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ARAŞTIRMA MAKALESİ / *RESEARCH ARTICLE*

Sleep Related Nighttime Crying in Early Childhood

Erken Çocukluk Döneminde Uykudan Ağlayarak Uyanma

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ABSTRACT

Objective: There are few studies about sleep-related nighttime crying in early childhood (SRNC). The aim of this study is to determine the prevalence of SRNC and to investigate factors influencing it among 3 to 36-month-old children.

Material and Methods: A questionnaire was administered to the parents of 3-36-month-old children visiting a well-child unit. Sociodemographic features and sleep characteristics of the children were evaluated. Children were divided into four age groups: Group 1=3-5 months, Group 2=6-11 months, Group 3=12-24 months, and Group 4=25-36 months.

Results: The prevalence of SRNC was 32.8% in the overall group; it was most common in Group-1 and Group-2. Of the families of children with SRNC, 43.4% described it as a "problem." SRNC was significantly lower among pacifier users in Group-1, children who wore pajamas in Group-2, and children who bedshared with parents in Group-3.

Conclusion: SRNC is common in early childhood. Concomitant factors change according to the age of the child, and SRNC significantly decreases after two years of age.

Keywords: Sleep, Nighttime Crying, Early Childhood

ÖZ

Amaç: Erken çocukluk döneminde uykudan geceleri ağlayarak uyanma (SRNC) ile ilgili az sayıda çalışma bulunmaktadır. Bu çalışmanın amacı, 3 ila 36 aylık çocuklarda SRNC prevalansını belirlemek ve etkileyen faktörleri araştırmaktır.

Gereç ve Yöntemler: Çocuk Sağlığı İzlem Polikliniğine devam eden 3-36 aylık çocukların ebeveynlerine anket uygulandı. Çocukların sosyodemografik özellikleri ve uyku özellikleri değerlendirildi. Çocuklar dört yaş grubuna ayrıldı; Grup 1= 3-5 ay, Grup 2=6-11 ay, Grup 3=12-24 ay ve Grup 4=25-36 aylık çocuklardan oluşturuldu.

Bulgular: Tüm grupta SRNC prevalansı %32.8 iken, Grup-1 ve Grup-2'de yaygın olduğu görülmüştür. SRNC'li çocuğu olan ailelerin %43.4'ü bunu "sorun" olarak tanımlamıştır. Grup-1'de emzik kullananlarda, Grup-2'de pijama giyenlerde ve Grup-3'te ebeveynleri ile aynı yatağı paylaşan çocuklarda SRNC anlamlı olarak daha düşüktür.

Sonuç: SRNC erken çocukluk döneminde sık görülebilmektedir. Eşlik eden faktörler çocuğun yaşına göre değişmekte ve SRNC iki yaşından sonra önemli ölçüde azalmaktadır.

Anahtar Kelimeler: Uyku, Gece Ağlaması, Erken Çocukluk

INTRODUCTION

Night waking is waking up sometime after falling asleep and is one of the most common behavioral sleep problems in childhood. It has been reported to occur with a frequency of 20-30% (1-2). Behavioral problems can also be seen in children with night awakenings (3). Sleep problems affect not only the health of the child but also the health of other family members (4). It has been reported that without intervention in the early period, sleep problems may continue in the future (5).

After 3 months, long night and day sleep occurs in children by combining 'sleep-wake' cycles to a great extent (6). Night awakenings are the short waking period that occurs at the end of the non-REM period of sleep. While this process is usually not noticed in adults, it can be a longer and more

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troublesome process, especially in children who have fallen asleep conditionally. It has been shown that there are many factors affecting night awakening in children. Some of these are the sleep / wake cycle, the mother's psychological state and maternal depression, the child's temperament, the place where the child sleeps and sleeping together (7-9).

The act of waking at night and crying (Sleep-Related Nighttime Crying (SRNC) - in contrast to waking up from sleep without crying) has been described in the literature and is called 'Yonaki' in Japan. Accordingly, SRNC is a sleep problem that is usually seen between 4-24 months, starts after midnight, and differs from crying due to colic (10). While intermittent SRNC can be considered an acceptable situation, experiencing this problem every night can reduce the quality of sleep and life of both child and parent.

We encountered many studies about night wakings but many fewer which investigated waking up and crying (10,11). The aim of this study is to evaluate early childhood sleep habits with an emphasis on sleep-related night-time crying (SRNC) and to investigate factors associated with SRNC in children aged three to 36 months.

Table 1: Sociodemographic and mother-children properties of cases in the whole cohort and by age grouping

	Total n (%)	Group 1 n (%)	Group 2 n (%)	Group 3 n (%)	Group 4 n (%)	*P*
Mother-child relationship and environment						
Breastfeeding	191(59.7)	51 (96.2)a	66 (88.0)a	70 (53)b	4 (6.7)c	***<0.001****
Permissive parenting	179(56.3)	35 (70)a	53 (70.7)a	69 (51.9)b	22 (36.7)b	***<0.001****
Day trips	180(56.4)	22 (41.5)a	39 (52)a, b	80 (60.6)b	39 (66.1)b	***<0.05****
Watching TV	202(62.9)	20 (38.5)a	36 (47.4)a	94 (70.7)b	52 (86.7)c	***<0.001****
Sleep problems						
Waking every night	159(49.7)	29 (55.8)a	45 (59.2)a	73 (54.9)a	12 (20.3)b	**<0.001***
SRNC	106(32.8)	20 (37.7)a	33 (43.4)a	49 (36.6)a	4 (6.7)b	**<0.001***
Mean number of wakes in SRNC†	3.2	2.8	3.4	3.2	3.0	0.233
Sleep latency	111(34.7)	16 (30.8)	32 (42.1)	44 (33.3)	19 (31.7)	0.467
Resisting going to bed	107(34.2)	8 (16.3)a	23 (31.9)a, b	51 (38.6)b	25 (41.7)b	**< 0.05***
Preparation before sleep and sleeping place						
Preparation before sleep	279(88.3)	42 (82.4)	66 (90.4)	119 (90.2)	52 (86.7)	0.448
Wearing pajamas	256(82.8)	36 (72)a	55 (78.6)a	109 (83.4)a	56 (94.9)b	**< 0.05***
Brushing teeth	31 (9.9)	0 (0)a	0 (0)a	13 (10)b	18 (30)c	**< 0.001***
Using the toilet	51 (16.3)	0 (0)a	2 (2.8)a	14 (10.8)b	35 (58.3)c	**< 0.001***
Feeding	197(63.1)	33 (64.7)a	52 (72.2)a	86 (66.7)a	26 (43.3)b	**< 0.05***
Holding infant on lap	55 (17.6)	14 (27.5)a	18 (25)a	18 (13.8)b	5 (8.3)b	**< 0.05***
Rocking	150(47.9)	25 (49)a,b	42 (58.3)b	63 (48.5)a, b	20 (33.3)a	**< 0.05***
Reading a book	30 (9.6)	1 (2)	3 (4.2)	10 (7.7)	16 (26.7)	DA
Listening to music	42 (13.4)	6 (11.8)	13 (18.1)	13 (10)	10 (16.7)	0.347
Singing a lullaby	115(36.7)	17 (33.3)a,b	36 (50)b	46 (35.4)a	16 (26.7)a	**< 0.05***
Room-sharing	206 (65)	46 (88.5)a	57 (78.1)a	82 (62.1)b	21 (35)c	**< 0.001***
Bed-sharing	40 (12.6)	3 (5.8)	8 (11)	20 (15.2)	9 (15)	0.324
Daytime sleep						
Sleeping during daytime	270(86.8)	46 (92)a	64 (90.1)a	117 (90)a	43 (71.7)b	**< 0.05***
Sleep duration (hour) during daytime*	280 (2.2)	41 (2.9)	66 (2.2)	123 (2.1)	55 (1.9)	**<0.001***

Group 1 (3-5 months), Group 2 (6-11 months), Group 3 (12-24 months), Group 4 (25-36 months)
†: Evaluated among the children with SRNC.
DA: Insufficient data for statistical analysis.
a, b, c: Each subscript letter denotes a subset of age group categories whose column proportions do not differ significantly from each other at the 0.05 level (in post hoc analysis).
*: number in parenthesis denotes the average hours of sleep in the daytime, which is significantly different between Group 1 and 2, Group 1 and 3, and Group 1 and 4.

MATERIALS AND METHODS

This cross-sectional study recruited 3-36-month-old children from a well child follow-up clinic between 1st October 2007 and 31st March 2008. Exclusion criteria were being born at <37th gestational week, those requiring intensive care, those with chronic disease, and <3-month-old children. The recruitment flow chart of the study is shown in Figure 1. A total of 323 parents were included (49.8% of children female) in the study. The study population was divided into four age groups. Group-1= 3-5 months, Group-2= 6-11 months, Group-3= 12-24 months, and Group-4= 25-36 months. Written consent was provided by the parents. The study was approved by the local ethics committee (no.844).

A questionnaire about sleep features was developed by two pediatricians. Sociodemographic information, the most common problems related to sleep, night-time waking, night-time crying, and parental concerns over the years were summed up. A pilot study was performed with 21 families. Some questions were rewritten to make clear statements. Demographic data included child age, sex, type of delivery of child, family structure, number of siblings, parents' ages, parents' educational levels, employment status, and job type.

Children who wake up crying every night were assumed to have SRNC. In cases of SRNC, we asked how many times children wake up, and what parents attempt to calm them for sleep resumption. Evidence of child sleep problems, difficulty in falling asleep, difficulty in maintaining sleep, and waking frequency were also asked. Details of maternal sleeping patterns including evidence of lethargy and/or stress, difficulty in getting out of bed, sleep disorders, and sleep duration were investigated. The main person responsible for childcare and whether parents enjoy providing childcare were recorded. Parental behavior towards their children (permissive or non-

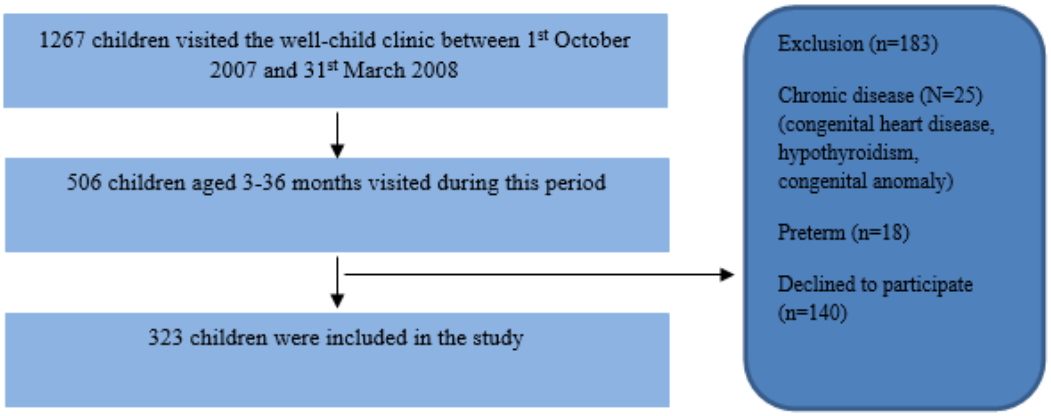

Figure 1: Flow chart showing the derivation of the study population and reasons for exclusion

Table 2: Factors affecting SRNC according to age groups by pairwise comparison.

	Total n	Non-SRNC n/non-SRNC (%)	SRNC n /SRNC(%)	P	x^2
Group 1 (n=53)		21/33(63.6)	6/20 (30)	**0.018**	5.638
Pacifier usage	27				
Group 2 (n=76)					
University graduate mother	34	15/43 (34.9)	19/33 (57.6)	**0.049**	3.889
Sleep latency	32	8/43 (18.6)	24/33 (72.7)	**<0.001**	22.436
Resisting falling asleep	23	8/41 (19.5)	15/31 (48.4)	**0.009**	6.770
Wearing pajamas	55	34/39 (87.2)	21/31 (67.7)	**0.049**	3.876
Listening to music before bed	13	4/41 (9.8)	9/31 (29)	**0.035**	4.433
Rocking before bed	42	19/41(46.3)	23/31 (74.2)	**0.018**	5.634
Group 3 (n=134)					
Sleep disorder in mother					
Breastfeeding					
Permissive parenting	38	18/85 (21.2)	20/49 (40.8)	**0.015**	5.901
Daily trips	70	37/83 (44.6)	33/49 (67.3)	**0.011**	6.413
Bed-sharing	69	37/84 (44)	32/49 (65.3)	**0.018**	5.602
Room-sharing	80	57/84(67.9)	23/48 (47.9)	**0.024**	5.087
Wearing pajamas	20	17/83 (20.5)	3/49 (6.1)	**0.026**	4.942
	82	44/83 (53)	38/49 (77.6)	**0.005**	7.885
	109	72/81 (88.9)	37/49 (75.5)	**0.045**	4.035

Group 1 (3-5 months), Group 2 (6-11 months), Group 3 (12-24 months), Group 4 (25-36 months).

Table 3: Multiple logistic regression analysis of the factors associated with SRNC

	B	Exp B	p	OR (95% CI)
Group-2				
High maternal education level	1.7	5.3	0.020	1.3-21.5
Sleep latency	1.9	7.2	0.002	2-25.5
Not changing into pajamas before sleep	1.9	6.6	0.032	1.7-37.34
Rocking to sleep	1.7	5.24	0.024	1.24-22.1
Group-3				
Maternal sleep disorder	1.1	2.9	0.02	1.2-6.9
Breastfeeding	1.1	3	0.008	1.3-6.9
Parental permissiveness	1.3	3.8	0.002	1.6-8.9
Bedsharing	-1.8	6.3	0.009	1.6-25

Confidence interval 95%, p <0.05 was significant.
In Group-1 only one parameter and in Group-4 no SRNC associated parameters were identified, so logistic regression analyses were not applied.

permissive parenting) was evaluated. Permissive parenting is a parenting style that is characterized by having few and inconsistent rules and a relaxed attitude to parenting (9). Breastfeeding, watching TV, daily trips, and pacifier usage were investigated. Questions about preparations for sleep, including wearing pajamas, brushing teeth, using the toilet, feeding, holding on the lap, rocking child to sleep, reading books, listening to music, and singing a lullaby, were asked. Where children sleep (parents' room-room sharing/parents' bed-bed sharing) and presence of day sleep were recorded.

Statistical Analysis

SPSS version 15 (Chicago, IL, USA) was used for statistical analysis. The Pearson Chi-Square test was used for comparison of qualitative data and the Kruskal Wallis test for numerical data. Logistic regression analyses were applied using the backward stepwise method. All results were evaluated in the 95% confidence interval, with a p<0.05 level of significance.

RESULTS

The mean age was 15.84±9.84 month-old, 4.42±0.49 month-old in Group-1, 8±1.49 month-old in Group-2, 17.52±4.68 month-old in Group-3 and 32±3.37 month-old in Group-4. Of the children, 43% were born by normal delivery. Most of the families were the nuclear type, and offspring proportions were single child 42.5%, two children 42%, and more than two children in 15.5% of the families. In addition, 19.9% of the families contained more than five people. Maternal and paternal age was 32.2±5.5 and 36.1±6.1 years old, respectively. 45.8% of the mothers and 59.5% of the fathers graduated from university. 42.9% of the mothers were housewives, 42.9% were civil servants and 14.2% were employees in the private sector. Of 49.2% at least one of the parents were smokers, and 85% of the smokers denied that they smoked at home. Of the mothers, 43.6% slept less than 6 hours, 42.4% felt stress, 31.6% did not wake easily, and 28.2% had sleep disorders.

Of the families, in 93.2% the main caregiver of the child was the mother. An additional adult assisted with childcare in 42.2% of families (either a close relative such as a grandparent (65.2%) or a babysitter (34.8%)). Most parents (91.6%) indicated that they enjoyed providing childcare.

Mother-child interaction and environmental factors which may affect child sleep patterns are shown in Table 1. As expected, the frequency of breastfeeding decreased with age. While permissive parenting decreased, day trips and the frequency of watching TV significantly increased with age. Sleep problems and characteristics of preparation for sleeping are also shown in Table 1. SRNC frequency was 32.8%, and 56.6% of the families with an SRNC child reported that this was not a problem. The mean frequency of waking episodes per night was 3.2 in the total study group.

The breastfeeding frequency of children with SRNC was 100% in Group 1, 87.9% in Group-2, 67.3% in Group-3, and 25% in Group-4. Only in Group-3 was SRNC significantly higher among breastfed children (Table 2). The most common method for attempting to calm a crying child was feeding (75.5%). Among 12-24-month-olds, there was not any relation between bed-sharing and breastfeeding. Significant risk factors identified in SRNC groups are shown in Table 2.

SRNC families used a pacifier at a lower rate in Group-1, but logistic regression analyses were not possible as no other significant variables were identified. In the logistic regression analysis of Group-2, significant factors associated with SRNC were high maternal education level, sleep latency, not changing into pajamas before sleep, and rocking to sleep. In Group-3, maternal sleep disorder, breastfeeding, and parental permissiveness were risk factors for SRNC, while bed-sharing with parents was protective against SRNC. In Group-4, no SRNC-associated parameters were identified.

DISCUSSION

In this study, SRNC was most prevalent among 6-11-month-old children and significantly decreased after 24 months. Thus, there was a considerable variation between the age groups in our study, although the frequency of SRNC did not vary appreciably between children aged 3 months and those aged nearly two years. This study also identified a number of risk factors associated with SRNC which vary through age groups.

Fukumizu *et al.* reported SRNC frequencies in childhood among 3 age groups: infants (3-6 months), toddlers (18-21 months), and children (36-41 months); they were 18.8%, 64.9% and 59.9% respectively (10). Although we found a higher frequency in the youngest age group, SRNC was less common in the subsequent age groups than in Japanese children. It is of interest that Japanese children older than three years were affected by SRNC nearly 60%. As our study did not recruit children in this age group, it is not possible to directly compare, but the much-reduced frequency of SRNC in our oldest age group of only 6.7% suggests that this trend was unlikely to reverse and thus there is a considerable difference in SRNC frequency among children older than 3 years. However, in a meta-analysis, the frequency of waking up at night had been shown to decrease up to 2 years of age showing a developmental trend, similar to our results (12). Different study locations, hence different sociocultural structures, could be the reason for varying results. Thus, Mindell *et al.* (13) reported that the frequency of sleep problems which occurred between 0-3 years can vary among populations depending on the culture.

In this study, 56.6% of the families with an SRNC child reported that this was not a problem. Other studies from Western countries indicated that children usually develop self-calming behaviors after 12 weeks of age and subsequently night waking studies have become a common investigation issue (14,15). However, mothers from traditional Eastern countries have considered night wakings as "less of a problem." Sixteen percent of Korean mothers (16) of night wakers and 12.8% of Indian mothers (17) of night wakers considered it a sleep disorder, while in our study around half of them stated it was a problem. Sadeh *et al.* (18) described problematic night waking criteria in the early stage of childhood and, similar to our study, night waking over three times a night is one of the criteria. Our study corroborates Sadeh's assertion and similar age groups showed the same frequency at a significant level.

We found that pacifier usage lowers the frequency of SRNC in the 3-5-month age group. Pacifier usage has been reported to be protective against Sudden Infant Death Syndrome but is also associated with reducing the duration of breastfeeding and may cause problems with dental and middle ear health (19). The studies on the effects of pacifiers on sleep are relatively limited and the results are controversial (20,21). We believe that parents of children with SRNC should be advised of the benefits of pacifier use, but this advice should be given in the context of the negative effects, including shortened duration of breastfeeding (22).

A high level of maternal education was a risk factor for SRNC in the 6-11-month age group in this study. Similarly, a low level of maternal education is presented to have a positive effect on sleep patterns in children in a local study from western Türkiye (23). Furthermore, Touchette *et al.* (24) reported that a low level of maternal education status was associated with shorter sleep duration and hyperactivity among 1.5-5-year-old children. There are limited studies on this issue, and the causality of association between maternal educational level and children's sleep problems has not been conclusively demonstrated to date.

A further risk factor associated with SRNC in this study was rocking to sleep in the 6-11-month age group. It has been reported that children who accustomed to particular behaviors before sleep through rocking by their parents are less able to self-calm and more prone to struggle to sleep (25,26). However, changing into pajamas in the same age group was protective against SRNC. Wearing pajamas is a sleep routine. The importance of sleep routines has been indicated in several studies to develop positive sleep habits in children (27-29). In our study, it is striking that the habits of reading books and brushing teeth before bed were not common in children up to the age of two years. We can emphasize to families that providing sleep routines may promote better quality of sleep and are also important for child development.

We found a tendency among parents of children with SRNC to show permissive parenting. This parameter is important, although defining "permissive parenting" is a subjective parameter. The parent-completed questionnaire is probably not reliable. Similar to our results, it has been shown that a permissive parental attitude may lead to sleep problems in children (30).

In our study, SRNC was common in the 12-24-month age group who breastfed. In the literature, night-time feedings and the expectation of night-time feeding reduce SRNC more slowly than in children who have stopped breastfeeding (31). Thus, children that breastfed have more night wakes (32,33). This might be a result of infant-cued parenting by mothers towards their children (34).

Bed-sharing among 12-24-month-old children was associated with a lower risk of SRNC in this study. According to our results, there is no relationship between bed-sharing and breastfeeding in this age group, so we think bed-sharing is an independent protective factor from SRNC. In the literature, results about bed-sharing and night wakings are controversial (35). In addition, the rate of bed-sharing has been reported to be a cultural variable (36). Informing parents of children with SRNC in appropriate age groups about the effects of bed-sharing may improve the situation, although both the other benefits and possible problems should also be discussed.

Our study has some limitations. Most of the parents included in the study were educated to a relatively high level compared to Turkish norms, and as such our population is unlikely to be representative of the Turkish population. Data were collected through questionnaires completed by parents, thus the study

presented some subjective results. However, this study is one of the few studies conducted about SRNC and the topic of night wakings of children, and presents important findings about it.

In conclusion, SRNC is found to be a common problem in the first two years of life and significantly decreases after 24 months. Although there are some behaviors which increase the risk of SRNC, others may be protective factors for it and these factors vary by age. Prospective multicenter studies which include representative population samples are needed to resolve some of the questions raised by this study.

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