

## Sleep In Infants –A Pilot Study In North Karnataka

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### ABSTRACT

**Background:** Normal growth and development, emotional wellness, and immune function all require adequate sleep. Sleep is commonly thought to be a time when the mind and body relax and recover, but in reality, sleep is a period of significant neuronal and physiological activity. This study intends to find the prevalence of sleep disturbance in typically developing infants.

**Methodology:**The study included 60 participants. The parents of the participants who met the study criteria were administered a questionnaire including demographic details of the child and questions pertaining to the sleep behaviour of their child during the first 12 months of life. The data collected was subjected to appropriate statistical analysis.

**Result:** The study included 60 participants of either gender in the age group of 12-24 months. The mean birth weight of all the children was 2891.6 ( $\pm 553.9$ ) grams. The mean age of sleep development of all participants was 4.18 ( $\pm 2.61$ ) months. Pearson's correlation analysis revealed that there was no statistical significance between mother's age at delivery and birth weights or sleep development age of children. Also, the birth weight and sleep development age of children didn't correlate with each other. A large number [50(83%)] of children developed the sleep pattern by 6 months of age, which was significant at a z-value of 7.303 at p-value of  $< 0.00001$ .

**Discussion:** The mean birth weight of boys was higher than the girls. The boys also developed the circadian sleep wake cycle slightly later than girls. However, no significant correlation was found between birth weights and sleep development ages of children. Majority of the infants developed the sleep rhythm in first 6 months of life whereas a small proportion developed it later till 12 months of age.

**Conclusion:** The boys developed the circadian sleep wake cycle slightly later than the girls. However, maximum children developed the sleep pattern by 6 months.

**Keywords:** Sleep; Infants; Sleep Behaviour; Circadian Rhythm.

### INTRODUCTION

Sleep is a reversible behavioural state of reduced attentiveness and interaction with the environment. Although it is commonly believed that sleep is a time for the body and mind to relax and recover, there is actually a lot of neurological and physiological activity during sleep. The fact that infants and young children spend the majority of their time sleeping suggests that sleep is crucial for the body and

brain to develop. The mean youngster has spent more time sleeping by the time they are three years old than they have in all of their wakeful activities.<sup>1</sup>

The circadian rhythm starts to develop at 2 to 3 months.<sup>2</sup> Social cues like feeding times and bedtime rituals start to affect sleep/wake patterns as well. Sleep needs lessen and sleep/wake state organisation gets better as the baby gets older. There is a consolidation of night-time

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sleep, and separate naps form during the day. The longest period of uninterrupted sleep is typically 6 hours long by the time a baby is 6 months old.<sup>3</sup> The nocturnal sleep phase is often divided into two lengthy naps that are separated by one night-time feeding. Children normally sleep 14 to 15 hours per day by the time they turn one year, with the majority of the time spent asleep and the remaining hours taken during one to two daytime naps.<sup>1,3</sup>

Pre-sleep behaviours include feeding, rocking, and being held frequently co-occur with sleep onset in young infants.<sup>4</sup> Sleep disturbances may be due to Sleep Onset or Sleep Continuity Problems.<sup>5</sup>

Poor quality of night time sleep may have day time behavioural manifestations, such as poor concentration, impulsivity and over activity.<sup>6</sup> Sleep disturbance has been strong associated with increased risk of anxiety, speech, behavioural, attention and learning problems; depression and developmental delay.<sup>7</sup>

Sleep disturbances have been reported to affect the physical, emotional and cognitive development and performance significantly among children with cerebral palsy than typically developing children. Children with cerebral palsy have a higher incidents of awaking after sleep onset, initiating and maintaining sleep, sleep wake transition, sleep breathing disorders, excessive day time sleeping etc. than typically developing children.<sup>8</sup>

Based on previous studies, the prevalence of individual sleep disorders is 3.2% to 25.5%.<sup>9</sup>

Sleep has been found to influence the various aspects of development in children and also reported to influence development of children with cerebral palsy. As sleep disturbance has been strongly associated with an increased risk of developmental delay, it could be used as a predictor for early identification of any developmental issues in infants. Most of the sleep related studies reported were done in children from 4 to 10 years of age. None of the studies in infants were found during the search for review of literature. Thus, the objective of this study was to identify sleep development patterns in infants

in our geographic location, so as to facilitate early identification and intervention for prevention of delays and better developmental outcomes.

## METHODOLOGY

Ethical permission was obtained for the data collection related to the study.

### Inclusion Criteria

Typically developing infants of either gender aged 12 to 24 months were included in the study.

### Exclusion Criteria

Children with a known diagnosis of neurodevelopmental delay, genetic or metabolic disorders were excluded from participation in the study.

100 infants were screened for inclusion and exclusion criteria prior to participation in the study. 4 children had Down's syndrome, 6 children were not well at the time of data collection, parents of 12 children were not available (children accompanied by caretakers and/or grandparents) for data collection and 18 parents did not agree for participation in the study. Thus, the data of 60 children was collected and further subjected to analysis.

## RESULTS

The data of 60 children was subjected to appropriate statistical analysis using Statistical Package for Social Sciences (SPSS) Version 23.0. Descriptive analysis was done using means, standard deviations and percentages. All calculations were performed at  $p < 0.05$  as statistically significant.

The 60 participating children included 34 (56.6%) boys and 26 (43.3%) girls in the age group of 12 to 24 months. The proportion of boys and girls in the study was not significantly different with a z-value of 1.4606 at p-value of 0.1.

Mean birth weight of all the children was 2891.6 ( $\pm 553.9$ ) grams with boys and girls at 2914.7 ( $\pm 604.0$ ) and 2861.5 ( $\pm 490.7$ ) grams respectively. The birth weights were not significantly different with a t-value at 0.365 at a p-value of 0.7.

**Table 1- Frequency Distribution of Parental Responses**

	QUESTIONS	NV	OC	SM	OFT	AL
		N(%)	N (%)	N (%)	N (%)	N (%)
1	Resisted going to bed	25 (41.7)	11 (18.3)	12 (20)	3 (5)	9 (15)
2	Difficulty in falling asleep?	42 (70)	7 (11.7)	7 (11.7)	1 (1.7)	3 (5)
3	Jerks body parts when asleep?	38 (63.3)	12 (20)	8 (13.3)	1 (1.7)	1 (1.7)
4	Woke up more than twice at night?	16 (26.7)	7 (11.7)	18 (30)	6 (10)	13 (21.7)
5	Difficulty to fall asleep again after waking up?	40 (66.7)	10 (16.7)	7 (11.7)	-	3 (5)
6	Making sounds in sleep?	46 (76.7)	5 (8.3)	5 (8.3)	3 (5)	1 (1.7)
7	Wakes up by crying?	33 (55)	14 (23.3)	11(18.3)	1 (1.7)	1 (1.7)
8	Snoring?	42 (70)	6 (10)	9 (15)	1 (1.7)	2 (3.3)

NV-Never, OC-Occasionally, SM-Sometimes, OFT- Often, AL-Always

The mean age of sleep development of all participants was 4.18 ( $\pm 2.61$ ) months, with the boys and girls at 4.4( $\pm 2.72$ ) and 3.9( $\pm 2.47$ ) months respectively. The sleep development age were not significantly different with a t-value of 0.773 at a p-value of 0.4.

Table 1 shows that the number of responses of parents about their children's sleep. Parents of a significant number of children reported that the children woke up twice or more. Parents of children also reported that their children never made sounds in sleep (76.7), had any difficulty in falling asleep (70), had snoring (70), had difficulty falling asleep after waking up (66.7), had jerky movements of body parts (63.3), woke up by crying (55), resisted to going to bed (41.7), woke up more than twice (26.7).

Pearson's correlation analysis between mother's age at delivery and birth weight of the children revealed that there was no statistically significant correlation with r-value of 0.006 at p-value of 0.9. It also revealed that there was no significant correlation between mother's age at delivery and sleep development age of the children with r-value of -0.237 at P value of 0.07. Also, there was no significant correlation between the birth weight and the sleep development age of children with r-value of -0.034 at p-value of the proportion of children with sleep development age  $\leq 6$  [50(83%)] and 6-12 [10(17%)] months is statistically significant with a z-value of 7.303 at p-value of  $< 0.00001$ .

**Table 2: Sleep Development Age Wise Z-Score.**

	$\leq 6$ months	6-12 months
BOYS	27	7
GIRLS	23	3
TOTAL	50	10

## DISCUSSION

The gender representation of girls and boys was equal among the 60 participating children.

Mean birth weight of the boys was higher than the girls in the study, however it was not statistically significant. This result is partly supported by an article which also suggests that male children have significantly higher birth weight. The result of our study may not have been significant as the sample included was very small as compared to the other study which has reported that gender would influence the birth weight and male neonates would have a significantly higher birth weights than the female neonates.<sup>10</sup>

The mean age of sleep development of boys was higher than the girls in the study, however it was not statistically significant. This implies that boys developed the circadian sleep wake cycle slightly later than the girls. A study has reported that girls sleep longer and have better sleep quality than boys. It also reports that Sex differences in sleep appear in infancy and persist into childhood and adult life mediated by oestradiol which plays a role in cortical maturation and function as early as fetal life.<sup>11</sup>

A very weak positive correlation existed between mother's age at delivery and birth

weight of the children which was not statistically significant. This implies that as the maternal age at delivery increased the child's birth weight decreased. A number of studies have reported that child's birth weight decreased with increasing maternal age.<sup>12-17</sup> A very weak negative and statistically non-significant correlation existed between the sleep development age of the children and the mother's age at delivery and also the birth weight of the children. However, no articles discussing the influence of maternal age at child birth and child's birth weight on child's sleep development age were found during the search for review of literature.

It also revealed that there was no significant correlation between the birth weight and the sleep development age of children. However, no supporting or refuting articles for the same were found.

## CONCLUSION

This is one of the very few studies reporting the sleep behaviour in infants. There are various biopsychosocial and environmental factors that influence the sleep behaviour in infants. In view of the sleep behaviour of infants in the first 12 months of infancy, this study would like to conclude that boys included in the study, developed the circadian sleep wake cycle slightly later than girls. However, there was no significant correlation found between the birth weight and the sleep development age of the participants. Also, it was noted that a very large proportion of the infants developed the circadian pattern of sleep by 6 months of age.

However, these results may not be generalised to the entire population as the sample size was small and limited to a single geographic location. The study further included only typically developing children and the various maternal psychological factors which may have influenced child behaviours were not taken into account in the study.

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