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The Effects of Mothers' Anxiety and Depression on the Sleep Habits of 0–3-month-old Infants

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ABSTRACT

Objectives: This study aimed to explain sleep habits of infants and investigate the factors that may affect their sleep in the first 3 months after birth.

Methods: Infants who were born between October 29, 2014, and November 30, 2014, at the Department of Gynecology and Obstetrics were recruited for this study. A face-to-face interview was conducted to mothers of the infants within the 3 days after birth. The mothers were asked to fill out the "Baby sleep evaluation questionnaire" and the Edinburgh Postnatal Depression and Beck Anxiety Scale were filled. All questionnaire were applied monthly.

Results: The study included 70 infants. The mean sleep duration of 1-month-old infants was found to be 14.0±2.4 hours, while the mean daily sleep duration of 3-month-old infants was 13.7±2.0 hours. While 10 (83.3%) of the mothers who experienced anxiety in the second month stated that their babies had poor sleep quality, 23 (39.7%) of the mothers who did not have anxiety evaluated the sleep quality of their babies as poor (p=0.010). When comparing the first, second and third months of the babies separately, factors such as using a pacifier, nasal obstruction, nurse availability, or sex had no effect on sleep duration and waking frequency (p>0.05).

Conclusion: Poor sleep quality reported by mothers decreases toward the third month. It was evaluated that the babies of mothers with anxiety in the second month had worse sleep quality than babies of mothers without anxiety.

Keywords: Anxiety, depression, infant, sleep

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INTRODUCTION

Sleep and related issues are crucial for subject's quality of life; sleep and sleep disorders have an important role in medical practice.[1] Irregular sleep habits and short sleep duration during infancy affect an infant's physical, mental, and social integrity negatively.[2] As a key member of the primary health care team, the family physician, whose majority of the patient population is children, is able to assess and intervene early in developmental problems that could have serious lifelong health implications.[3] Absence of sleep disorders or taking the necessary precautions in an early stage is important for an individual's health.

This study aimed to evaluate the sleep habits in the first 3 months of life and the effects of sleep habits of infants on the postpartum depression and anxiety.

METHOD

This study evaluated the sleep habits of infants who were born in the Obstetrics and Gynecology Department between October 29, 2014, and November 30, 2014. One hundred and fifty-seven mothers gave birth, five (3.1%) of these births were stillbirths and 2 (1.2%) died shortly after live birth. Twenty-eight (17.8%) of infants were diagnosed with a congenital abnormality, prematurity, infants born from multiple pregnancies, and infants who had to stay in neonatal intensive care unit after birth were not included in the study. A total of 20 (12.7%) mothers did not consent to participate in the study. The study was started with 102 (64.9%) mother-infant pairs. All mothers participated voluntarily. Two (1.2%) infants who were hospitalized during the study period were excluded. Four (2.5%) mother-infant pairs who participated in the study were excluded due to mothers' inability to collect data. A total of 26 (16.5%) mothers were excluded from the study because they could not be contacted again; hence, the study was completed with a total of 70 (44.5%) mother-infant pairs.

In order to examine sleep of infants, mothers were interviewed face to face to fill up the infant sleep evaluation questionnaire during the first 3 days after birth. The questionnaire includes questions about infants' sleep and mothers' opinions regarding the infant's sleep. A "sleep diary" was given to the mothers to keep a log during a day period in every week of each month. In the last week of every month, the diaries were gathered from the families. In total, 12 diaries were collected for each baby. At the end of each month, the mothers were interviewed to fill up the infant sleep evaluation questionnaire, Edinburgh Depression Scale, and Beck Anxiety Inventory. By this, four times infant sleep evaluation questionnaires, four times Edinburgh Depression Scale, and four times Beck Anxiety Inventory were collected for each mother-infant pair. The data were gathered until the end of 3 months. Some factors including the mother's comments on the infant's sleep quality, total day- and nighttime sleep duration, total day and night waking frequency, and nighttime falling into sleep duration were compared to some variables like the infant's gender, the presence of a person who helps baby care, pacifier use, the infant's sleep position, nasal obstruction, daily defecation numbers of the infants, and depression and anxiety in mothers.

All statistical data were analyzed using the Statistical Package for the Social Sciences Program, SPSS 15.00. Descriptive statistics were presented as frequency, percentages, mean, standard deviations. Continuous variables with normal distribution were evaluated with the Student-t test and ANOVA test. Also, Pearson's chi-square test and Yates' correction were utilized for categorical variables. In all analysis results, a $p<0.05$ was considered significant.

RESULTS

This study included 70 infants, consisting of 37 (52.8%) boys. Sociodemographic characteristics of the participants are summarized in Table 1.

While 67 (58.2%) helped with baby care at the first visit (third day after birth), the frequency of grandmothers who helped with baby care decreased to 16 (20.0%) towards the third month. While on the first day after birth, more than one person provided help for 50 (71.4%) of the mothers and, 31 (44.2%) of the mothers stated that they were left alone in baby care in the third month. In the study group, the frequency of families who hired babysitters was quite low and they were 5 (6.0%), 4 (4.7%) and

Table 1. Sociodemographic characteristics of the participants

	n (%)
Gender	
Boys	37 (52.9)
Girls	33 (47.1)
Number of siblings	
None	32 (45.7)
1 sibling	27 (38.6)
2 and above siblings	11 (15.7)
Delivery type	
Cesarean section	50 (71.4)
Spontaneous vaginal route	20 (28.6)
Maternal age groups	
20-30 years	33 (47.1)
31 and over years	37 (52.9)
Maternal education status	
Primary school	12 (17.1)
High school	30 (42.9)
University	28 (40.0)
Working status of mother	
Employed	32 (45.7)
Unemployed	38 (54.3)
Paternal age groups	
24-30 years	19 (27.1)
31-40 years	38 (54.3)
41 and over years	13 (18.6)
Paternal education status	
Primary school	7 (10.0)
High school	25 (35.7)
University	38 (54.3)

7 (8.7%) at the 1st, 2nd and 3rd months, respectively. While only 58 (82.9%) of 3-days-old infants were breastfed, this rate dropped to 45 (64.3%) in the first month but reached to 53 (75.7%) in the second and third months. The frequency of infants slept in their own cradles in the first, second and third month were 66 (94.3%), 63 (90.0%) and 64 (91.4%), respectively. The frequency of infants slept in their parents' bedrooms in the first, second and third month are 58 (82.9%), 56 (80.0%) and 61 (87.1%), respectively. While 52 (74.3%) of 3-day-old infants slept on one of their sides this frequency decreased to 27 (38.6%) in the third month. As the age progressed, the frequency of supine position sleeping infants were 16 (22.9%) in 3-day-old, in the third month it has increased to 40 (57.1%). The sleep duration of the infants in the first three months are summarized in Table 2.

While the frequency of infants sleep by breastfeeding was 68 (94.1%) in the third day, it was 49 (55.0%) in the third month. Rocking the child and frequency of using a bottle or pacifier were 25 (28.1%) and 10 (11.2%) respectively in the 3rd month. While the frequency of babies who fell asleep in less than 15 minutes was 49 (70.0%) in the first 3 days, it decreased to 29 (41.4%) in the first month, then increased to 33 (47.1%) in the second month and 47 (67.1%) in the third month (p=0.099 between the 3rd day and 1st month, p=0.007 between the 1st and 2nd month, p=0.002 between the 2nd month and 3rd month, respectively). While only 4 (5.7%) of the 3-day-old infants slept on their parents' bed, this rate increased to 6 (8.6%) in the third month. Of the mothers who participated in the study, 30 (42.8%) reported 3–4 bad nights in a week in the first month. Both in the second and third months, 12 (17.1%) of the mothers reported 3–4 bad nights in a week. During the first month of the study, 28 (40.0%) of the mothers stated that their infants had sleep problems. The frequency of mothers stated that their infants had sleep problems decreased to 17 (24.2%) in the second month (p=0.019). None of the participants stated sleep problems for the first 3 days. Results revealed that the 30 (42.8%) of mothers perceived frequent night waking as a problem in the third month while 40 (57.2%) of mothers did not perceive (p=0.003). While the daily waking number of 3-month-old babies whose sleep quality was evaluated as good by the mothers was 7.1±1.9, the number of waking up of babies whose sleep quality was evaluated as bad was found to be 8.5±2.2 (p=0.010). In the first month, 29 (59.2%) mothers stated that babies who poop 3 or more times a day had better sleep quality than babies who poop 2 or less a day, while 6 (28.5%) mothers reported that babies who poop 2 or less a day had better sleep quality (p=0.030).

When comparing the third day and the first, second and third months of the babies separately, there was no significant difference was observed in the waking frequency of the infants (p=0.299). The mean nighttime waking was 3.5±1.2 times during the first 3 months, while daytime waking was 4.5±1.7 times, and total waking was 8.1±1.8 times daily. Factors related to total sleep durations and nighttime waking frequencies of the infants during the first three months are summarized in Table 3.

The frequency of high depression scale score in mothers was found to be 18 (25.7%) on the 3rd day and 6 (8.6%) in the 3rd month. Similarly, the frequency of high anxiety scale score was observed as 34 (48.6%) on the 3rd day and 9 (12.9%) on the 3rd month. The frequency of mothers with anxiety and depression in the first three months of the infants are summarized in Table 4.

In the second month while 10 (83.3%) of the mothers who had anxiety stated that their infants had poor sleep quality, 23 (39.7%) of the mothers who had not anxiety evaluated the sleep quality of their infants as poor (p=0.010). The anxiety status of the mothers according to the quality of infants' sleep in the first three months are summarized in Table 5.

Table 2. The sleep duration of the infants during the first three months

	Infant age			p
	1st month	2nd month	3rd month	
Total sleep duration (h/day)	14.0±2.4	14.0±2.4	13.7±2.0	0.905
Day-time sleep duration (h/day)	6.8±1.3	6.3±1.3	6.0±1.5	0.047
Nighttime sleep duration (h/day)	7.3±1.4	7.9±1.4	8.0±1.3	0.040

Data is expressed as mean±SD.
ANOVA test.

Table 3. Factors related to total sleep durations and nighttime waking frequencies of the infants during the first three months

	Total sleep time (hours) (n=70)						Nighttime Waking Frequency (n=70)					
	1st month	p	2nd month	p	3rd month	p	1st month	p	2nd month	p	3rd month	p
Gender												
Boys	14.2±2.1	0.740	13.6±1.7	0.070	13.5±1.5	0.300	3.8±1.0	0.530	3.5±1.3	0.860	3.4±1.2	0.540
Girls	14.0±2.0		14.6±2.3		14.0±2.4		3.6±1.3		3.5±1.0		3.2±1.1	
Using a pacifier												
Present	14.1±1.6	0.830	14.5±2.0	0.170	13.6±1.6	0.770	3.7±1.1	0.820	3.8±1.5	0.110	3.6±1.2	0.190
Absent	14.2±2.4		13.7±2.0		13.8±2.2		3.6±1.2		3.3±0.9		3.2±1.1	
Nurse availability												
Present	14.2±2.0	0.620	14.0±2.0	0.630	13.7±1.8	0.990	3.7±1.2	0.820	3.6±1.3	0.230	3.5±1.1	0.200
Absent	13.6±2.7		14.3±2.2		13.7±2.1		3.6±1.0		3.2±0.9		3.1±1.3	
Nasal obstruction												
Present	13.8±2.1	0.130	13.7±1.7	0.048	13.5±2.0	0.220	3.6±1.0	0.490	3.6±1.2	0.340	3.2±1.2	0.250
Absent	14.8±1.9		15.0±2.7		14.2±1.9		3.9±1.5		3.2±1.1		3.6±1.0	
Defecation frequency												
<3 times	14.4±1.6	0.630	14.5±2.0	0.570	13.7±1.9	0.440	3.9±0.9	0.570	3.7±1.7	0.550	3.2±1.1	0.440
≥3 times	14.0±2.2		14.1±2.0		14.2±1.7		3.6±1.2		3.5±1.0		3.5±1.1	
Depression status of mother												
HDSS	13.6±2.2	0.410	14.3±2.6	0.750	13.9±1.8	0.890	3.7±0.9	0.910	3.0±0.1	0.008	2.8±1.1	0.380
LDSS	14.3±2.0		14.0±2.0		13.7±2.0		3.7±1.2		3.5±1.1		3.4±1.2	
Anxiety status of mother												
HASS	13.7±2.1	0.240	14.3±2.2	0.580	13.8±2.1	0.930	3.8±0.8	0.530	3.3±0.8	0.550	3.8±1.3	0.150
LASS	14.4±2.0		14.0±2.0		13.7±2.0		3.6±1.3		3.6±1.3		3.2±1.1	

HDSS: High depression scale score; LDSS: Low depression scale score; HASS: High anxiety scale score; LASS: Low anxiety scale score.
Data is expressed as mean±SD.
Student-t test.

Table 4. The frequency of mothers with anxiety and depression in the first three months of the infants

	HDSS	LDSS	HASS	LASS
3rd day	18 (25.7)	52 (74.3)	34 (48.6)	36 (51.4)
1st month	9 (12.9)	61 (87.1)	17 (24.3)	53 (75.7)
2nd month	6 (8.6)	64 (91.4)	12 (17.1)	58 (82.9)
3rd month	6 (8.6)	64 (91.4)	9 (12.9)	61 (87.1)

HDSS: High depression scale score; LDSS: Low depression scale score; HASS: High anxiety scale score; LASS: Low anxiety scale score.

Data is expressed as n (%).

Table 5. The anxiety status of the mothers according to the quality of infants' sleep in the first three months

	Anxiety Status		p
	Absent	Present	
3rd day			
Good sleep quality	20 (55.6)	26 (76.5)	0.110
Poor sleep quality	16 (44.4)	8 (23.5)	
First month			
Good sleep quality	28 (52.8)	7 (41.2)	0.570
Poor sleep quality	25 (47.2)	10 (58.8)	
Second month			
Good sleep quality	35 (60.3)	2 (16.7)	0.010
Poor sleep quality	23 (39.7)	10 (83.3)	
Third month			
Good sleep quality	36 (59.0)	4 (44.4)	0.500
Poor sleep quality	25 (41.0)	5 (55.6)	

Data is expressed as n (%).

Chi-square test.

DISCUSSION

This study aimed to evaluate the sleep habits in the first 3 months of life and the effects of sleep habits of infants on the postpartum depression and anxiety. Mothers' reports of poor sleep quality in infants' decreases toward the third month.

Anxiety and depression are frequent among pregnant and postpartum women.[4,5] A meta-analysis that includes 59 studies and 12.000 women reported the rate of postpartum depression during the first 2 months after birth as 13%.[6] The rate of postpartum depression varies between 9% and 30% according to various studies in Turkey.[7-11] In this study, while the rate of depression was found as 25.7% on the first days after birth, this rate decreased to 8.6% in the following months. Anxiety disorder is speculated to be more frequently seen than depression in the postpartum period; however, it is underestimated.[12,13] The rate of anxiety was found to be 11.1% in a study conducted by Reck et al. with 1.024 women in Germany during the first 3 months in the postpartum period.[14] According to another study conducted by Stuart et al. among 107 women, the rate of anxiety was 10.28 %.[15] In this study, the rate of anxiety was found to be 25.7% in the first 3 postpartum months. The high rate of anxiety on the first days decreased when the mothers got used to the presence and demands of the baby. Both in the second and fourth months, the rate of anxiety was found to be 41% in a thesis, conducted by Sayılgan, which examines the mothers of 2- or 4-month-old infants with a different scale in order to find out the frequency of postpartum anxiety.[16] As studies on this subject in Turkey are few, the means to compare the results are limited.

Generally, the relationship between postnatal depression of the mother and infant's sleep problem is accepted. The mothers of the infants who have sleep problems were speculated to have depression/anxiety, or the mothers who have anxiety may characterize infants' sleep as more problematic. Several studies have shown that the frequency of depression or anxiety decreased as sleep duration of the infants increased due to the parent-based sleep education.[13,17,18]

Nearly half of the mothers and all fathers had a job. According to this data, the study group consisted of nuclear families who had upper-middle income and educational level. The grandparents were observed to help the mothers in baby care after the birth. The frequency of fathers who helped in baby care did not change. Additionally, in the 3 months period, the frequency of grandparents who helped in baby care decreased rapidly, and one third of the mothers were left all alone in baby care. This may be due to the study population, which consisted mainly of nuclear families that were living in a big city. The grandparents who were living in different cities or distant districts returned to their homes when the baby grew up a bit. Only one third of the mothers stated that their spouses helped in baby care.

Limited help of the fathers was remarkable. This fact may be associated with the social bias that gives the responsibility of baby care to mothers and the difficulty that a father has in becoming a part of baby care when grandparents are also living in the same house. Most of the infants in this study group slept together with their parents in the same room but in separate beds. A study that examined infants' sleep patterns in different countries around the world showed that in the countries where Caucasians live, the rate of bed sharing with an infant was 11.8% and the rate of room sharing was 28%. Among Asians, it is 64.7% and 87.5%, respectively.[19] In this study, the rate of room sharing was found to be similar with the Asian societies. In this study, the rate of bed sharing was averaged at 6.4%. In a study conducted in Australia, 7.2% of 1–36-month-old infants were reported to have shared the same bed with their parents.[20] In another study conducted in the USA, while more than 35% of the parents stated that they often share the same bed with their children, 76% of the parents stated that they occasionally share the same bed.[21] In England, the rate of bed sharing was found to be 64%, while in China, the rate was 58%.[22,23] In Sweden, 23% of the infants slept with their parents regularly.[24] As sleeping in the same room but in separate beds during the first 6 months of life protects the baby from sudden infant death syndrome, saying that most of the families in the study group behaved accordingly is possible.[25,26]

Nearly all the infants on the first day of life and more than half of the infants in the first 3 months fell asleep while breastfeeding. At the beginning infants got tired of feeding and fell asleep. After that, mothers held the infant in her lap and get the baby to sleep by breastfeeding and enfolding in her arms. This behavior is mostly learned from the society. Mother's warmth and the rhythm of her heart sound probably ease babies to sleep. During the interviews, some of the mothers stated that they held the baby in their laps for a long time, nearly during the whole sleep period, and they added that they were afraid of waking the baby up while putting it to its bed. Family behavior related to putting the baby to sleep varies in different societies. A study conducted in 17 countries with 29.287 children examined for sleep pattern from birth up to 3 years. The study asserted that 57% and 4% of Caucasians and Asians, respectively, showed the behavior of getting the baby to sleep alone.[19] In the same study, 26% of all parents stated that they made their infants sleep while breastfeeding, 26% of them preferred enfolding their infants in their arms, and 23% of them preferred rocking.

This study showed that the behavior of putting the baby to sleep includes a sincere contact between the family members and the infants, similar to Asian societies. A study conducted in the USA and Canada and examined the first 3 years after birth showed that breastfeeding, bottle feeding, rocking, and patting behaviors to get the baby to sleep decreased rapidly when the baby grew up, and it also showed that the percentage of sleeping alone in their cradles increased.[27] These behaviors (breastfeeding, bottle feeding, rocking, and patting) that were shown in order to get the baby to sleep were believed to cause more sleep problems, more frequent night waking, and demand for the repetition of the same behavior during the night waking.[27-30] In this study, mother's behavior of putting the baby to sleep was compared to sleep problems, and no significant association was found, which may be due to the small study group and monitoring, which did not continue in the following months. Although total sleep duration of infants tended to decrease with age in the first 3 months, it was 14 hours on the average, and nighttime sleep was longer than daytime sleep in general. This result is consistent with the results of other studies. Teng et al. reported that daily average sleep duration was 13.2 hours according to a study conducted in Australia and New Zealand with 2.154 infants and children.[20] Michelson et al. found the daily average sleep duration as 15.2 hours in 78 infants who were younger than 3 months.[31] Wooding et al. reported it as 14.8 hours in 874 infants who were younger than 4 months.[32] In a meta-analysis of the studies that were conducted in various countries, Galland et al. reported it as 14.6 and 13.6 hours in 2- and 3-month-old infants, respectively.[33] Sadeh et al. conducted an interview with 5.006 parents in Canada and reported that the total daily sleep duration decreased with age and nighttime sleep got longer.[27]

Waking frequencies of the infants were 8 times a day, 3.5 times at night, and 4.5 times during the day on average. Mickelson et al. reported that the rate of 6-hour-long night wakeless sleep was 35% in infants younger than 3 months of age, and it increased with age.[31] The same study also asserted that night waking frequency was associated with feeding. As the mothers feed the infants in 4–6 hours intervals, the infants wake up 2 or 3 times at night. Sette et al. reported that 56.4% of 3-month-old infants wake up 2 or 3 times, 8.8% of infants wake up 3 or more times at night, and 34.8% of infants do not wake up at night.[34] The study conducted by Sadeh et al. showed that average nighttime waking frequency was 1.89 in 0–2-month-old infants.[27] Additionally, the study illustrated that sleeping while breastfeeding, sleeping in the same room, feeding with bottle at night, taking the baby to parent's bed, and irregular bed routine increased the number of night waking. A meta-analysis by Galland showed that night waking frequency of 0–2-month-old infants was 1.7.[33]

In this study, waking frequency of the infants was rather high. A study comparing different societies asserted that wakeless sleep was less common when the infants sleep in their parents' room compared to sleeping in separate rooms.[19] Araz et al. conducted a study in the Southeastern Turkey and showed that 56% of the 0–6-month-old infants sleep in the same room with their parents, and 68.6% of them wake up frequently at night.[28] No study was found on falling asleep duration after waking up. This study found out that the infants fall asleep in a shorter period on the first days of life. The duration of falling asleep increased a bit in the first month. Moreover, results showed that most of the infants are put to sleep gradually easier from the first to the third month. This may be because as the infants are more tired on the first days of life, they fall asleep easily while breastfeeding. In the first month, the infants are more uncomfortable as they suffer from gas and colic. Putting the infant to sleep gets easier when these problems begin to disappear and when the mother gains experience in the third month. While the rate of the mothers who perceived the infants' sleep as bad was 35% in the first days after birth, this rate increased in the following month and decreased again later. With this perception related to bad sleep, the factors of short sleep duration, high night waking frequency, and long falling asleep duration after waking up were effective. The rate of mothers who perceived a sleep problem in their infants dropped from 40% in the first month to 17% in the third month. The numbers of bad nights decreased gradually. This progress in sleep may be attributed to the mothers' gaining experience and the infants' growing up. Teng et al. reported that 30.69 % of the mothers who had children under 3 years of age stated a sleep problem.[20] Hiscock and Wake reported this rate as 36%.[35] These results are consistent with our study. In another study conducted in Turkey, 47.1% of the mothers who had 0–6-month-old infants stated a sleep problem.[28]

In the third month, the mothers characterized the sleep of the infants who had high night waking frequency as bad. Probably mothers expected a decrease in the waking frequency in the third month. However, this study showed no difference in waking up frequency between months. This case may be interpreted as a sleep problem. Moreover, the mothers who were diagnosed with anxiety in the second month characterized the infants' sleep as bad. The difference between the second month and the others was the decrease in the number of people who helped in baby care. The decrease in this support may have led the mothers especially those who had anxiety to perceive the infants' sleep as bad. In the first month of life, the sleep of the infants who passed less feces was characterized as bad. In the first month, infants generally strain when passing feces. Mothers interpret that situation as the infant has a problem and he/she will get relaxed after passing feces and then he/she will sleep better. This may be the reason for the mothers to characterize the sleep of the infants who pass less feces as inadequate.

In this study, infant sleep was examined during the first 3 months of life. This study is useful in investigating the relationship between babies' sleep and maternal anxiety and depression. The sample size was relatively small. For these reasons, some tendencies about infants' sleep are striking, but their statistical significance does not exist. Further studies are needed including a large sample size and a longer follow-up in Turkey.

This study had some limitations. One of these limitations that this study was conducted as a single center. Another limitation is that some mothers could not be reached for follow-up and, as a result, the sample size of the study was small.

CONCLUSION

In conclusion, it was observed that the frequency of mothers reporting poor sleep quality of their babies decreased towards the third month, and babies of mothers with anxiety in the second month had worse sleep quality in this study.

Disclosures

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Authorship Contributions: Concept – M.S., U.B.; Design – M.S., U.B.; Supervision – U.B, A.D.Ç.; Materials – M.S, U.B.; Data collection &/or processing – M.S; Analysis and/or interpretation – M.S., U.B., A.E.G.; Literature search – M.S, U.B.; Writing – M.S., U.B.; Critical review – A.D.Ç.

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