Survey on the Relationship between Sleep Habits and Children`s Growth in Ahvaz City 2015

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Abstract

Background: Exact determination between children's sleep habits and their growth could help us to prevent this risk factor of children's growth disorders. Thus this research was performed to investigate the correlation between sleep habits and growth of preschool children in Ahvaz- Iran.

Materials and Methods: In this cross-sectional study, the data was obtained by using available sampling from 208 children of 3-6 years old that came to a private pediatric clinic in Ahvaz, South West of Iran in 2015 without regard to their gender. Measurement of height and weight of all patients with the meter and scale was performed. After measuring height and weight, stature-for- age and weight-for- age percentiles was calculated using child growth chart calculator of CDC for each child. Information on the onset time of night sleep, time to wake up in the morning and nap duration of children were gathered using researcher made questionnaire. Data analysis was performed with descriptive statistic and Kendall's tau-b statistical test using SPSS-19.

Results: Results of this study showed of the 208 children that were evaluated, 32 of them (15.38%) was stunted, underweight, or both and 176 (84.6%) of them hadn`t any growth disorder. Results of Kendall's tau test showed that there is no significant relationship between the onset time of night sleep, waking up time in the morning, nap duration and neither height-for-age percentile nor weight-for-age percentile of preschool children (P>0.05).

Conclusion
The results of this study showed that children sleep habits does not affect their stature and weight-percentile. But this isn`t mean that going to sleep late has no effect on children's health, since the establishment of a normal sleep-wake rhythm is essential for both physical and mental development in children, so it is necessary to educate parents regarding the importance of children's sleep.

Key Words: Children, Sleep Habits, Growth.

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1- INTRODUCTION

First years of life are the most important period of growth and development of human being (1). Three index for measuring children's growth problems are stunting (low height for age), underweight (low weight for age) and wasting (low weight for height) (2). These problems can be risk factors for children's morbidity, mortality and lead to unpleasant consequence on different aspects of human life in future (3). For example stunting affects three aspects including health, development and economic in long duration and cause to adult shortness, obesity and its negative health consequence, reducing reproductive power, loss of productivity in school, decreased learning ability, decreased working ability and reduce economic output (4).

Growth problems are global issues. According to world health organization (WHO) report, there is approximately 97 million children under 5 years who are underweight and 167 million children under 5 years who are suffering from stunting in developing countries (5 ,6). As well cases of growth problems are found in Iran that most of them are suffering from stunting (7, 8).

Several genetic and environmental factors affect children's growth. Genetic factors such as parent's height have direct influence on children's growth and could predict their adulthood height. It seems genetic factors are more effective in children height growth than weight gain (9). Non genetic factors such as birth weight, nutritional status, growth hormone (GH) and diseases also affect children's growth (10, 11). Other effective non-genetic factors are sleep habits and one of them is late night sleep (12, 13).

Since the bulk of GH pulse secretion occurs shortly after sleep onset, altering in sleep-wake cycle could lead to GH release

inhibition (14). On the other hand, melatonin hormone that is secreted during night, inhibit osteoclast activity and vice versa for osteoblast activity that induce bone growth (15, 16).

Previous studies have shown the relationship between night sleep duration and weight gain of children (17-20). But the ones that survey the relationship between onset times of night sleep, waking up time in the morning and children growth are a few (21, 22). In addition field investigation showed that majority of parents particularly parents of children with growth problems complaint about the time of their children going to sleep at night. So we decided to survey the relationship between sleep habits and preschool children`s growth.

2- MATERIALS AND METHODS

2-1. Study design and population

In a cross sectional study, the data was obtained by using available sampling from 208 children of 3-6 years old that came to a private pediatric clinic in Ahvaz city, Southwest of Iran in 2015 without regard to their gender. Sample size due to the inclusion and exclusion criteria and based on the conducted pilot study with considering the prevalence of late night sleep and wake up late in the morning (P1=0.68) in children with growth disorder and (P2=0.50) in children with normal growth and also 95% confidence level and 80% power, by using NCSS software was 208 children. Inclusion criteria include: no underlying physical and mental disease such as diabetes, congenital heart disease, renal disease, attention deficit/hyperactivity disorder (ADHD). Exclusion criteria: include lack of parental permission to participate in the study.

2-2. Measuring tools

Measurement of height and weight of all patients by expert researcher with the same tools(meter from Seca brand made in

Germany and scale from accumed brand, type SYE2010A1 made in china) and with the proposed way by WHO in this specialist clinic for routine was performed (23). After measuring Stature and weight, Stature -for- age and weight-for- age percentiles was calculated by using child growth chart calculator of Center for disease control and prevention (CDC) for each child. Children with weight, Stature or both less than the 5th percentile were considered as having growth disorder (24). First of all physical and mental health status of children were investigated through oral questions from parents and also observation of the children`s records.

Demographic information and child`s data on Stature, weight, the onset time of night sleep, time to wake up in the morning, nap duration, age and gender were gathered using researcher made questionnaire. The questionnaire consisted of two parts; the first part include 5 questions about demographic information and the second part include 5 questions about height, weight, the onset time of night sleep, time to wake up in the morning, nap duration. The questionnaire was given to 10 pediatrics faculty members of Medical School and their comments were applied in the questionnaire. To confirm the reliability, questionnaires for 10 children at once were completed by the researcher and researcher assistant. The obtained data was entered in the SPSS-19, reliability of the questionnaire was confirmed with 0.86 correlation coefficient. P- value- <0.05 was considered.

2-3. Ethical considerations

The Ethics Committee of Ahvaz Jundishapur University of Medical Sciences approved the study (ID number: GP93014) and all of the children parents provided written informed consent. Participation in the study was voluntary and the questionnaires had no name. Data were extracted all the questionnaires, in general.

2-4. Data analysis

Data analysis was performed using SPSS-19 software in the way that to express the frequency of each of the variables, descriptive statistic was used; to measure statistical correlation and also continuity between sleep habits of child and his height growth and weight gain, kendall's tau statistical test was used.

3. RESULTS

The sample size in this study was 208 and during study no attrition was occurred. Finally 208 children aged 3 to 6 years old, were studied. Results of the study showed that 51.4% of subjects were male and 48.6% of them were female. Most of the studied children (41.3%) aged 3 to 4 years old. The majority of subjects (53.3%) were 15 to 20 kg and most of them (46.6%) were 100 to 110 cm. Results showed that 20.2% of children were in 25 to 50 weight percentile and 33.6% of them were in 50 to 75 Stature percentile (**Table.1**).

Of the 208 children that were evaluated, 32 (15.38%) of them was stunted, underweight or both and 176 (84.6%) of them hadn`t any growth disorder. Results showed that 0.5% of children just were stunted, 5.8% of them just were underweight and 9.1% of them had both disorders (stunted and underweight). The more details are presented in (**Figure.1**).

The majority of participants (51%) were going to bed between 12 MN to 2 AM. The more details of information is presented in (**Figure.2**). Also, 47.6% of participants were waking up between 10 AM to 12 MD (**Figure.3**). Results showed that the majority of children (52.9%) were taking a siesta; and majority of their afternoon nap duration (18.8%) was 60 to 90 minutes (**Figure.4**).

Results of Kendall tau test showed that there is no significant correlation between the onset time of night sleep and neither Stature percentile (r=0.06; P=0.303) nor

weight percentile (r=0.075; P=0.198) of children ages 3 to 6 years old. Also the results of this test showed that there is no significant correlation between wake up time and neither Stature percentile (r= 0.064; P=0.275) nor weight percentile (r= 0.025; P=0.666) of children ages 3 to 6 years old. Furthermore results of kendall tau test showed that there is no significant correlation between the afternoon nap duration and neither Stature -for-age percentile (r= -0.102; P=0.069) nor weight-for-age percentile (r= -0.063; P=0.258) of the children (**Table.2**).

Table1: Frequency and percentages of Stature and Weight percentile and demographic information in 3–6 year-old children

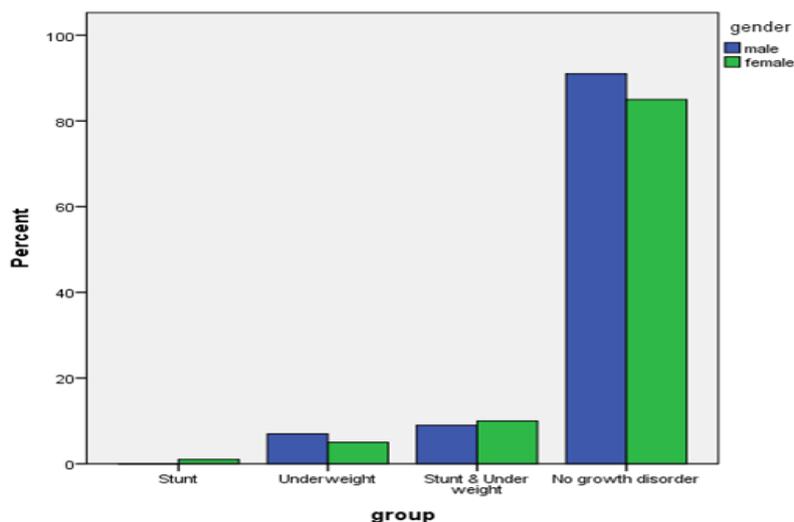| Variables		Frequency	Percent
Gender	Male	107	51.4
	Female	101	48.6
Age	Between 3-3.5 year	45	21.6
	Between 3.5-4 year	41	19.7
	Between 4-4.5 year	40	19.2
	Between 4.5-5 year	28	13.5
	Between 5-5.5 year	29	13.9
	Between 5.5-6 year	25	12
Weight	15-10kg	81	38.9
	20-15kg	111	53.5
	25-20kg	15	7.1
	25<kg	1	0.5
Stature	90>cm	11	5.3
	100-90cm	78	37.5
	120-100cm	96	46.2
	120<cm	23	11.1
Weight percentile	*5>	31	14.9
	10-5	21	10.1
	25-10	35	16.8
	50-25	42	20.2
	75-50	45	21.6
	90-75	26	12.5
	95-90	1	0.5
	95<	7	3.4
Stature percentile	*5>	21	10.1
	10-5	18	8.7
	25-10	36	17.3
	50-25	52	25
	75-50	70	33.6
	90-75	4	1.9
	95-90	7	3.4
	95<	0	0

*Stunted and underweight.

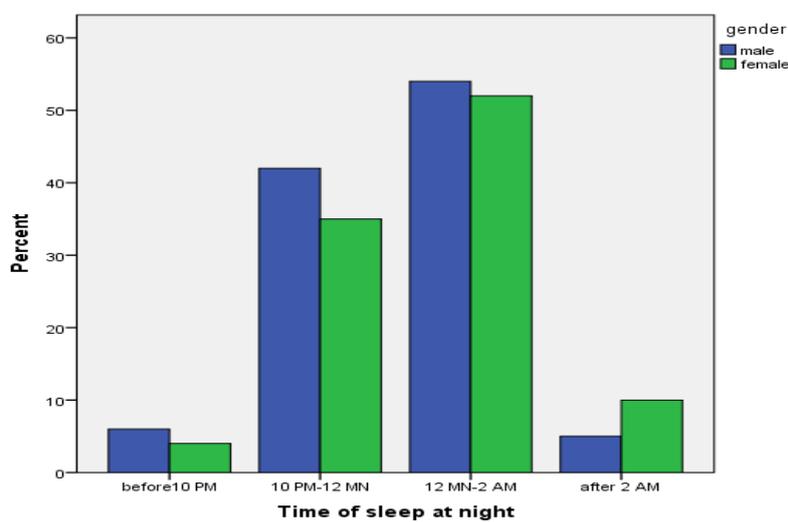**Fig.1:** Percentages of growth status in 3–6 year-old children

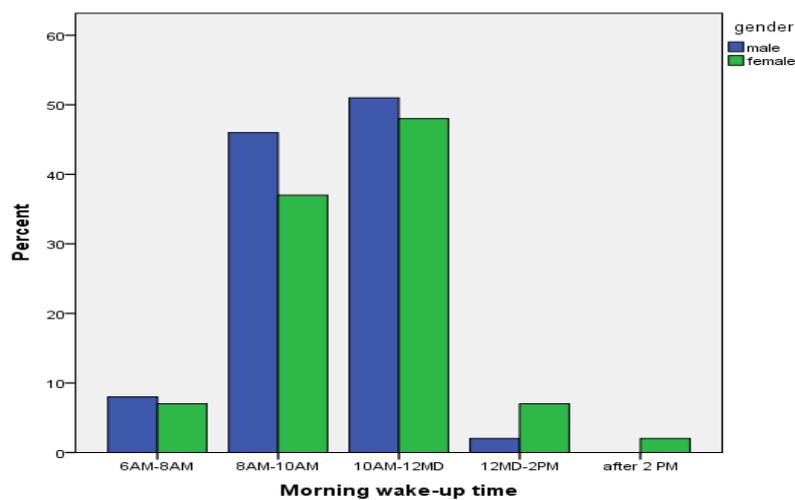**Fig.2**: Percentages of time of sleep at night in 3–6 year-old children

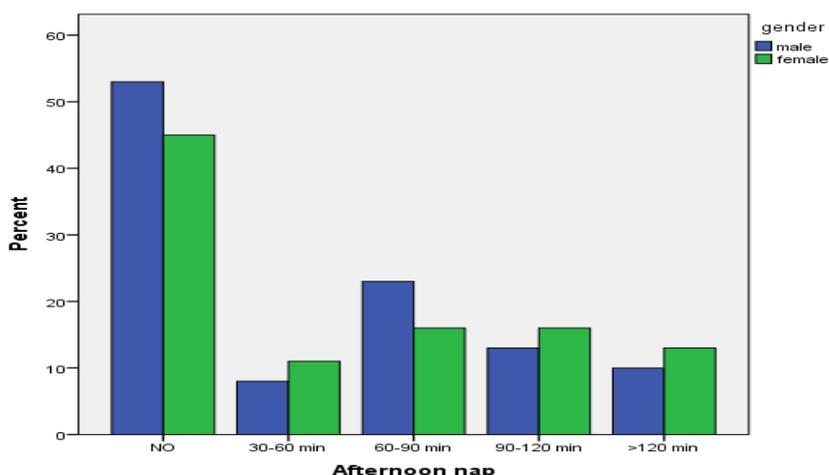**Fig.3**: Percentages of morning wake-up times in 3–6 year-old children

Fig.4: Percentages of Afternoon nap status in 3–6 year-old children

Table: Comparison the categorical pain intensity during the intervention in control and interventional groups by fisher test

Variable type	Kendall's Tau-b test	Variable type	
		Stature percentile	Time of Sleep at night
Stature percentile	Pearson correlation	1.000	0.060
	Sig.(2- tailed)	-	0.303
	N	208	208
Time of Sleep at night	Pearson correlation	0.060	1.000
	Sig.(2- tailed)	0.303	-
	N	208	208
		Weight percentile	Time of Sleep at night
Weight percentile	Pearson correlation	1.000	0.075
	Sig.(2- tailed)	-	0.198
	N	208	208
Time of Sleep at night	Pearson correlation	0.075	1.000
	Sig.(2- tailed)	0.198	-
	N	208	208
		Stature percentile	Morning wake-up time
Stature percentile	Pearson correlation	1.000	0.064
	Sig.(2- tailed)	-	0.275
	N	208	208
Morning wake-up time	Pearson correlation	0.064	1.000
	Sig.(2- tailed)	0.275	-
	N	208	208
		Weight percentile	Morning wake-up time
Weight percentile	Pearson correlation	1.000	0.025
	Sig.(2- tailed)	-	0.666
	N	208	208
Morning wake-up time	Pearson correlation	0.025	1.000
	Sig.(2- tailed)	0.666	-
	N	208	208
		Stature percentile	Siesta
Stature percentile	Pearson correlation	1.000	0.102-
	Sig.(2- tailed)	-	0.069
	N	208	208

		Weight percentile	Afternoon nap
Siesta	Pearson correlation	0.102-	1.000
	Sig.(2- tailed)	0.069	-
	N	208	208
		Weight percentile	Afternoon nap
Weight percentile	Pearson correlation	1.000	0.063-
	Sig.(2- tailed)	-	0.258
	N	208	208
Afternoon nap	Pearson correlation	0.063-	1.000
	Sig.(2- tailed)	0.258	-
	N	208	208

4- DISCUSSION

The results of study showed that 51.4% of subjects were male and 48.6% of them were female. Furthermore the age ranged of majority of subjects (41.3%) were 3 to 4 years old. These results are almost in line with results study of Araki et al. (2008) (13); although the result is difference with the study of Javadi et al. (2014), due to the mean age of their subjects was 4.17+0.8 (22). Although in our study the age is considered as a ranking variable.

The present study showed that the majority of participants (51%) were going to bed between 12 AM to 2 AM and the 47.6% of participants were waking up between 10 AM to 12 PM. These results are almost in line with results study of Javadi et al., their study results showed that the average sleep duration among the children was 10:54 (SD 00:48) h/day, participants went to bed late (23:18 h SD 00:48) and waking up early (09:26 h; SD 01:00). Daytime sleepiness was reported by 6.9% of the participants (22).

The results of this study showed that 10.1% of children were stunted (Stature percentile <5) and 14.9% of them were underweight (weight percentile <5). While results of Payandeh et al. (2013) showed that 7.5% of children were underweight and 12.5% of them were stunted (7). The reason of this difference may be the difference in weather conditions in the Northeast and Southwest or even racial

difference. Another reason may be due to difference in sample sizes. Since in that study 70,339 children aged 0 to 5 years old were investigated.

Results of study showed that there is no significant correlation between the onset time of night sleep/ wake up time in the morning and children growth (Stature /weight). These results are in line with Kohyama et al. study (2002) (21); they concluded from their study that there is no significant relationship between the onset time of night sleep and the average stature / weight and BMI of children ages 3 years old. But this isn`t mean that going to sleep late has no effect on children health; late night sleep and waking up late could affect other aspects of physical and mental health of children. For example results of Yokomaku`s study (2008) showed that late night sleep, waking up late and irregular sleep pattern have negative effects on mental health of children ages 4 to 6 years old (25).

The finding of Eshaghie et al. showed that there is a significant and direct relationship between sleep disorders and behavioral problems in primary school student (26). Also, the results of Araki`s study showed that the establishment of a normal sleep-wake rhythm is essential for both physical and mental development in children (13).

The results of Fan and et al study (2009) showed that obesity in children who slept less than 9 hours at night is more than

those who slept at least 11 hours (19). The results study of Spruyt and et al. (2011) in Canada, Kentucky on 308 children ages 4 to 10 years old showed that sleep duration of obese children during the week comparison with weekend had more variation and sleep duration of obese children at the weekend was less than others, in addition less sleep duration and more irregularity in sleep could activate inflammatory pathways that has adverse effects on insulin sensitivity and lipid profiles in obese children (12).

The results of the current study showed that there is no significant correlation between afternoon nap duration and neither Stature -for-age percentile nor weight-for-age percentile of children ages 3 to 6 years old. These results confirm the results of this study about lack of communication between sleep habits and growth (Stature /weight) of children. Furthermore according to the peak of GH is at night sleep (27), we can conclude the effect of GH on nap is unimportant.

5. CONCLUSION

The results of this study showed that children sleep habits does not affect their stature and weight percentile. But this isn`t mean that going to sleep late has no effect on children's health, since the establishment of a normal sleep-wake rhythm is essential for both physical and mental development in children, so it is necessary to educate parents regarding the importance of children's sleep.

6- CONFLICT OF INTEREST: None.

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