

Research Article

A Study to Investigate the Prevalence of Nappy Rash among Babies Aged 0 to 36 Months Old in a Tropical Country

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Corresponding author:** Biranjia-Hurdoyal SD, Department of Health Sciences, University of Mauritius, Mauritius**Received:** June 26, 2015; **Accepted:** November 27, 2015; **Published:** December 01, 2015**Abstract*Objective:** This survey based study was designed to determine various factors which affect the prevalence of nappy rash among babies aged 0 to 36 months in a tropical country, 'Mauritius'.**Methods:** A total of 400 mother/baby pairs were randomly selected and interviewed with the help of a questionnaire.**Results:** Only 380 pairs were finalized for data analysis and 303 (79.7%) babies were found to have a history of at least one episode of nappy rash, with a peak at the age of 7 to 12 months. The highest prevalence of nappy rash was found among babies who used disposable nappies exclusively. The choice of nappy was affected by household income and number of children per family ($p < 0.05$). Area of residence with high humidity, summer season, early stopping of breast feeding and age of the baby significantly increased the prevalence of nappy rash ($p < 0.05$). Baby girls, use of barrier cream and aeration of nappy area for more than one hour per day were associated with less nappy rash, although the associations were not significant.**Conclusion:** Nappy rash occur at high prevalence in a tropical country. Parents should be educated on the importance of breast feeding and aeration of nappy area.**Keywords:** Diaper; Nappy rash; Infants; Climate**Introduction**

Nappy rash is a consequence of contact between an infant's diapered skin and his nappy which results in irritant contact dermatitis [1]. The common causes of nappy rash have been found to be the result of urine and faeces on the diaper area. Exposure to urine for long period of time increased the temperature, humidity and pH. Furthermore, digestive enzymes such as proteases, lipases and trypsin from the skin and faeces could accelerate skin maceration in presence of urine [2,3]. Several other factors have been reported to influence the incidence of nappy rash. These included age of baby, health status, type of nappy worn, application of barrier cream and type of feeding [4-6]. Babies were most vulnerable in the first year of life due to the incomplete epidermal skin barrier [7]. The prevalence of nappy rash has been found to vary from country to country, ranging from 15% in Italy, 16% in UK, 43.8% in China, 75% in US and 87% in Japan [4-6,8,9].

Cloth and disposable nappies are the two most common types of nappy used by babies. Cloth nappies have been used since long ago as they are washable and therefore, economical. Cloth nappies have also proved to be very comfortable during hot weather and could be best used if they were changed after each urination [5,10]. Disposable diapers are preferred because of their ability to maintain dry skin for a long period of time and could be disposed after use [11,12].

Hygiene has been recognized as an important aspect in the

prevention of diaper dermatitis. The diaper area should be cleaned appropriately and diapers should be frequently changed, especially after defecation to reduce the contact between the dirtied nappy and the skin [11]. Lukewarm water mixed with irritant-free and fragrance-free soap or cleanser should be used to wash the diaper area daily [13]. However, a sanitization agent with a pH higher than that of the skin could alter its microbiota and cause skin dehydration and scaling. This effect could be lessened by using tap water which has almost a neutral pH. But, water alone would not get rid of fat-soluble substances such as faeces in contrast to alkaline soaps (pH 9.5) or detergents (pH 5.5) [14]. Increased aeration of diaper area and the use of barrier cream diminished the incidence of nappy rashes. Barrier creams should be applied after each diaper change and bathing. A suitable barrier cream should reduce skin maceration by infiltrating its lipid content in the stratum corneum and between epidermal cells to render the layer impermeable [13]. Moreover, the early introduction of cereals and change in diet in the first year of life was also found to accelerate the incidence of rashes [5]. These incidences might be most probably linked to the adaptation process of the gastrointestinal tract to nutrition.

Numerous studies have investigated the incidence of nappy rash among babies attending hospitals and the majority of them were carried out in US or European countries. This study aimed to investigate the factors which could affect prevalence of nappy rash among babies aged 0-36 months in a tropical country, Mauritius. The

Table 1: Demographic details of participants.

Details	N (%)
Age (months)	
0-6	66 (17.4%)
7-12	71 (18.7%)
13-18	62 (16.3%)
19-24	59 (15.2%)
25-30	55 (14.5%)
31-36	67 (17.6%)
Area of residence	
Central plateau	178(46.8%)
East region	46 (12.1%)
North region	67 (17.6%)
South region	46 (12.1%)
Western region	43 (11.3%)
Gender	
Male	212 (55.8%)
Female	168 (44.2%)
Type of nappy used	
Disposable nappy exclusively	257 (67.6%)
Both disposable and cloth	117 (30.8%)
Cloth nappies only	6 (1.6%)

n: sample size

study was approved by the Department of Health Sciences, University of Mauritius.

Materials and Methods

The recruitment for this study was done at nurseries, child’s residence, recreation centers and working places of mothers such as offices and schools from various regions of the Mauritius. A total of 540 mothers who had children aged between 0-36 months were included in the selection and they were explained the rationale of the study. Information sheets and consent forms were provided to them. A total of 400 mother/baby pairs agreed to participate voluntarily in the study. The age distribution of the participants is shown in (Table 1). One self-administered questionnaire which was designed for the purpose of the study was distributed per infant and mothers with twins or triplets were given two or three questionnaires respectively. Parents were asked about the age at which their babies had suffered from their last episode of nappy rash, period of the year, diet of the infant, type of nappy worn, socio-economic status and family income. Statistical analysis was done using SPSS v16.0 (SPSS Inc, Chicago, IL, USA) and a p-value of less than 0.05 was considered to be statistically significant. Pearson χ^2 test was performed to determine whether there was any significant difference in the prevalence of nappy rash between age groups and other variables such as gender, use of barrier cream and season of the year.

Results

Of 400 questionnaires, 380 were complete for analysis. The demographic details of the participants are given in (Table 1). The cloth nappies were further covered by baby panties. It was noted that

Table 2: Prevalence of nappy rash at age 0 to 36 months.

Age of baby (months)	Prevalence of nappy rash n (%)
0-6	42 (63.6)
7-12	64 (90.1)
13-18	45 (72.5)
19-24	47 (79.6)
25-30	48 (87.2)
31-36	57 (85)

n: sample size

an increase in family size and decrease in household income shifted the selection of nappies from exclusive disposable nappy to the use of both disposable and cloth and finally to cloth nappies only ($p < 0.05$). A total of 303 (79.7%) babies reported at least one episode of nappy rash and (151) 39.7% had at least one paediatric consultation for same. Nappy rash was reported among 204 (67.3%) using disposable nappies exclusively, followed by 95 (31.6%) of the babies using both cloth and disposable nappies and 4 (1.3%) using cloth nappy exclusively. The relationship between the area of residence of the baby and the prevalence of nappy rash was found to be statistically significant ($p < 0.05$). The highest rate of nappy rash was noted among babies who lived in the central plateau of the island ($n=154$; 50.8%), followed by those staying in the north ($n=49$; 16.2%), south ($n=34$; 11.2%), west ($n=34$; 11.2%) and in the eastern region ($n=32$; 10.6%). Moreover, an increased number of babies suffered from diaper rash during summer as compared to winter season (71.6% vs. 5.6%, $p < 0.05$). Baby boys had higher prevalence of nappy rash compared to girls (53.8% vs. 46.2%), although the difference was not statistically significant. Pearson correlation indicated that the occurrence of nappy rash increased with age ($p < 0.05$). The highest prevalence was noted at the age of 7 to 12 months followed by a decrease at 13-18 months and an increase again after 19 months (Table 2).

Babies who were aerated for less than 1 hour per day developed nappy rash at higher rate than those who were aerated for more than 1 hour (66.3% vs. 33.6%). Aeration was done by leaving the child without nappy at home. Furthermore, a significant correlation was found between nappy rash and introduction to cereal at the age of 7-9 months ($p < 0.05$). A total of 240 (63.1%) parents tried to reduce the occurrence of nappy rash by applying cream barriers and only 28 (11.7%) of them reported to be successful. It was also noted that early stoppage of breast-feeding at 9 months or less, increased the chances of nappy rash ($p < 0.05$) and breast-feeding was found to be associated with a lower prevalence of nappy rash as shown in (Table 3).

In Mauritius, the use of home-made remedies was found to have an important role in the management of nappy rash, as 35% of parents had used methods such as bathing the baby’s diaper area in salted water, applying coconut oil and feeding babies with arrow root. However, no significant difference was found in the prevalence of nappy rash when the home-made remedies were used.

Discussion

In the present study, 79.7% of the babies had at least one episode of nappy rash, which is higher as compared to 52% in UK [6]. Mauritius, being a tropical island has a higher temperature and atmospheric humidity as compared to most countries where similar

Table 3: Effect of type of feeding on prevalence of nappy rash.

Type of feeding	Prevalence of nappy rash n (%)
Breast-feeding exclusively (n = 64)	39 (60.9)
Baby formula milk exclusively (n = 210)	179 (85.2)
baby formula milk and breast-feeding (n=87)	67 (77)
cow milk and normal diet (n = 9)	8 (88.9)
baby formula milk and cow milk (n=5)	5 (100)
baby formula milk and normal diet (n=2)	2 (100)
breast-feeding, bottled milk and normal diet (n=3)	3 (100)

n: sample size

studies have been conducted and such climatic factors could increase the prevalence of nappy rashes by accelerating the actions of urine and faecal enzymes [2,3,15]. The exclusive use of cloth diapers has decreased worldwide. Here in Mauritius, the trend of using both cloth and disposable nappy exists at higher rate (30.8%) as compared to the 15% previously reported [11]. The reason of using cloth nappy was found to be mostly financial. Most babies from low and lower middle class families used cheap and low quality disposable diapers which consisted of very little amount of absorbent gels. Despite the highest prevalence of nappy rash was found among babies using disposable nappy exclusively, no significant association was obtained. The quality of the disposable nappies also did not affect the prevalence of nappy rash significantly. However, two previous studies had concluded that infants using disposable nappy exclusively had less rash as compared to those using cloth nappy [4,16]. The climate in the countries of study and the difference in the quality of disposable nappy used by the babies might explain the disparity.

It was noted that 39.7% of the babies who had suffered from nappy rash, had at least one paediatric consultations which was superior to the 20% previously reported [5]. Nappy rash was more prominent among babies living in the central plateau of the island, where the humidity level could reach 84% at times. Previous studies have reported that increased humidity around the delicate infant skin could be a source of skin maceration and hence nappy rash [1,2]. Moreover, babies developed nappy rash more in summer as compared to winter season and the increased prevalence was noted especially in babies wearing disposable diapers exclusively in summer. Nappy rash was not found to be significantly associated with the gender of babies which was similar to a previous study [5]. Babies aged between 7 and 12 months had highest tendency for nappy rash and an increase was also observed among those aged 24 months or more. Philipp et al. [5] reported a peak in the first four weeks after birth while Jordan et al. [4] and Benjamin [16] reported a maximum from 9 to 12 months of age and Longhi et al. [8] concluded age 3 to 6 months as most vulnerable. The high prevalence of nappy rash at the age of 6-9 months was associated with the adaptation process of the gastrointestinal tract of the infants when switching of food from breast-feeding to formula-feeding, cereals or other foodstuffs [5]. Most children at 24 months or above are highly active, eat normal diet and are potty trained. If the infants are still diapered, an increase in friction would occur at the nappy area. With increasing age and normal diets, higher levels of faecal enzymes would be excreted which could harm the skin if exposed for long period of time.

In the present study, it was found that when cereals was introduced

at the age range of 3 to 6 months, the incidence of nappy rash was lower as compared to those who were introduced to cereals at 6 to 9 months. However, the opposite was reported by a previous study where the premature beginning of cereals in babies' diet increased nappy rash [5]. Interestingly, in this study, a strong relationship was observed between breast feeding and absence of nappy rash. Furthermore, discontinuing breast-feeding at an early age was found to accentuate the prevalence of nappy rash. Nappy rash was reported to be less common among babies who were breast-fed as their stools were of lower pH and contained fewer urease producing bacteria [5,16].

Conclusion

To conclude, nappy rash is very common in Mauritius. It causes parental anxiety and result in high numbers of paediatric consultations. Parents should be educated about the benefits of breast feeding, increased aeration time of nappy area and the proper use of cloth nappies, especially during summer. Infants should be potty trained as early as possible in tropical countries.

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