



Evaluation of Feeding Behaviors Related to Oral Health in Nighttime Bed-Sharing Children between Zero to Four Years Old - A Cross Sectional Study

Venkatesh Babu • Abhipsa Roy

Department of Pediatric and Preventive dentistry, V.S Dental College and Hospital Bangalore, Karnataka, India
drmsvbabu@gmail.com

ABSTRACT

Aim: To evaluate the feeding behaviors in nighttime bed-sharing children between zero to four years old and its correlation to their oral health.

Methods: A cross sectional study was conducted in a simple randomly selected sample of 200 children who were between 0-4-year old and their mothers. A printed questionnaire was given to the mother that enquired about child demographics, mother demographics, the total family income, whom the child lives with, who took care of the child during the day, birth order, birth maturity, medical problems, and child temperament. The data also included information on nighttime feeding behaviors that were used by the parent to help the child to sleep. Dental caries was recorded according to WHO criteria 2013.

Results: Most of the children participating in this study bed shared with their mothers every night of the week and were mostly below two years old, lived with both parents, were perceived to be stubborn and were more likely to either breast feed throughout the night, or breastfeed or bottle feed to help them sleep. Also, they had a higher incidence of caries rate than the children who did not bed share with their mothers every night of the week.

Conclusion: This study is important since it shows few practices that are associated with nighttime bed sharing habit which consequently places the child at a higher risk for developing caries. The dentists should inquire about the feeding habits (especially the night time feeding practices) as well as the night time bed sharing habits of the mother-children dyads so that adequate counseling can be provided to the mother, if needed and preventive strategies can be made targeted especially at mothers and children who bed share at night.

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1. Introduction:

In most under-developed and developing nations of the world, bedsharing of the parent with the infants and toddlers is a common practice but this has been a topic of controversial discussion for many years in several developed nations, especially in the United States.

The terms bed sharing and co-sleeping have been often used interchangeably in literature. The term “co-sleeping” refers to the situation when the parent and the infant sleep in close vicinity to each other but do not share the same surface; while bedsharing is termed as a form of co-sleeping in which one and the same surface is shared by the infant and the parent (Axelsen, et al. 2016; Moon, 2011).

Historically, the American Academy of Pediatrics (AAP) had sternly advised against parents’ bedsharing

with their infants who were one year old or lesser, claiming it to increase the chances of infant deaths due to suffocation, strangulation, parent roll over, etc. Sudden Unexpected Infant Death (SUID) or Sudden Unexpected Death in Infancy (SUDI) is a term that describes a sudden death which can be explainable or unexplainable. SIDS- Sudden Infant Death Syndrome, a subcategory of SUID refers to infant deaths that remain unexplained even after thorough investigational procedures (Axelsen, et al. 2016).

The AAP still advises against bedsharing but it has encouraged co-sleeping of the parents with their infants, in the same room. AAP has come up with guidelines, especially for infants below the age of one to curb the incidence of SIDS (Moon, 2011; Moon, 2016). Considerable evidence is present to support the fact that SIDS reduces by 50% when bed sharing is avoided



(Kattwinkel, et al. 2005). In the United States alone it has been reported that around 3500 infants die annually due to SIDS and the reasons for it are mostly attributed to strangulation, entrapment, overheating, suffocation and re-breathing the expired air from the parents. Despite AAP guidelines, there has been an increase in bedsharing in the United States itself, with 11.2% of the parents reporting it as a normal practice, as reported by the studies performed by few researchers (Axelsen, et al. 2016; Colson, et al. 2013). The National Infant Sleep Position (NISP) study reported an increase in bedsharing rates from 6.5% in 1993 to 13.5% in 2010. The studies claimed bed sharing rates to have increased tremendously and most of the parents in the United States claimed it to be a normal practice (Colson, et al. 2013). According to the studies done on infant sleeping arrangements and practices during the first year of life, it has been noted that there has been an increase in the rate in bedsharing; the maximum being at 2 weeks age of the infant and minimum being at 12 months of age (Hauck, Signore, et al. 2008).

In the Middle Eastern and South Asian communities, sleeping on the same bed surface as the infant is a common practice. In India, bedsharing of the mothers with the infants is normally practiced, especially in the small towns and rural parts of the country. Even when the infant stage surpasses, most mothers still continue bedsharing with their children. Sleeping together with infants and toddlers definitely puts this population of children under the risk of SIDS. A lot of contributing factors are involved in bedsharing of the Indian parents with their infants; the main being the lack of awareness of the potential health hazards to the child. Many mothers, on the contrary, are of the belief that keeping the infants close to them while sleeping will safeguard their well-being. The level of the mother's education, occupation and socio-economic status of the family are also determining factors of bedsharing with the infant at night time. Studies done by NISP has shown that mothers who had not finished school tended to share bed with their infants more often than the ones who held a college degree or greater (Colson, et al. 2013). Also, in most studies done in various parts of the world, it was seen that households with low socio-economic status bed shared more than the households with higher socio-economic status.

Mothers mostly chose to bed share with their infants at night to achieve a sleep cycle which is in sync with the baby. It is easier for the mother to breast feed or bottle feed the baby anytime during the night. It also helps the baby fall asleep faster and more easily, especially during the first few months when they wake up in the middle of the night and to achieve bonding and provide warmth and comfort to the fussy infant (Axelsen, et al. 2016; Moon, 2011; Hauck, Signore, et al. 2008; Buswell & Spatz, 2007).

The AAP recommends that the infant should return back to the crib or to some other sleeping surface after breast feeding is completed (Axelsen, et al. 2016). There is

insufficient literature regarding bed sharing and oral health related night time feeding behaviors for infants, with regard to the Indian population. Quite a few studies have recorded an association between nighttime breast feeding and bottle-feeding habits with bed sharing. A study suggested that infants who bed shared with their mothers tended to breast feed three times longer during the night than the infants who slept apart (Mckenna, Mosko, Richard, 1997) Studies done by Huang, et al. (2013) showed that the longer bed sharing was practiced, higher was the duration of breastfeeding. Horseley, et al. (2007) in his review mentioned that the duration of breastfeeding increased when the mothers and infants bed shared every night.

The AAP advocates exclusive breast feeding for the first 6 months of the infants' life while breast feeding beyond 12 months depends on the wish of the mother-child dyad. Though substantiate research is available on the association between breast feeding and bed sharing, not many studies have been done on the night time feeding behaviors related to breast feeding and bottle feeding and its outcomes in infants and mothers who bed shared for every night of the week (Policy statement-Breastfeeding and the Use of Human Milk, Pediatrics 2012). The AAPD recommends "ad libitum breast feeding should be avoided after the first primary tooth begins to erupt and other dietary carbohydrates are introduced." (American Academy of Pediatric Dentistry, Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies, 2014). Knowing that there is an increased chance of developing early childhood caries due to night time breast feeding or bottle feeding habits, this study aimed at investigating the night time feeding behaviors and the implications of it on the oral health in bed-sharing healthy child between zero to four year olds and their mothers.

The study will help to assess the rate of bed sharing in mother-child pairs between the age of 0-4-year olds and the night-time feeding behaviors of the bed-sharing children between 0-4 years. The study will also assess and compare the caries prevalence in nighttime breast feeding and bottle-feeding children who bed-shared in comparison to caries prevalence in non-bed sharers, between 0-4 years.

2. Methodology:

A cross sectional study was conducted in a simple randomly selected sample of 200 children who were between 0-4-year olds and their mothers who came to V.S. Dental College and Hospital, Bangalore for regular treatment. Ethical clearance to conduct the study was obtained from institutional ethics review board. A printed questionnaire was given to the mother. Informed consent was taken from the mother before filling the questionnaire and before oral examination. Oral health assessment and DMFT index was checked in accordance with the WHO Oral Health Assessment Form for Children, 2013.

The study consisted of mother-children dyads of two categories and included those healthy children between 0-4 years who bed-shared with their mothers every night of the week and those between 0-4 years who did not bed share for a single night with their mothers. Mother-child pairs who bed shared for one to six nights every week (i.e. not every day of the week) were excluded from the study to avoid the effects of confounding variables in the mixed behavior of bed sharing. Special children and children with any systemic diseases were not included in this study.

Data obtained from the questionnaire included maternal report of child demographics (name, age, sex, religion, whom the child lives with, who took care of the child during the day, birth maturity, medical problems, and child temperament), mother demographics (education level, occupation, health problems during pregnancy, previous knowledge of early childhood caries) and the total family income. The data also included information on night time feeding behaviors (breastfed to sleep and/or throughout the night, bottle fed to sleep and/or throughout the night, and contents of the bottle including sweetened formula, milk and sugar, sweetened juice or plain water). Along with the data from the questionnaires, oral examination of each child was done by a single trained, calibrated examiner with the child sitting in an upright position under good natural day light. Sterile mouth mirrors and dental explorer was used for examination of each child. Dental caries status was recorded using WHO Oral Health Assessment Form for Children, 2013 criteria. Data obtained was tabulated and subjected to statistical analysis.

Bivariate analyses were performed to evaluate the factors associated with mother-child habits of bedsharing. The standard chi-square test, Fisher's exact test, and nonparametric Wilcoxon rank-sum test were used for the bivariate analysis. Logistic regression analysis (Odds ratio) was used to identify the significant predictors related to mother-child habits of bedsharing, adjusting for potential confounding effects of other covariates. A P-value of less than 0.05 was used to determine statistical significance.

3. Results:

200 mother-child dyads were included in the study who either bed shared every night of the week or did not bed share at night at all during the week. The mean \pm standard deviation (SD) age of the children was 2.247 ± 0.96 . Most of the children who came for the dental checkup were between 1-2 years (41%), followed by the children who were between 2-3 years (33%), followed by children below 1 year (15%). The group which visited least to the dental hospital was the children who belonged to 3-4 years group (11%). (Table 1)

Table 1: Age distribution of the study participants

Category	Number	Bed sharing		Chi square P value	Odds ratio
		Yes	No		
<1 year	30(15)	30(100%)	0	<0.03*	1
1-2 yrs	82(41)	72	10		0.93*
2-3 yrs	66(33)	60	6		0.47
3-4 yrs	22(11)	14	8		0.56
Total	200(100)	176	24		0.88*

*P<0.05 is statistically significant

The number of girls who participated in the study was 51% and the number of boys who participated was 41% and the statistical analysis showed that most of the kids' bed shared at night with their mothers (Table 2).

Table 2: Distribution of the study participants based on gender

Category	Number	Bed sharing		Chi square P value	Odds ratio
		Yes	No		
Male	98(49)	80	18	0.09	1
Female	102(51)	96	6		1.34
Total	200(100)	176	24		

*P<0.05 is statistically significant

Distribution based on religion showed that out of the 200 children-mother dyads, 68.2% were Hindus, 17.6% were Muslims and 14% were Christians. Based on religion, it was found that most of the mothers, irrespective of their religion bed shared with their children (Table 3).

Table 3: Distribution of the study participants based on Religion

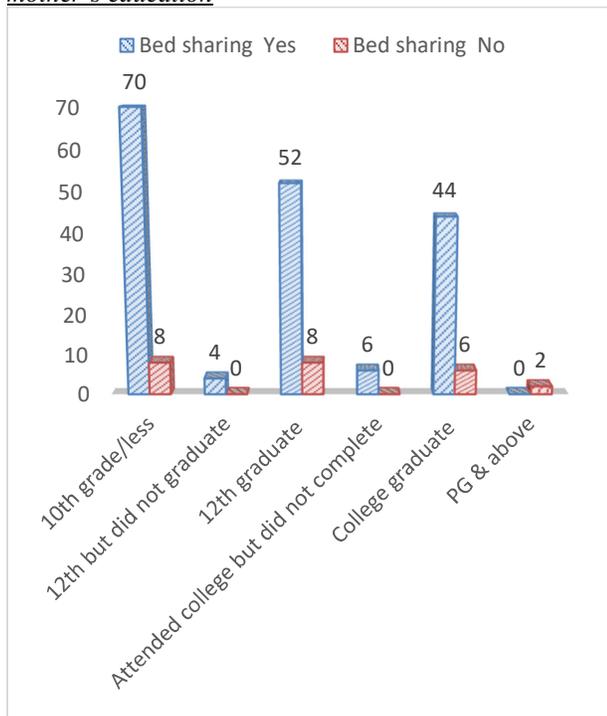
Category	Number	Bed sharing		Chi square P value	Odds ratio
		Yes	No		
Hindu	142(68.2)	130	12	0.04*	1
Muslim	52(17.8)	41	11		1.23*
Christian	6(14)	5	1		1.34
Total	200(100)	176	24		

*P<0.05 is statistically significant

39% of the mothers who were part of the study were educated till class 10 or less, 30% passed class 12, 25% were college graduates and only 1% held a post graduate degree and above. Most of the mothers who did not receive an education after passing class 10 bed shared with their infants. The mothers who had completed high school also tended to bedshare while none of the mothers who had attained a postgraduate or above, bed shared (Graph 4).



Graph 4: Distribution of the study participants based on mother's education



75% of the mothers were stay at home mothers while 24% were working professionals but none the less the majority was seen to bed share with their kids at nighttime (Table 5).

Table 5: Distribution of the study participants based on mother's occupation

Category	Number	Bedsharing		Chi square P value	Odds ratio
		Yes	No		
Housewife	150(75)	132	18	0.46	1
Working	50(25)	44	6		0.67
Total	200	176	24		

*P<0.05 is statistically significant

In this study, most of the families belonged to the lower and upper-lower socio-economic group and this group tended to bed share at night with their children compared to the higher socio-economic group (Graph 6).

75% of the children lived with both their parents and this group bedshared at night more often than the children who lived with their extended family members (Table 7).

The mother took care of the child throughout the day in 170 dyads out of the 200 examined and this group had the highest number of nighttime bed sharers (Graph 8).

96% of the mothers reported of no problems during pregnancy while 3% mothers reported of some problems during pregnancy (Graph 9).

Graph 6: Distribution of the study participants based on income (Kuppaswamy scale)

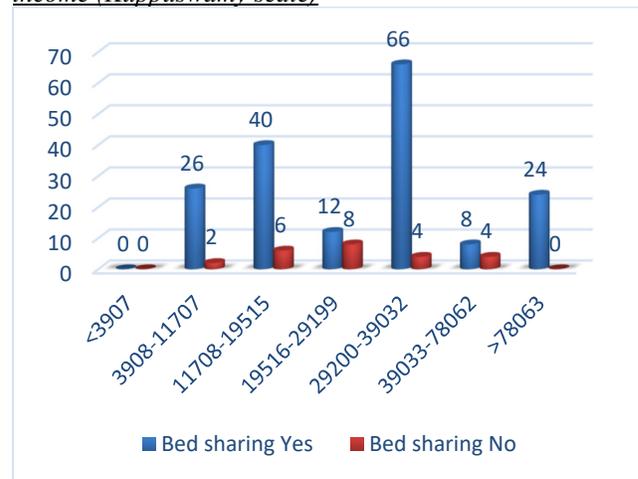
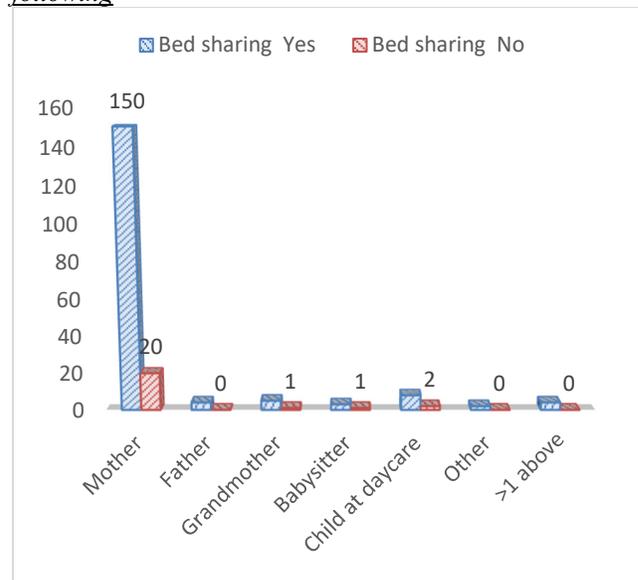


Table 7: Distribution of the study participants based on whom the child lives with

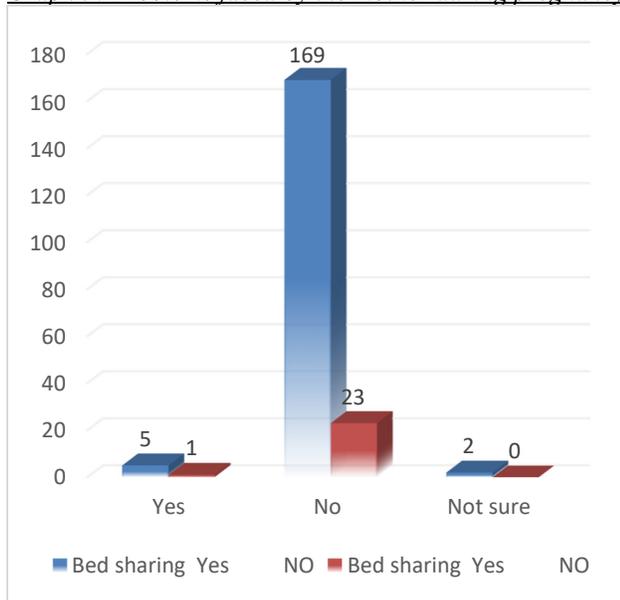
Category	Number	Bed sharing		Chi square P value	Odds ratio
		Yes	No		
Both parent	150(75)	131	19	0.34	1
Mother	0	0	0		-
Father	0	0	0		-
Other	0	0	0		-
>1 (parents +others)	50(25)	45	5		1.34
Total	200	176	24		

Graph 8: Child taken care throughout the day by the following



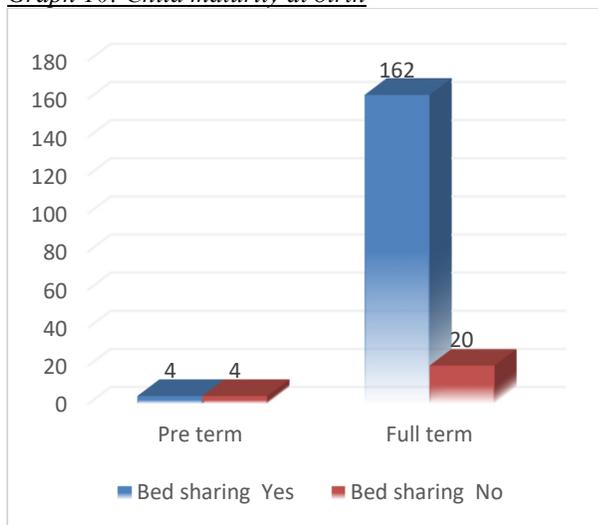


Graph 9: Problems faced by the mother during pregnancy



91% of the children were born full-term and 9% of the children were born pre-term. All the mothers who faced problems during pregnancy tended to bedshare and the majority of the children who were born pre-term shared bed with their mothers (Graph 10).

Graph 10: Child maturity at birth

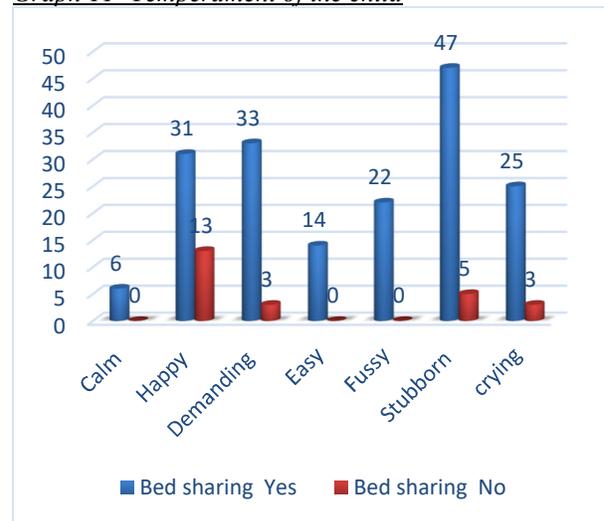


The mothers were enquired about the temperament of the child and it was found that the stubborn, crying and fussy children tended to bed share with their mothers more than the calm and happy children (Graph 11).

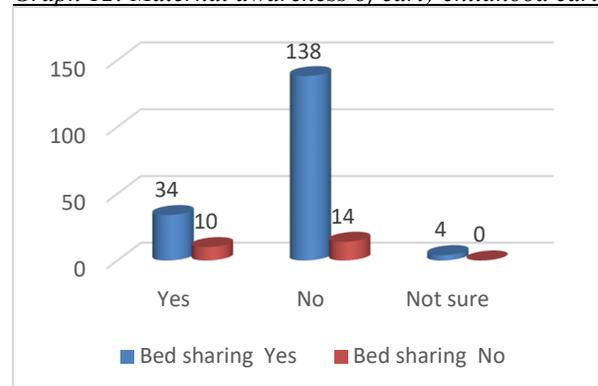
The mothers were questioned about their knowledge on nighttime breast feeding and its correlation with early childhood caries. 76% were unaware of it, 2% weren't sure and 22% knew about it. Most of the mothers who did not

know about it tended to bed share at night with their children (Graph 12).

Graph 11- Temperament of the child



Graph 12: Maternal awareness of early childhood caries

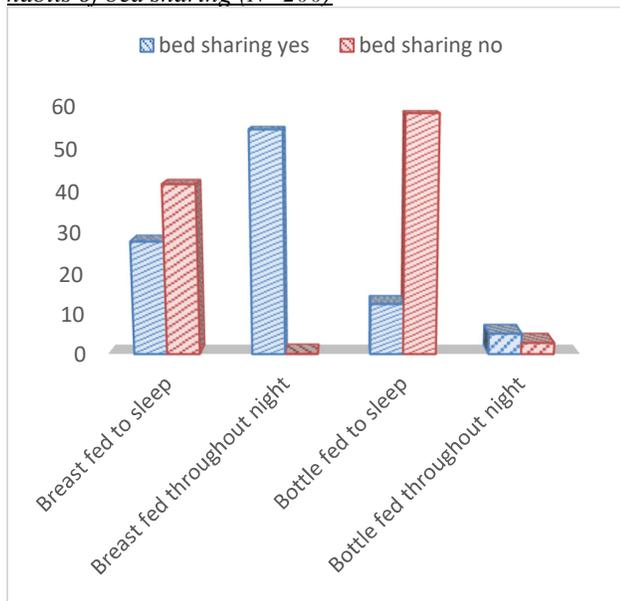


In this randomly selected sample of the mother-child dyads visiting the hospital, 176 dyads were found to be bed sharers and 24 were non-bed sharers. Among the 176 infants who bed shared, 54.5% of the infants were breast fed throughout night, 42.6% of the infants were breast fed to sleep, 12.5% of the infant were bottle fed to sleep and 5.1% infants were bottle fed throughout the night. The study comprised of 24 non-bed sharers. Among them, 83.3% of them were breast fed to sleep and 16.6% of them were bottle fed to sleep. None of these infants were breast fed or bottle fed through the night (Graph 13).

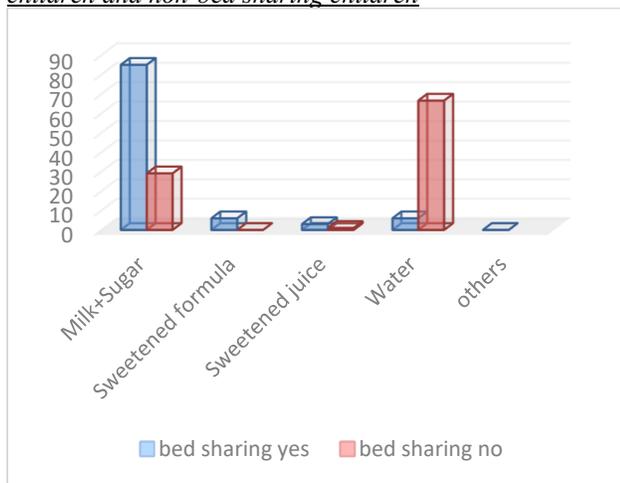
The bottle contents of the bed sharers mainly consisted of milk and sugar (85%), followed by sweetened formula (7%), followed by plain water (5%), followed by sweetened juice (3%). The bottle contents of the non-bed sharers mainly consisted of water (66.6%), followed by milk and sugar (29.1%), followed by (1%) sweetened juice (Graph 14).



Graph 13: Significant factors associated with mother-child habits of bed sharing (N=200)



Graph 14: Nighttime bottle contents of bed sharing children and non-bed sharing children

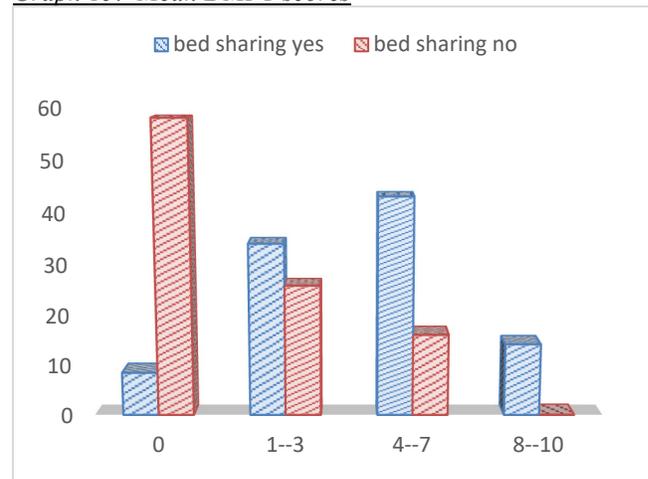


For bed sharers; the mean DMFT showed that 43.1% of the children who bed shared had a DMF scores range of 4-7, followed by 34% children in the range of 1-3, followed by 14.2% children in the range of 8-10, followed by only 8.5% children showing zero DMF scores.

For non-bed sharers; the mean DMFT scores for 58% non bed sharing children were zero, followed by 25.8% children in the range of 1-3, followed by 16.1% children in the range of 4-7. There was no child in the DMFT range of 8-10 (Graph 15). The mean DMFT scores for the non-bed shares at nighttime was 0.65 ± 0.40 . The individual DMFT scores of the children who bed shared and had nighttime feeding habits were compared to the mean DMFT of the non-bed sharers. The children who bed

shared and breast fed had a mean DMFT of 1.86 ± 1.03 , children who bed shared and bottle fed on milk and sugar had a mean DMFT of 3.65 ± 2.47 , bed shared and bottle fed on sweetened formula had a mean DMFT of 3.11 ± 1.87 , bed shared and bottle fed on sweetened juice had mean DMFT of 2.97 ± 1.03 , bed shared and bottle fed on plain water had mean DMFT of 0.31 ± 2.47 .

Graph 15: Mean DMFT scores



4. Discussion:

The present study demonstrated a higher prevalence of bed sharing among the study population with 176 mother-children dyads bed sharing every night of the whole week. This finding is in agreement to relevant literature which claims that the non-white Asian population shows higher prevalence of bed sharing with their infants (Colson, et al. 2013; Lozoff et al. 1996; Lahr, et al. 2007). Increased prevalence of bed sharing was linked to the African-American, Hispanic or maternal race other than the Caucasians as reported by NISP (Colson, et al., 2013; Axelsen, et al. 2016). It has a common norm to bed share for a minimum of 2-3 nights by the African-American families, irrespective of the socio-economic status as stated by Lozoff et al. 1996. Adam/Pacific islanders, African Americans and Hispanics are more likely to bedshare as reported by Lahr MB et al. 2007. Children from a maternal ethnic race other than Caucasians i.e. the African Americans and Hispanics reported higher rates of bed sharing in the study done by Colson et al. 2013. This hugely correlates with the present study as the population of the study largely consisted solely of South East Asian Indians for whom bed sharing with their infants was a common norm.

The current study shows the association between the total income of the family and its correlation with bed sharing. Most of the lower socio-economic families' bed shared with their infants than the families with a better socio-economic background (Lozoff et al., 1996).



In our study, most children who bed shared with their mothers were 2 years or younger, followed by the children who were between 2-3 years. A portion of the children who were between 3-4 years also bed shared with their mothers. There is abundance of literature citing the fact that infants below the age of 2 bed share with their mothers. Increased bedsharing was associated with infants younger than 15 weeks compared to infants 16 weeks or older, according to the studies done by NISP (Colson et al. 2013). Fewer studies have been done on bed sharing for children above 2 years. According to the study done by Axelsen R et al. (2016), 51% of children between 3-4 years bed shared with their mothers while in our study only 11% of the children between 3-4 years bed shared with their mothers.

According to our study, pre-term infants were more likely to bed share with their mothers. While this point is in correlation to the study done by Colson et al. (2013) it yields a different view from the study done by Iglowstein et al. (2007) who found no significant differences in sleep behavior, including bed sharing between preterm and full-term children over the first decade of life (Colson et al. 2013; Iglowstein et al. 2007).

Results from regression analysis show that children whose mothers did not perceive them as calm were almost twice as likely to bedshare as those who were perceived as having a calm temperament. Santos & Quinonez (2014) in their study found that children who were easily soothed were less likely to get sweetened liquids, indicating that temperament may be associated with feeding practices. Also, children who had early childhood caries were more likely to show temperaments of fear, frustration, sadness, and shyness; but the temporal relationship could not be determined. Spitz et al. (2006) reported that children who were perceived as difficult were more likely to be bottle-fed to sleep. A similar finding was reported by Axelsen, et al (2016). These studies suggest that a child's temperament can have an effect on nighttime feeding practices, eventually influencing the child's caries risk. Shantinath et al. 1996 reported that sleep problems among young children are a risk factor for nighttime bottle use and early childhood caries indicating that a child's temperament can have an effect on nighttime feeding practices, which may consequently influence the child's caries risk.

While looking into the relationship between nighttime bedsharing and clinical variables, we found that presence of cavitated and non-cavitated lesions were significantly associated at the bivariate level. Children who bed shared with their mothers at night were in the high caries-risk category at both bivariate and logistic regression levels. Children who bed shared at night and were breast fed or bottle fed on sweetened products were more likely to be in this high-risk category.

5. Conclusion:

This study showed that children, who bed shared with their mothers every night of the week were mostly below two years old, healthy, living with both parents, were perceived to be stubborn and were more likely to either breast feed throughout the night, or breastfeed or bottle feed to help them sleep. The children who bed shared for every night of the week also reportedly had higher caries rate than those who did not bed share. This study is important since it shows few practices that are associated with nighttime bed sharing habit and which consequently places the child at a higher risk for developing caries.

Hence the dentists should inquire about the feeding habits (especially the night time feeding practices) as well as the night time bed sharing habits of the mother-children dyads so that adequate counseling can be provided to the mother, if needed and preventive strategies can be made targeted especially at mothers and children who bed share at night.

Corresponding Author:

Venkatesh Babu, Professor and Head
Department of Pediatric and Preventive dentistry, V.S
Dental College and Hospital Bangalore, Karnataka,
India
E-mail: drnsvbabu@gmail.com

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