Sleep and Behavioral Problems among Preschool Children: Correlations from Pakistan Urban

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ABSTRACT

The study was undertaken to explore patterns, habits, and problems for sleep in preschool children of urban Karachi, Pakistan. Two schools participated with a sample size of 297 preschool children. A cross-sectional study design was implemented. The mean age of children was 4.6 ± 0.71 years, and the male/female ratio was 49:51. The average daily sleep duration (nocturnal + daytime nap) was 9.51 ± 1.21 hours. At least one sleep problem was reported in 73% of children, the most frequently found sleep problems were, bedtime and wakeup resistance (25.6%), sleepy or tired during the day (46%), complains of growing pains in the legs (25%), nocturnal enuresis (19%) and nighttime fears (18%). Sleep problems were found significantly correlated with: child clinging to an adult (r = 0.134, p value 0.021), whining (r = 0.213, p value <0.001), fussing (r = 0.136, p value 0.019), prosocial behavior (r = -0.137, p value 0.019), peer problems (r = 0.151, p value 0.009), hyperactivity (r = 0.216, p value <0.001), conduct problems (r = 0.313, p value <0.001), emotional problems (r = 0.346, p value <0.001) and SDQ total difficulty score (r = 0.398, p value < 0.001). Sleep inconsistencies begin during early years; sleep disorders result from poor sleep habits and poor sleep habits results in insufficient sleep. The findings confirmed raising parental awareness on sleep hygiene to recognize and seek appropriate healthcare as and when needed. It is however recommended to introduce interventions involving schools, healthcare practitioners and parents to improve the situation. Another important recommendation is to plan future research involving objective measures to capture sleep duration in children, such as actigraph or sleep diaries maintained by parents for more accurate ways to measure sleep duration.

Key words: Sleep hygiene, sleep disorders**,** sleep duration**,** technology, parents' knowledge, and perceptions

INTRODUCTION

Sleep is a significant marker of physical and psychological health during which body restores itself. Optimal sleep during early years has positive effects on executive functioning, memory consolidation [1], peer acceptance, and social skills [2]. Poor sleep on the other hand, in terms of both quality and quantity adversely effects academic performance [3]. Preschool children with less than 9.4 hours of sleep were found to demonstrate problems with behavior, such as, anger, aggression, hyperactivity, impulsivity, and tantrums [4]. Alongside, naps have been found to be associated with better memory among preschoolers [5], however, this was found true for habitual nappers only [6]. Findings from research and systematic reviews reported association between sleep duration and childhood obesity [7].

No consensus was found among health experts regarding the optimal sleep hours for preschool children [8]. In the United States the average sleep duration for preschool children was found to be 10.47 hours [4]. National Sleep Foundation (USA) recommends at least 11 to 13 hours of sleep for preschool children; similar findings were reported by other research studies [9]. More literature providing estimates on average sleep recommends 10 to 12 hours for preschoolers [3,10]. Based on the literature, there seems to be an anomaly and wide variation in individual sleep patterns among children of same age [11].

Apart from the duration, 14 to 27% of preschool children are reported to have sleep problems [12]. A recent

meta-analysis of 66 studies estimated 37.6% pooled prevalence of sleep problems among children [13]. Sleep problems reported in literature include children's resistance to go to bed, multiple nighttime awakenings, difficulty initiating or maintaining sleep, fears associated with sleep, and irregular sleep schedule. A comparative study of Japanese preschoolers revealed that children with delayed bedtimes also had less hours of nocturnal sleep, long naps, and shorter sleep durations. Problem behaviors were also high among this group with delayed bedtimes [5]. Having television in children's bedroom [14] and use of caffeinated drinks before bedtime [15] was also found to have strong associations with sleep problems, late-night routines, interrupted sleep, and shorter sleep duration. Sleep environment, sleep routine, and daytime activities are also found to have influence on sleep problems [16]. Poor quality sleep is associated with emotional, behavioral, and health problems. A systematic review of 69 studies on 0 to 4 years old children reported association between inadequate sleep and obesity, poor emotional regulation, impaired growth and higher risk of injuries [17].

Sleep is an important element of children's growth and development. According to pediatricians, sleep is as important as nutrition and exercise, sleep tends to be related to physiological and psychological health. Though sleep is fundamentally a biological process, sleep practices worldwide are culturally embedded [11]. Less literature is available on sleep patterns particularly from South Asian countries. The researchers did not find any studies related to sleep in preschool children from Pakistan. Therefore, this research was designed to understand sleeping patterns, habits, problems and to assess how behavioral, parental, and other contextual factors influence sleep duration and problems of preschool children in urban setting.

MATERIALS AND METHODS

This was a cross-sectional study, the study setting was a highly reputable private school system in Karachi, a cosmopolitan city of Pakistan. The population of Karachi based on Census (2017) is 16 million.

The sample size of the study was based on prevalence of sleep problems (14 to 43%) derived from the literature. For associated factors 0.5 proportion was used to get maximum sample size. With 5% level of significance and 80% power, the estimated sample size was calculated to be at least 377 preschool children. The sample size provided 95% confidence that the sample proportion was within ± 5% of the true prevalence of sleep duration and sleep problems. Adding another 10% for refusal, the total estimated sample size was 415 preschool children.

A structured survey questionnaire was adapted from National Sleep Foundation (https://www.sleepfoundation.org/) to capture various aspects of sleep patterns, behaviors, and problems. A section was added to capture the socio demographic variables and caregivers' sleep routine. Strengths and Difficulties Questionnaire (SDQ-Urdu) was used to measure children's behavior. The SDQ contains 25 items and measures of psychological attributes across five domains; emotional problems, peer problems, conduct problems, hyperactivity, and prosocial behavior. The survey questionnaire was translated into Urdu (local language) and then back translated into English to establish accuracy. The Urdu version of the questionnaire was pretested on similar population before its actual implementation.

List of students was acquired from schools, from each of these list, weighted sample was randomly generated from computer. An orientation session was held with parents, those showing willingness were recruited. Written consent was taken before the administration of questionnaire. Psychologists performed data collection; one-day training was provided to these psychologists to train them on administration of survey questionnaire. The respondents were primary caregiver, and information was collected retrospectively based on caregivers' experiences related to child's sleep during the past 2 weeks. The data was collected during 2017-18.

The data was entered on predesigned password protected Epidata software. Analysis was done on SPSS 19.

Hard copies of survey questionnaires were kept in lock and key. Backup of these files was kept password protected on port drive. An archival log was maintained to keep track of incoming data from each school and to follow the back-and-forth movement of forms with missing or inaccurate information. Data analysis involved descriptive statistics, means and standard deviation of continuous variables and proportions and percentages for categorical variables. Correlations were tested between demographic variables, sleep habits, sleep problems, home environment, and behavioral problems.

The overarching principles of academic integrity, honesty, and respect for people was the guiding principle of ethical considerations for this research. A transparent procedure for informed consent was employed. Participants were informed of their right to withdraw from the study without any harm. The participants' decision to refrain from answering question/s was respected. Confidentiality of the collected information was ensured at all levels. The study ensured minimizing risks and harms involved during data collection. Confidentiality and anonymity of study participants was completely ensured. Ethical approval was sought from the Aga Khan University –Ethical Review Committee.

RESULTS

Demographic Characteristics

The achieved sample size was 297 from two schools (182 + 115) with a 78.7% response rate. The respondents mainly involved mothers (72.7%), fathers (23.6%), and the rest were grandmothers and aunts (3.7%). Table 1 demonstrate demographic characteristics of study population. The mean age of children was 4.6 ± 0.71 years, with 143 (48.1%) boys. The difference between gender was insignificant (p value 0.523). Majority of the mothers (74.4%) were homemakers and half of the respondents lived in extended families with a mean of 6.08 ($\pm$ 3.02) family members, majority lived in a 3-room housing. Mean monthly income of the families was PKR 60,820 ($\pm$ 57,831) and mean per capita monthly income was PKR 11,540 ($\pm$ 11,258).

Daily Routine of Preschool Children

On an average, 18 hours of weekday routine was captured as demonstrated in Fig 1. Significant amount of children's time was spent on sleep (nocturnal plus naptime) and schooling. Many children were also found engaged in after school activities, which mainly involved going for religious education- *Madrassas*. Apart from that, substantial amount of time was spent on school homework (1.15 hours), internet (0.48 hours) and watching TV (0.41 hours).

Sleep Duration

In Fig 2, sleep duration was captured on a continuous scale as the sum of naptime and nocturnal sleep hours. The mean sleep duration for preschool children was 9.51 ± 1.21 hours, of which the mean night hours were 8.15 ± 1.14 and mean naptime was 1.35 ± 1.04 hours. Around 56% of the sampled children slept for 10 hours or more during the entire 24 hours. More than two-third of the children were found to take naps (78.2%). Significant correlation was found between age of child and sleep duration (p value – 0.040) indicating decrease in duration as the age increases. Time spent on school homework ((p value – 0.002) and family income (p value – 0.026) was found significantly correlated with sleep duration. Gender was found insignificant to sleep duration (p value – 0.880).

Sleep Habits

Table 2 provides information regarding sleep timings. The mean sleep onset time during weekdays was 10.10 ± 1.43 pm and median was10.30 pm. A huge proportion of children (79.4%) were found to sleep after 10 pm and the sleep onset time was found significantly correlated with wakeup time (p value < 0.001) and

duration of sleep (p value < 0.001). As shown in table 3, the mean wakeup time was 6.45 ± 0.28 am and median was 7.00 am. Naptime was found significantly correlated with sleep duration (p value < 0.001). The mean time taken to fall asleep was 2.56 ± 13.7 minutes and was found significantly correlated with children taking naps (p value = 0.022). Majority (89.6%) of children had an established bedtime routine; predominantly comprising of, using technology (44.5%), reading stories (39.4%), and praying (33.7%). Few children (28%) were found to brush teeth before going to bed.

Sleep Environment

Table 3 demonstrate fewer children (3.4%) with personal bedrooms and majority of children shared bedrooms with parents (77.1%) or siblings (14.1%). Only one-third of the preschool children had their own bed and the rest shared bed with parents, siblings, or family members. Having television in the bedroom was found significantly correlated with sleep duration (p value – 0.008) and sleep onset time (p value – 0.026). A quarter of the children were found to have sleepovers during weeknights, which was found significantly correlated to sleep duration (p value – 0.032).

Sleep Problems

Sleep problem was defined as a problem occurring at least ? 3 nights per week. Based on the caregivers' report, 73% of the preschool children were found to have at least one sleep problem. The most common sleep problems as shown by Fig 3 are complaints of uncomfortable feeling in legs (26.6%), followed by difficulty in waking up during morning (25.6%) and crying accompanied by refusal to leave the bed (23.9%). Gender difference was found insignificant for sleep problems (p value – 0.071).

Behavioral Problems

Table 4 provides information on behavioral problems among study sample. Based on this information sleep problems were found significantly correlated with child clinging to an adult (r = 0.134, p value – 0.021), child whining (r = 0.213, p value <0.001), child fussing (r = 0.136, p value 0.019), prosocial behavior (r = -0.137, p value 0.019), peer problems (r = 0.151, p value – 0.009), hyperactivity (r = 0.216, p value <0.0on this 01), conduct problems (r = 0.313, p value <0.001), emotional problems (r = 0.346, p value <0.001) and SDQ total difficulty score (r = 0.398, p value < 0.001). Correlation between sleep duration and sleep problems was found insignificant (p value – 0.136).

Parents' Perceptions regarding Children's sleep habits

According to Table 5, only 16% of the parents reported correct knowledge of sleep duration required by preschoolers. Very few parents (8.8%) were aware that their child had any sleep problems. Most parents (59.6%) were content with children's sleeping habits and did not wish to change anything; however, a few (16.5%) did want to change the time their child went to bed. Very few caregivers perceived that their children's sleep was affected by various factors (20.9%). Only a minority of parents cited causes, such as stressful situations at home (3%) and exposure to stressful news on television (2.4%) influencing children's sleep. Few parents (7.4%) also reported use of medicines to induce child's sleep. Half of the caregivers reported that their children had similar sleep schedules throughout the week including weekends. However, based on the data, the correlation between sleep duration during weekdays and weekends was highly significant (p value – 0.001). Parents' knowledge of sleep duration was found significantly correlated to sleep duration (p value < 0.001).

DISCUSSION

To our knowledge, this is the first study in Pakistan providing a snapshot of sleep duration, sleep problems

and sleep environment in preschool children. The findings clearly suggest that majority of preschoolers are getting insufficient sleep. Sleep problems are also on rise and sleep environment needs urgent attention.

The mean sleep duration for the sample was 9.51 ± 1.21 hours. A research study from India reported 10.32 ± 1.18 hours of sleep duration for 3 to 10 years' school-going children [18]. Taveras et al. (2009) reported Latino preschool children sleeping less than 11 hours. In addition, a greater proportion of children were found to take naps in this study (78%) compared to India (28.2%) [18] and Saudi Arabia (40.8%) [19]. The proportion of children taking naps is found to be extremely high in Eastern societies as compared to West [20].

Co-sleeping / bed sharing is found more prevalent in many countries, either as a cultural practice [21], sense of security [22] or due to non-availability of separate rooms for family members. Co-sleeping for the study sample was very high (68%) as compared to 12.4% in Saudi Arabia [19], 5% in Italy [23]. From India, co-sleeping was found in the range of 69 to 93% [18].

A high number of children (44.5%) were using technology at bedtime. TV in the bedroom was found significantly correlated with sleep onset and sleep duration. In China, 18.5% children were found to have television and 18.3% were found to have computers in bedrooms [17]. Television was found significantly associated with late onset, late awakening and shorter sleep duration. Several studies demonstrated that playing video games and watching TV was found strongly associated with bedtime resistance and delayed sleep onset [19]. Daily routine and monitoring by parents for children's bedtime and screen time have been found associated with better sleep quality and reduced behavioral problems. Based on the research evidence around the globe, the presence of electronic and technological devices in children's bedroom needs serious considerations on the quality and quantity of children's sleep.

Sleep problems were very high (73%) in this study compared to 42% in India [18]. The possibility of under and over estimation cannot be ruled out based on parents recall bias or parents reporting the most desirable and culturally appropriate responses. The most common sleep problems found in this study were found consistent with literature from other countries [18, 19]. Research studies asserted that sleep problems lead to health and behavior problems with higher rates of attention deficit/hyperactivity disorder [24]. More future research is required in the context of Pakistan to understand sleep influences on cognitive and social-emotional behavior.

Hiscock et al. (2007) reported that children with sleep problems were more likely to have behavioral problems. We also found correlations between sleep problems and behavioral problems among preschool children in this study. Many studies have found significant associations between sleep duration and behavioral problems [25], however, the data could not establish significant correlations between sleep duration and behavioral problems for this research.

LIMITATIONS

Sleep measurements can be subjective or objective [11]. The current findings should be interpreted with care, as the data collection was based on parents report only without using any objective measures for confirmation. Most of the literature available on sleep was found to rely on self-report or reported by parents. Objective measures to capture sleep duration in children, such as actigraph or sleep diaries maintained by parents are more accurate ways to measure sleep duration for future studies. There is also a possibility of recall bias due to the cross-sectional design of the study. The results of this research cannot be generalized and extrapolated to the entire preschool population in Pakistan, particularly the rural areas where these results might be completely different.

CONCLUSION

Sleep inconsistencies begins early and continues throughout adult life. Inadequate sleep contributes to ill health and behavioral problems. Sleep problems are a result of poor sleep habits and poor sleep habits result in insufficient sleep. Children in urban contexts are more sensitive to environments resulting in inadequate sleep. In addition, parents lack of awareness for proper sleep habits, routines and physical and socio-emotional environment, further influence children's sleep. Interventions involving schools, healthcare practitioners and parents could be an effective option to improve the situation. Parental awareness is crucial as preschool children are completely reliant on parents to recognize and seek appropriate care related to sleep as and when needed.

ACKNOWLEDGEMENT:

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Table 1. Demographic characteristics of preschool children in Karachi, Pakistan (**N = 297**)

Characteristics	Frequency (%)
Family Setup	
Nuclear	150 (50.5)
Extended / Joint	147 (49.5)
No. of People in the HH Mean ± SD	6.25 (4.15)
No. of rooms Mean ± SD	3.41 (1.87)
Gender of Child	
Female	154 (51.9)
Male	143 (48.1)
Age of child (in years)	
2 to 2.99	05 (1.7)
3 to 3.99	57 (19.2)
4 to 4.99	131 (44.1)
5 and above	104 (35)
Child's Birth Order (N = 294)	
1st	148 (50.3)
2nd	89 (30.3)
3rd	46 (15.6)

4th and above	11 (3.7)
Fathers' Education (N = 293)	
Under Matric (< 10th Grade)	16 (5.4)
Matric	39 (13.3)
Intermediate	53 (18.0)
Bachelors (4 years / Pass)	95 (32.4)
MBBS /Engineers / LLB/ Nursing diploma	11 (3.7)
Master's	77 (26.2)
PhD	01 (0.3)
Madrassa	01 (0.3)
Mothers' Education (N=287)	
Under Matric (10th Grade)	08 (2.7)
Matric	45 (15.6)
Intermediate	63 (21.9)
Bachelors (4 years / Pass)	108 (37.6)
MBBS / Engineers / LLB/ Nursing dip.	12(4.1)
Master's	48 (16.7)
PhD	02 (0.6)
Madrassa	01 (0.1)
Mothers' Occupation	
Professional, technical, and related professions	52
Administrative and Managerial Workers	01 (0.3)
Clerical and related workers	05 (1.7)
Sales Professionals	07 (2.3)
Service Professionals	08 (2.7)
Home Makers	221 (74.4)
Not reported / Don't know	03 (1.0)
Fathers' Occupation	
Professional, technical, and related professions	56 (
Administrative and Managerial Workers	36 (12.1)
Clerical and related workers	66 (22.2)
Sales Professionals	105 (35.3)
Service Professionals	08 (2.7)
Agriculture / Fisherman	01 (0.3)
Production and related professionals	11 (3.7)
Others	07 (2.4)
Not reported / Don't know	07 (2.4)
Monthly Family Income in PKR (N = 259)	
8000 to 30,000	79 (30.5)
31,000 to 45,000	52 (20.1)
> 45,000	128 (49.4)
Mean (SD)	60820 (57831)

Median	45000
Number of Rooms in the house	
Up to 2 rooms	101 (34)
3 rooms	89 (30)
4 rooms	55 (18.5)
5 or more	51 (17.2)
Min, Max	(1, 12)
Mean (SD)	03 (02)
Household Members	
Up to 4 members	94 (31.6)
5 members	73 (24.6)
6 and more members	130 (43.8)

Table 2. Sleep Habits of preschool study population in Karachi, Pakistan **(N=297**)

Characteristics	**Frequency (%)**
Bedtime	
7:00 – 7:59 PM	04 (1.3)
8:00 – 8:59 PM	13 (4.4)
9:00 – 9:59 PM	44 (14.7)
10:00 – 10:59 PM	119 (40)
11:00 – 11:59 PM	80 (26.9)
12:00 – 12:59 AM	30 (10.1)
1:00 – 1:59 AM	07 (2.4)
Wakeup Time	
5:00 – 5:59 am	08(2.6)
6:00 – 6:59 am	135 (45.5)
7:00 – 7:59 am	153 (51.6)
8:00 – 8:59 am	01 (0.3)
Sleep Duration (7:00 pm to 8:00 am)	
Less than 8 hours	87 (29.3)
8:00 to 8:59 hours	111 (37.3)
9:00 to 9:59 hours	64 (21.6)
10:00 to 10:59 hours	26 (8.7)
11:00 and more hours	9 (2.9)
MEAN (SD)	8:15 (1:14)
MEDIAN	8:00
Sleep Duration on Weekends	
Mean (SD)	9.47 (1.60)
Median	9.00
Children with Bedtime routine	266 (89.6)

Activities during Bedtime Routine Multiple Response)	
Teeth brush	83 (27.9)
Story time	117 (39.4)
Eating	42 (14.1)
Praying	100 (33.7)
Singing / listening to Music	22 (7.4)
Technology	132 (44.5)
Eating	4.2 (7.7)
Bathing	04 (1.3)
Spending time with family	18 (6.1)
Playing Outdoor	05 (1.7)
Sleep Latency (in mins)	
0	29 (9.8)
0.1 – 5	57 (19.1)
5.1 – 10	58 (19.5)
10.1 – 15	57 (19.2)
15.1 – 20	23 (7.7)
20.1 – 25	2 (0.7)
25.1 – 30	57 (19.2)
30.1 and more	14 (4.7)
Mean (SD)	2.56 (13.7)
Median	0.15
Naptime Duration (N = 232)	
Less than an hour	03 (1.0)
1 to 1:59 hours	66 (22.1)
2 to 2:59 hours	108 (36.3)
3 to 3:59 hours	47 (15.8)
4 hours	08 (2.7)
Mean (SD)	1.35 ± 1.04
MEDIAN	2.00
Total time children slept during 24 hours	
Mean (SD)	9:51 (1:21)
Median	10:00

Table 3. Sleep Environment of preschool study population in Karachi, Pakistan (**N=297**)

Characteristics	Frequency (%)
Bedroom (N=291)	
Children with own Bedroom	10 (3.4)
Sharing bedroom with Siblings	42 (14.1)
Sharing bedroom with Parents	229 (77.1)

Sharing bedroom with Aunty / grandparents	10 (3.3)
Child with own bed	
Yes	96 (32.3)
No	201 (67.7)
Items in the room where child slept	
Television	145 (48.8)
Computer	129 (43.4)
Telephone / Cell Phone	200 (67.3)
Night lamp	143 (48.1)
Who Puts child to bed	
By him/herself	78 (26.3)
By father	29 (9.8)
By mother	173 (58.2)
By both parents	12 (4.0)
By Siblings	02 (0.7)
By Grandmother	03 (1.0)
Adult present in the room when child falls asleep (N=296)	
Every night	247 (83.5)
A few nights a week	13 (4.4)
Rarely	08 (2.7)
Never	28 (9.4)
Children spending weeknights at relatives	75 (25.3)

Table 4. Behavior of preschool study population in Karachi, Pakistan (**N=297**)

Characteristic (Multiple Responses)	Frequency (%)
Child fall asleep in class	24 (8.1)
Parents called upon in school for child complains	64 (21.5)
Child have difficulty making friends	74 (24.9)
Easily Distracted	239 (80.5)
Fidgety	160 (53.9)
Late to school due to oversleeping	68 (22.9)
Missed school due to oversleeping	37 (12.5)
Fuss	244 (82.2)
Whine or complain	158 (53.2)
Cling to an adult	

Table 5. Parents Perceptions (PP) Regarding Children's Sleep (**N = 297**)

Characteristics	Frequency (%)
PP that their child is getting….	

Less Sleep	45 (15.1)
More Sleep	07 (2.4)
Adequate Sleep	245 (82.5)
PP for hours of sleep required for preschool children	
7 to 7:59 hours	11 (3.7)
8 to 8:59 hours	74 (24.9)
9 to 9:59 hours	56 (18.8)
10 to 10:59 hours	108 (36.4)
11 to 11:59 hours	14 (4.7)
12 hours and more	34 (11.4)
PP for children's Sleep Patterns on Weekends compared to Weekdays	
Less sleep	36 (12.1)
More sleep	114 (38.4)
Same amount of sleep	147 (49.5)
PP if their child have any sleep problems	26 (8.8)
Things Parents want to change regarding children's sleep habits	
Time to go to bed	49 (16.5)
Time to wakeup	11(3.7)
Duration of Sleep	11 (3.7)
Behavior at bedtime	05 (1.7)
Nothing to change	177 (59.6)
Others	44 (14.8)
PP for child's sleep being disturbed……	
Due to stressful situations at home	09 (3.0)
Due to stressful news on TV	07 (2.4)
Other reasons	46 (15.5)
Use of Medicines to induce sleep	22 (7.4)

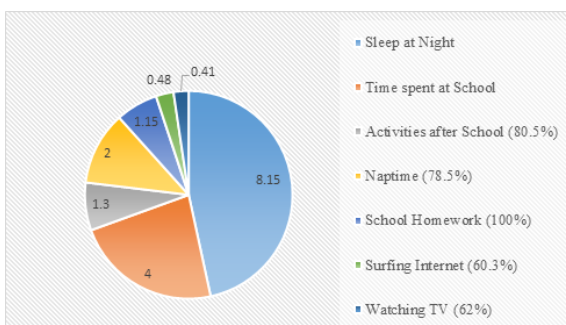Fig 1. Preschool Children's Daily Routine (in Hours)
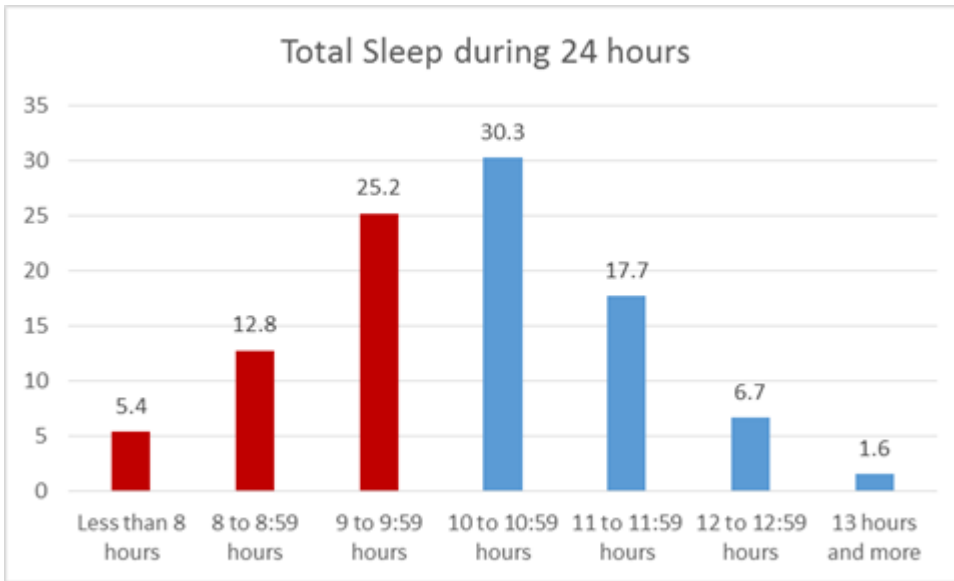
Fig 2. Distribution of Sleep Duration during 24 hours

Fig 3. Frequency (%) of various sleep problems in preschool children (**N=297**)