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Effect of Environment on Sleep Efficiency in Thai Children

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ABSTRACT

This study aimed to determine the environment effect to the sleep efficiency of Thai children in Thailand. Participants in this study were investigated by using the Denver Development Screening Test (DDST) for measuring their usual development. The normal development participants were questioned about the sleep characteristics and were recorded the sleep log by their parents. The target population of this study was both male and female Thai children who were lived central part of Thailand. Data collection was conducted in a two-month period during February to March 2006. Twenty-seven Thai children were selected by purposive sampling. Sample size was 20-30 cases. The participants of this study were more girl (n = 79, 58.52%) than boy (n = 56, 41.48%). Their age ranged from 0-6 years with the mean and standard deviation of 3.19 and 0.50 years, respectively. More than half of the participants (n = 85, 62.97%) were 0-3 years. Regarding to the health status, the result of this study demonstrated that the health condition of the children's emotion and behavior prior the experimental procedures. Generally, more than half of the participants did not have any illness or disconfirm one week prior the experiment and were not under frequent medical administration. Most of the participants had positive emotion and friendly or socialization. Sleep environment of the children at home was the main factor in which might influence the children's sleeping behavior and attitude of following or postponing the bed time. The result of this study shows that the participants are easy awaked during sleep via the environmental influence. More importantly, it can be significantly altered the sleep cycle of the children and effect the results of the study.

Key words: Environmental influence, health promotion, sleep behavior, sleep efficiency, sleep pattern, sleep characteristics

INTRODUCTION

Sleep is one of the basic needs of human beings and is very important for physical and mental health (Schibler and Fay, 1990). For children, each child, especially the newborn, has an individual sleep pattern with a different amount and length of sleeping time (Wong, 1999). Sleep is the best rest and basic to human survival. One-third of the human life span spends on sleeping (Eveloff, 1995; Shaver and Giblin, 1989). The sleep-wake cycle, which follows the circadian rhythm in a 24- h cycle, is mediated by the neurotransmitters, hormone level and temperature (Eveloff, 1995). Newborn infants spend about two thirds of time sleeping in order to promote growth and development during the early phase of life (Kohyama, 1998). Term infants spend 16 to 18 h sleeping each day (Kick, 1996). The sleep pattern of newborn infants is a cycle which

can be divided into 2 states; active sleep or Rapid Eye Movement (REM) and quiet sleep or Non Rapid Eye Movement (NREM). Each cycle lasts from 50 to 60 mins. Normally, the sleep pattern will begin with active sleep for about 10 to 45 min, followed by quiet sleep which lasts about 20 min (Catlett and Holditch-Davis, 1990). Arousal of newborn infant appears after one or two sleep cycles (Thomas, 1995). Sleep in the newborn infant, especially quiet sleep, will enhance growth and restore basic tissue: this is necessary for recovery and rehabilitation of health (Schibler and Fay, 1990). In addition, quiet sleep produces the highest oxygenation level which may be beneficial for infants with respiratory problems. Active sleep is important for memory, learning and psychological adaptation and it has been hypothesized 'as being necessary for brain development (Catelett and Holditch-Davis, 1990). The sleep pattern of newborn infants is controlled by the relative maturity of the Central Nervous System (CNS) (Balsmeyer, 1990). Healthy newborn infants always demonstrate the sleep pattern as described above. Premature infants, who are born before the end of the last day of the 37th week of gestation, still have an immature body system and CNS which affects their sleep patterns (Ashwill and Droske, 1992). Both the active and quiet sleep of premature infants are poorly organized and of short duration, as they easily respond to stimuli and move from quiet sleep to active sleep (Gardner *et al.,* 1993). Also, premature infants are unprepared for life outside the uterine environment and demonstrate inappropriate adaptation which is linked to the immature function of neurophysiological development. They have an imbalance of all subsystems from the syndactive theory e.g., autonomic system, motor system, state organization system, attention/interactive and self-regulatory system. Especially, the state organization system involves the display of different ranges of sleeping and waking, and displays clarification of states where they are present (NANN, 1995). This inappropriate adaptation results in most premature infants being admitted to a neonatal intensive care unit (Modrcin-McCarthy *et al.,* 1997). However, the extra-uterine environment of the hospital itself poses dangers to sleep. Environmental conditions which adversely affect normal sleep-wake patterns during hospitalization include poorly established light-dark differences, the continuous noise of monitors and staff conversation, exposure to activities and treatment protocols which mandate frequent interruption of sleep (Schibler and Fay, 1990). The Hypotheses of the present study includes (a) the normal sleep pattern in Thai children both aged 0-3 years and 3.1-6 years are different to the other studies and (b) the differentiation of normal sleep pattern in Thai Children that aged 0-3 years and 3-6 years, respectively.

MATERIALS AND METHODS

Population and sample: The target population of this study was both male and female Thai children who were lived central part of Thailand. Data collection was conducted in a two-month period during February to March 2006. Twenty-seven Thai children were selected by purposive sampling based on criteria as follows: (1) normal delivery, (2) normal birth weight (more than 2,500 g, less than 4,000 g), (3) have no head injury during delivery, (4) there are no seizure symptom, (5) must not a premature baby, (6) there are no illness before 7 days and during the experiment, (7) no history of sleep abnormality or disorder, (8) newborn should sleep with his/her parents, and (9) parents are fully agreed and sign the agreement of the experiment.

Sample size: The sample size for this study was 135 participants. Participants aged from 0 to 6 years were divided into two groups. The first group was aged 0-3 year's olds (n = 85) and the second group was aged 3.1-6 year's olds (n = 50). The participants of this study were Thai children who lived in the central part of Bangkok, Thailand. The data was collected from February to March 2006.

Instrumentation: The instruments for data collection were consisted of (1) the demographic data recording form was developed by the researchers which consisted of usual sleep pattern at home including bedtime, wake time, total sleep time, daily living activities before sleep and sleep disturbing factor and (2) instruments for data collection of the sleep-wake patterns in premature infants including (a) video camera Panasonic Model. No. NY-Vx7EN, and video cassette (size 4×7.3 inches).

Data analysis: The data was analyzed according to (1) frequency and percentage of the subjects classified by demographic data and (2) observation to the sleep patterns of children from videotape, coded in the observation record for duration and sleep-wake states. Data obtained was then analyzed by using the Software Package of Social Statistic/Personal Computer (SPSS/PC) Version 11.5 in the following criteria (1) the demographic data were reported by descriptive statistics as frequency, percentage, mean and standard deviation and (2) an unpaired t-Test was used to compare the difference in each sleep parameter between the night time and day time recordings.

RESULTS

Demographic characteristics of the participants were shown in Table 1. They were more female (n = 79; 58.52%) than male (n = 56; 41.48%). Their age ranged from 0-6 years with the mean and standard deviation of 3.19 and 0.50 years, respectively. More than half of the participants (n = 85; 62.97%) were 0-3 years.

Table 1 shows the number and the percentages that calculated from the frequency of the subjects, which are divided into two large groups, gender (boys/girls) and age (0-3 and 3.1-6) differences.

In Table 2, more than half of the respondents (68.15%) reported that the participants did not have any illness or disconfirm one week prior the experiment whereas 31.85% were not. The 91.11% of the participants was not under frequent medical administration. Most of the respondents (100%) reported that the participants had no seizure symptom and had personal history of medical and illness attention (91.11%) whereas the 86.66% had the history in head injury.

Table 3 indicates the health condition of the children's emotion and behavior prior the experimental procedures. The purpose of this questionnaire collection is to test if the children who applied to participate in the experiment have met the requirement and the criteria of the interests. For example, the children respond the negative attitude in the question such as if they are socialized, can be eliminated from the experiment. At the mean time, it is important to understand the health condition of the children as well if they have history in medical illness or head injury, which might affect the results of the experiment via technical scanning.

Table 1: Demographic characteristics of the participants (n = 135)

Characteristics	Frequency	Percentage
Gender		
Boy	56	41.48
Girl	79	58.52
Age (years)		
0-3	85	62.96
3.1-6	50	37.04

Table 2: Health status of Thai child's behavior (n = 135)

Characteristics	Frequency	Percentage
No illness or disconfirm 1 week prior the experiment		
Never	92	68.15
Yes	43	31.85
Under frequent medical administration		
Never	123	91.11
Yes	12	8.89
Seizure symptom		
Never	135	100.00
Yes	0	0.00
Personal history of medical and illness attention		
Never	123	91.11
Yes	12	8.89
History in head injury		
Never	117	86.66
Yes	18	13.34

Table 3: Health status of Thai child's emotion (n = 135)

Characteristics	Frequency	Percentage
Positive emotion		
Yes	119	88.15
No	16	11.85
Socialization/friendly		
Yes	123	91.11
No	12	8.89
Easily aggressive when can't get something desired		
Yes	14	10.38
No	121	89.62
Timid		
Yes	12	8.89
No	123	91.11
Over active		
Yes	98	72.60
No	37	27.40
Over dependent on the care giver		
Yes	10	37.03
No	17	42.97
Flexible		
Yes	107	79.26
No	28	20.74
Routine activity (one time for sleeping and eating)		
Yes	113	83.70
No	22	16.30
Isolated or not		
Single	27	20.00
Group	108	80.00

According to Table 3, most of the respondents reported that the participants had positive emotion (88.15%) and friendly or socialization (91.11%). Only few of the participants (10.38%) was reported easily aggressive when can not get something desired. Additionally, other health status

of the participants include timid (8.89%), over active (72.60%), over dependent on the care giver (37.03%), flexible (79.26%) routine activity by mean of one time for sleeping and eating (83.70%) and isolation (20.0%), respectively.

Based on the Table 4, most of the participants were taken to bed by their parents (68.89%). Only few of the participants (31.11%) was reported to be taken to bed by grand parents and others.

Table 5 demonstrates the results of the questionnaire collection regarding the subjects' behavior and adjustment to the strictly set bed time. Although, some of the behaviors above might be influenced or taught by the family members or the attractiveness of the environment

Table 4: Person who takes the children to bed

Persons	Frequency	Percentage
Parents	93	68.89
Grand parents/others	42	31.11

Table 5: Activity before bed (n = 135)

Characteristics	Frequency	Percentage
Continuous postponing?		
Often (4-7 day/week)	2	1.48
Sometimes (2-3 day/week)	23	17.04
A few (1 day/week)	31	22.96
Never	79	58.52
Not willing to?		
Often (4-7 day/week)	3	2.22
Sometimes (2-3 day/week)	20	14.81
A few (1 day/week)	15	11.11
Never	97	71.86
Fully participated		
Often (4-7 day/week)	74	54.82
Sometimes (2-3 day/week)	23	17.03
A few (1 day/week)	20	14.81
Never	18	13.34
Belonging dependent?		
Often (4-7 day/week)	32	23.70
Sometimes (2-3 day/week)	12	8.89
A few (1 day/week)	3	2.22
Never	88	65.19
Sway head/body?		
Often (4-7 day/week)	2	1.48
Sometimes (2-3 day/week)	9	6.67
A few (1 day/week)	0	0.00
Never	124	91.85
Praying?		
Often (4-7 day/week)	31	22.96
Sometimes (2-3 day/week)	13	9.63
A few (1 day/week)	7	5.19
Never	84	62.22
Touch body?		
Often (4-7 day/week)	7	5.19
Sometimes (2-3 day/week)	0	0.00
A few (1 day/week)	10	7.41
Never	118	87.40

Table 6: Characteristics of sleep behavioral (n = 135)

Characteristics	Frequency	Percentage
Sleep problem insomnia		
Often (4-7 day/week)	0	0
Sometimes (2-3 day/week)	14	10.37
A few (1 day/week)	33	24.44
Never	88	65.19
Sudden crying in the middle of the night		
Often (4-7 day/week)	4	2.97
Sometimes (2-3 day/week)	47	34.81
A few (1 day/week)	39	28.89
Never	45	33.33
Wet bed		
Often (4-7 day/week)	70	51.85
Sometimes (2-3 day/week)	32	23.70
A few (1 day/week)	11	8.15
Never	22	16.30
Mumbling in the dream		
Often (4-7 day/week)	3	2.22
Sometimes (2-3 day/week)	10	7.41
A few (1 day/week)	32	23.70
Never	90	66.67
Sleep walking		
Often (4-7 day/week)	0	0
Sometimes (2-3 day/week)	0	0
A few (1 day/week)	7	5.19
Never	128	94.81
Bruxism		
Often (4-7 day/week)	0	0
Sometimes (2-3 day/week)	4	2.96
A few (1 day/week)	7	5.18
Never	124	91.85
Unstable		
Often (4-7 day/week)	88	65.18
Sometimes (2-3 day/week)	31	22.96
A few (1 day/week)	10	7.41
Never	6	4.44

(TV, toy, or climate), however, it might be relay on the children's willing of participation. Compare to the previous Table 6 indicates more of the sleep behavior of the subjects instead of the activities before bed. According to this table, most of the subjects have the experience of wet bed (51.85%) and unstable in sleep (65.18%), which can stimulate the subjects to wake up or start the new sleep cycle during the sleep duration.

Table 7 shows the sleep environment of the children at home, which might also influence the children's sleeping behavior and attitude of following or postponing the bed time. According to this table, the subjects are not easy awaked during sleep via the environmental influence, it can be significantly altered the sleep cycle of the children and effect the results of the study.

Regarding to the health status, the result of this study demonstrates that the health condition of the children's emotion and behavior prior the experimental procedures. The purpose of this questionnaire collection is to test if the children who applied to participate in the experiment have met the requirement and the criteria of the interests. For example, the children respond the

Table 7: Sleeping environment (n = 135)

Room characteristics	Frequency	Percentage
Mosquito net		
Yes	123	91.11
No	12	8.89
Constant air floe		
Window	131	97.04
No	4	2.96
Supplement to help air flow		
Air conditioner	82	60.74
Fan	53	39.62
Brightness of the room		
Bright	0	0
Dim	69	51.11
Dark	664	8.89
Noise		
Often (4-7 day/week)	2	1.48
Sometimes (2-3 day/week)	20	14.81
A few (1 day/week)	10	7.41
Never	103	76.30
Power		
Often (4-7 day/week)	29	21.48
Sometimes (2-3 day/week)	41	30.37
A few (1 day/week)	12	8.89
Never	82	60.75
Insect		
Often (4-7 day/week)	0	0
Sometimes (2-3 day/week)	17	12.60
A few (1 day/week)	32	23.70
Never	86	63.70
Smell		
Often (4-7 day/week)	0	0
Sometimes (2-3 day/week)	7	5.19
A few (1 day/week)	21	15.55
Never	107	79.26
Light		
Often (4-7 day/week)	3	2.22
Sometimes (2-3 day/week)	21	15.55
A few (1 day/week)	14	10.37
Never	97	71.86

negative attitude in the question such as if they are socialized, can be eliminated from the experiment. At the mean time, it is important to understand the health condition of the children as well if they have history in medical illness or head injury which might affect the results of the experiment via technical scanning. The majority of the participants were positive emotion (88.15%), socialization (91.11%), no timid (91.11%), over active (72.60%), flexible (79.26%), routine activity (83.70%) and play group (80.00%). Most participants were never continuous postponing (58.52%), never not willing to bed (71.86%), often fully participated (54.82%), never belonging dependent (65.19%), never sway head/body (91.85%), never praying (62.22%) and never touch body (87.40%).

Sleep environment of the children at home was the main factor in which might influence the children's sleeping behavior and attitude of following or postponing the bed time. The result of this study shows that the participants are easy awaked during sleep via the environmental influence. More importantly, it can be significantly altered the sleep cycle of the children and effect the results of the study. Additionally, the result of this study indicates more of the sleep behavior of the subjects instead of the activities before bed. That is to say, most of the subjects have the experience of wet bed (51.85%) and unstable in sleep (65.18%), which can stimulate the subjects to wake up or start the new sleep cycle during the sleep duration. Most of the participants sleeping environment room have mosquito net (91.11%), window constant air floe (97.04%), air conditioner supplement to help air flow (60.74%), brightness of the room dim (51.11%) and dark (48.89%). The participants were trouble sleeping environment 4-7 day/week never noise (76.30%), never powder (60.75%), never insect (63.70%), never smell (79.26%) and never light (71.86%).

LIMITATION OF STUDY

The study did not control confounding factors such as noise, lights and nursing activities in the setting in both periods which could have the effect on to the results of the study. Although these issues were previously considered in this study, some factors were scarcely controlled in the real setting. In addition, the sample size in this study was considered a limitation due to high cost of the instrumentals use for data collection. However, the sample size (n = 27) in this study, according to Polit and Hungler (1999) may assure an acceptable number of the sample due to a larger sample size providing greater confidence in generalize ability and increase the accuracy of the results.

CONCLUSION

Sleep environment of the children at home was the main factor in which might influence the children's sleeping behavior and attitude of following or postponing the bed time. The result of this study shows that the participants are easy awaked during sleep via the environmental influence. More importantly, it can be significantly altered the sleep cycle of the children and effect the results of the study.

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