published of possible relationships between swaddling and acute respiratory infections or pneumonia.

The common cultural practice is that immediately after birth babies are tightly bound in layers of cloth. Complete swaddling immobilizes the baby from the neck to the feet. The legs are pressed firmly together with the knees straight and the arms are bound to the sides or slightly to the front of the body. The layers of cloth are not only pulled tightly but they are also securely tied to minimize body movement. In partial swaddling cloth is wrapped around the legs and torso up to the armpits, but the arms are free. In both types of swaddling the child may also be covered with netting or a blanket to prevent exposure to flies, drafts or cold air. Babies are almost always laid on their backs and kept in a dark room to induce sleep.[5] Swaddled babies seldom cry and respirations seem shallow to an observer, raising the question of whether full expansion of the lungs occurs. A variety of devices are used to dispose of excreta in Turkey but in the urban area where this study was done families use cloth diapers.

Methods

The records from Gulveren Health Center in a suburb of Ankara were examined to look for associations between swaddling and selected health problems. This teaching health center of Hacettepe Medical School has high standards of follow-up and care of all the children in the health center area. Records were available on 186 infants, of whom 94 had been unswaddled, 29 had been partially swaddled, and 63 had been completely swaddled. The rate of swaddling is lower than the national figure because this study included only those babies who were swaddled for at least three months.

All infants were examined and detailed histories were taken. The ages of the children at the time of this cross-sectional study ranged from three to 12 months, with a mean of 6.8 months. Sex ratios were similar in all groups as shown

in Table 1. The mothers ranged in age between 21 and 25 years and literacy levels in the three groups were 84, 88, and 89 percent. The average number of people in each household was 5.0 in the unswaddled group, 4.81 in partially swaddled, and 5.47 in the completely swaddled group. Families were all from the same socioeconomic levels with most fathers employed in industrial plants in Ankara and approximately 11 percent unemployed in each group.

Body weights and developmental stages were similar in all groups. The history included careful questioning about respiratory infections; having more than two infections during the period up to examination was classified as frequent upper respiratory infections. Physical examination included observation for signs of rickets and congenital dislocation of the hip.

All children had been followed at the health center by midwives with high compliance for regularly scheduled clinic and home visits. If illness occurred, babies were usually brought to the health center. At the time of regularly scheduled visits, parents were also asked about illnesses treated elsewhere. All of this information was filled in on follow-up records. If the baby had special tests at a hospital, the laboratory and x-ray records were obtained and transferred to the follow-up cards. History of respiratory infections was included in this analysis only if the diagnosis had been recorded on the baby's follow-up records. A diagnosis of pneumonia was made only when clinical records showed cough, fever, and crepitations. All pneumonia cases had positive x-rays at the time of illness which were reviewed again as part of this study. Some had respiratory distress but none required hospitalization.

Results

Table 1 shows the frequency of respiratory illnesses identified in these infants. Pneumonia and a history of at least two upper respiratory infections were each about four times more common in swaddled than unswaddled babies. The association with partial swaddling was as strong as with complete swaddling and these groups were combined for statistical testing.

Discussion

Few studies have been done of the effects of swaddling. Lipton,[6] *et al,* reported that swaddling reduces motor activity and encourages the baby to sleep. Chisholm[7] confirmed these findings about motor activity and sleep and also reported less response to stimulation and less variation in heart rate. A report from Beijing[8] compared transcutaneous oxygen tension in 40 neonates with moderate pneumonia, confirmed radiologically, who were observed for periods when they were swaddled and unswaddled and placed in prone and supine positions. Measurements were made 30 minutes after feeding when the infant was asleep. Unswaddled babies in the prone position had oxygen tension 18 percent higher than swaddled supine babies and 12 percent higher than unswaddled supine babies. Several studies have shown that babies in the prone position have improved respiratory function when compared with babies in the supine position.[9,10] It may be that a combination of swaddling and the supine position produces the greatest effect on respiratory ventilation.

Rickets was more common in swaddled babies than in unswaddled babies presumably because of lack of exposure to sunlight. In Israel, Block reported an association between swaddling and congenital dislocation of the hip[11] and similar results were reported among Navajo babies bound to cradle boards.[12] No such association was found in this series of cases.

The extremely high mortality and morbidity from neonatal and infant pneumonia in China and Turkey is being further investigated by prospective studies which will provide more precise information on time relationships between swaddling and pneumonia. If a causal relationship can be defined, educational efforts can try to modify this traditional practice. The possible advantages of swaddling should also be studied since parents say that a swaddled baby child is easy to care for because it is quiet and sleeping most of the time.

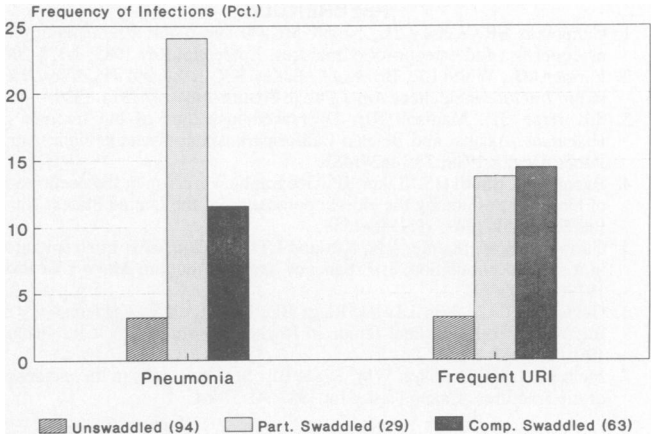

FIGURE 1—Swaddling and Respiratory Infections.

TABLE 1—Swaddling, Pneumonia and Respiratory Infections in Turkey

	Unswaddled (n:94)	Partially Swaddled (n:29)	Completely Swaddled (n:63)
Age (months)	7.9 ± 2.3	8.1 ± 3.3	7.4 ± 2.1
Male/Female	1.08	1.07	1.11
Number in Household	5.0	4.81	5.47
% Literacy of Mothers	84	88	89
	n %	*n* %	*n* %
Pneumonia*	3 3.2	7 24.1	8 11.6
Frequent URI*	3 3.2	4 13.8	10 14.5

*Fisher's exact test used to compare unswaddled with both groups of swaddled babies added together: for pneumonia p = .002 and for frequent upper respiratory infections p = .004.

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Assessment of AIDS Knowledge, Attitudes, Behaviors, and Risk Level of Northwestern American Indians

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Abstract: A survey was made of 710 American Indians of Oregon, Washington, and Idaho to assess the population's knowledge, attitudes, and behaviors in respect to acquired immunodeficiency syndrome (AIDS), to estimate the population's risk, and to plan strategies to reduce it. In contrast to 3 percent of the general population, this study found 10.6 percent of male and 6.4 percent of female Pacific Northwestern American Indians in groups considered at high risk for AIDS. (*Am J Public Health* 1990; 80:875–877.)

Introduction

Assessment of the degree to which any population is at risk for infection with the human immunodeficiency virus (HIV) is difficult. The American Indian/Alaskan Native population presents a special challenge because of its heterogenous cultural roots and its dispersion within the general population. Few Native Americans who live on reservations have been included in the National Health Interview Survey (NHIS), which studies the public's knowledge and attitudes toward acquired immunodeficiency syndrome (AIDS) (Deborah Dawson, National Center for Health Statistics, personal communication, July 14, 1989).

No census exists of persons with Native American ancestry; many in rural or reservation areas do not have telephones, and are not represented in telephone surveys. Unpublished AIDS knowledge, attitudes and behavior studies include data from women clients in a WIC (Women, Infants and Children) program; a survey of health care workers in Arizona; a survey of junior college students who primarily have Indian ancestry; and a survey of health service workers who work primarily with American Indians in the San Diego, California area (Steven Helgerson, Indian Health Service, personal communication, November 7, 1989).

Current literature reports a low rate of known AIDS cases in the American Indian population, especially in comparison to other minority groups,[1–3] but data on HIV infection do not exist and current information could understate risk in this relatively small and vulnerable population. In order to assess risk and recommend appropriate educational and preventive initiatives, the Northwest Portland Area Indian Health Board conducted an extensive survey of AIDS knowledge, attitudes, and behaviors among American Indians who live in the Pacific Northwest states of Oregon, Washington, and Idaho.

Methods

The questionnaire* was adapted from an Indian Health Service form, which included many of the items on the NHIS.[4] Questions probed respondents' knowledge about AIDS, attitudes toward people with AIDS, and behaviors related to HIV transmission. The questionnaire included a number of questions on sexual behavior (number and sex of partners, degree of acquaintance with partners, age at first sexual intercourse, etc.) and on the use of various licit and illicit drugs, including alcohol. Demographic questions asked respondents to identify their age, sex, ethnic affiliation, and education, and to categorize their residence by on or off reservation, community type and size, and state and county.

The survey was administered from September 1988 through March 1989 at 24 Indian centers in Oregon, Idaho, and Washington either by a member of the staff of the Northwest Portland Area Indian Health Board or by staff at the participating agency. Sixty-six percent of respondents were surveyed at health clinics or health stations, 17 percent at tribal offices, and 17 percent at Indian educational or community agencies. Respondents include employees, persons conducting tribal business, persons seeking health care, and family members accompanying them. All respondents were asked to complete the questionnaire; anonymity was guaranteed and individuals were assured that they would not be denied any tribal service if they chose not to answer the survey, or any part of the survey.

The sample consisted of 710 persons from ages 12 to 78 with a median age of 33 years; 237, 283, and 190 respondents were from Oregon, Washington and Idaho, respectively. Women represented 73 percent of the sample (Table 1). Idaho had the largest percentage resident on a reservation (85 percent), Washington was intermediate (69 percent), and Oregon was lowest (43 percent). This percentage did not differ by sex, but fewer of the age group under age 30 resided on reservations (59 percent) than in the age group over 50 (71 percent), while the age group from 30 to 49 was intermediate (65 percent).

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*For a copy of the questionnaire or a tabulation of responses, please write to the NW Portland Area Indian Health board, 520 SW Harrison, Suite 440, Portland, OR 97201.