Investigation of the Relationship Between Reflux, Sleep Quality and Prenatal Attachment in Pregnancy

Gebelikte Reflü ile Uyku Kalitesi ve Prenatal Bağlanma Arasındaki İlişkinin İncelenmesi

Didar Akmaz*[1], Keziban Amanak[2]

[1] Maternity and Child Diseases Hospital, Aydın, Türkiye

[2] Faculty of Health Sciences, Department of Midwifery, Adnan Menderes University, Aydın, Türkiye

ABSTRACT

Objective: The aim of the study was to investigate the relationship between reflux in pregnancy, sleep quality and prenatal attachment.

Material and Method: The study was conducted with 180 pregnant women (case: 90, control: 90). Data were collected using the 'Reflux Symptom Index', 'Personal Information Form', 'Pittsburgh Sleep Quality Index' and 'Prenatal Attachment Inventory'. The research data were analyzed by chi- square, t- test and Pearson correlation analysis.

Results: In this study, the mean Pittsburgh Sleep Quality total index score of the case group was 11.13±3.25 and 7.02±2.54 in the control group, and the mean Prenatal Attachment Inventory score was 37.33±11.20 in the case group and 43.00±12.64 in the control group. In addition, it was observed that prenatal attachment levels of pregnant women in both groups decreased in parallel with the level of sleep quality.

Conclusion: In this study, it was concluded that sleep quality and prenatal attachment levels of pregnant women with reflux were lower than pregnant women without reflux and prenatal attachment levels decreased in parallel with sleep quality.

Keywords: *Prenatal attachment, Reflux, Sleep quality*

ÖZET

Giriş: Araştırmanın amacı; gebelikte reflü, uyku kalitesi ve prenatal bağlanma arasındaki ilişkinin incelenmesidir.

Materyal ve Metot: Araştırma 180 gebe kadın (vaka: 90, kontrol: 90) ile yürütülmüştür. Çalışma verileri, "Reflü Semptom İndeksi", "Kişisel Bilgi Formu", "Pittsburgh Uyku Kalitesi İndeksi" ve "Prenatal Bağlanma Envanteri" kullanılarak elde edilmiştir. Araştırma verileri ki-kare, t-testi ve Pearson korelasyon analizi değerlendirilmiştir.

Bulgular: Çalışmada istatistiksel olarak anlamlı şekilde olgu grubunun Pittsburgh Uyku Kalitesi toplam indeks puan ortalaması 11.13±3,25, kontrol grubunun 7.02±2.54; Prenatal Bağlanma Envanteri puan ortalaması vaka grubunda 37.33±11.20, kontrol grubunda 43.00±12.64 olarak saptanmıştır. Ayrıca araştırmada her iki grupta yer alan gebelerin prenatal bağlanma düzeylerinin uyku kalitesi düzeyine paralel olarak azaldığı görülmüştür.

Sonuç: Araştırmada reflüsü olan gebelerin uyku kalitesi ve prenatal bağlanma düzeylerinin reflüsü olmayan gebelere göre daha düşük olduğu ve prenatal bağlanma düzeylerinin uyku kalitesine paralel olarak azaldığı görülmüştür.

Anahtar kelimeler: *Prenatal bağlanma, Reflü, Uyku kalitesi*

* Corresponding author: Didar Akmaz. E-mail: didarr.ozturkk@gmail.com
ORCIDS: Didar Akmaz: 0000-0001-9793-7809, *Keziban Amanak*: 0000-0001-8824-084X

INTRODUCTION

Pregnancy, a time of physiological and psychological changes, is generally a period of special and positive emotions for women. However, it can also be a time of various challenges, including gastroesophageal reflux disease (GERD). GERD is a prevalent condition with significant health implications, affecting the quality of life of individuals and contributing to substantial healthcare costs worldwide (Heidelbaugh, 2018). While the exact prevalence varies, GERD is reported to affect 30-50% of pregnant women (Herregods et al., 2015; Heidelbaugh, 2018). In Turkey, epidemiological studies have shown a prevalence of GERD ranging from 19% to 25% in the general population (Sezer Yeşil and Öztürk, 2016; Bor, 2017). The pathophysiology of GERD during pregnancy is complex, with decreased lower esophageal sphincter pressure due to hormonal changes being a primary contributing factor (Yalaki and Kara, 2014; Turan et al., 2016). Reflux in pregnancy not only causes physical discomfort but also significantly impacts sleep quality (Nodine and Matthews, 2013; Mindell et al., 2015; Hu et al., 2024). Furthermore, emerging evidence suggests a potential link between reflux and impaired prenatal attachment. While the exact mechanisms are still under investigation, sleep disturbances caused by reflux can contribute to maternal anxiety and depression, which in turn can negatively impact the development of a secure mother-infant bond (Ghanbari-Homaie et al., 2022). Given the potential impact of reflux on maternal well-being and fetal development, it is crucial to investigate the interplay between reflux, sleep quality, and prenatal attachment in pregnant women. However, no study could be found in the literature review that examined the relationship between reflux during pregnancy and sleep quality and prenatal attachment. Therefore, this study was conducted to investigate the association between reflux during pregnancy and sleep quality and prenatal attachment level. This study aimed to examine the association between these factors and contribute to a better understanding of the challenges faced by pregnant women with reflux.

MATERIAL and METHOD

The study protocol was approved by the Aydın Adnan Menderes University, Faculty of Health Sciences, Non-Invasive Clinical Research Ethics Committee (No.: 2020/035). Subsequently, written permission was obtained from Tunceli Provincial Health Directorate to conduct the study in Tunceli State Hospital. This cross- sectional and case-control analytical study was conducted between September 24, 2020, and June 24, 2021, in the Obstetrics and Gynecology Clinic of Tunceli State Hospital affiliated with Tunceli Province. With the convenience sampling method, 180 pregnant women were included in the study, 90 in the case group and 90 in the control group. The sample size of the study was calculated as 156 pregnant women using the G-Power programme by using the study data of Yanıkkerem and Saruhan (2012). Pregnant women aged 18-37 years who can read and understand Turkish have a single fetus, are in the third trimester of pregnancy (between 28-40 weeks), and volunteered to participate in the study were included in study. In contrast, those who belong to the high-risk group of pregnancy and have any pregnancy complications and those with systemic and neurological diseases were excluded from the study. Research data were collected using Personal Information Form, Reflux Symptom Index, Pittsburgh Sleep Quality Index, and Prenatal Attachment Inventory.

The Personal Information Form was prepared by researchers based on the literature (Çoban and Yanıkkerem, 2010; Yeşilkaya, 2018). This form includes 12 questions that question the identifying characteristics of pregnant women.

Reflux Symptom Index (RSI) was developed by Belafsky et al. in 2002 and is a nine-title index designed to detect the presence of laryngopharyngeal reflux (Belafsky et al., 2002). An index score of ten or more indicates the presence of reflux. A score of 0 is considered unproblematic, and a score of 5 is regarded as a severe problem. The RSI has been used in studies to determine the presence of reflux. It has been shown to be reliable and valid (Ezerarslan et al., 012; Günel et al., 2012; Karaaltın et al., 2016; Verim et al., 2016). In this study, pregnant women with a score of 10 and above in the Reflux Severity Index were included in the case group, and pregnant women with a score below 10 were included in the control group.

Pittsburgh Sleep Quality Index (PSQI) was developed in 1989 by Buysse et al., the PSQI is a self- report test that provides information about sleep disturbances, sleep efficiency, type of sleep disturbances, and severity of sleep disturbances experienced in the past month. Its Turkish validity and reliability were performed by Ağargün et al. (1996). The Cronbach alpha value of the scale was 0.804. PSQI consists of 24 questions. Scores of 5 points or more on the scale are considered low sleep quality (Çoban and Yanıkkerem, 2010). In this study, the Cronbach alpha value was determined as 0.789.

Prenatal Attachment Inventory (PAI) was developed in 1993 by Mary Muller. It was adapted by Yılmaz and

Beji in 2009. This scale was developed to explain the thoughts, feelings, and situations that pregnant women experience and determine the degree of attachment to the baby during the prenatal period. A minimum of 21 points can be scored on this scale, and the maximum score is 84. The higher the score on the scale, the higher the degree of prenatal attachment. Yılmaz and Beji found that the Cronbach's alpha reliability coefficient of the scale is 0.84 (Yılmaz and Beji, 2013). In this study, Cronbach's alpha value was 0.78.

Statistical Analysis

Chi-square or t-tests were performed in independent groups to compare the personal and obstetric characteristics of the pregnant women in the case and control groups. An Independent groups t-test was used to compare the means of PSQI and PAI of the case and control groups, and Pearson's correlation analysis was used to examine the relationship between the means of PSQI and PAI.

RESULTS

It was found that the pregnant women in both groups who participated in the study had statistically similar university and post-university education levels, most of them were not employed, most of them had the same income, most of them lived in the city, most of them had a nuclear family structure, and their average age was close (Table 1). It was found that the pregnant women in the case and control groups who participated in the study had statistically similar first pregnancy i.e., the majority of them had no living child, a large proportion of them had no history of miscarriage or abortion, they mostly had planned pregnancy and the average week of pregnancy was close (Table 2). The study found that the pregnant women in the case group had higher total and subscale mean scores than the pregnant women in the control group, and this difference was statistically significant ((p<0,05) for the total and all subscales of the PSQI). In addition, the mean PAI scores of pregnant women in the case group (37.33±11.20) were statistically significantly lower than those of pregnant women in the control group (43.00±12.64) (p<0.05) (Table 3). In the study, a high negative correlation was found between the total and subscales of the PSQI and mean PAI scores in the case group (total scale score r: -0.791, p<0.001), while a moderate negative correlation was found in the control group (total scale score r: -0.498, p < 0.001) (Table 4).

Table 1. Distribution of personal characteristics of pregnant in the case and control group(n=180)

Characteristics	Case Group (n = 90)n (%)	Control Group (n=90)n (%)	X²/p
Educational status			
Primary Education High	16 (17.8)	15 (16.6)	2.220/0.
School University or	22 (24.4)	21 (23.4)	695
Higher	52 (57.8)	54 (60.0)	
Employment status			
Yes	17 (18.9)	18 (20.0)	0.224/0.
No	73 (81.1)	63 (80.0)	712
Income Status			
Income less than expenses	18 (20.0)	16 (17.8)	1.749/0.
Income equal to expenses	63 (70.0)	59 (65.5)	417
Income more than expenses	9 (10.0)	15 (16.7)	
Place of residence			
City	78 (86.6)	79 (87.8)	4.170/0.
Town	7 (7.8)	6 (6.6)	244
Village	5 (5.6)	5 (5.6)	
Family type			
Nuclear family	84 (93.3)	85 (94.4)	1.851/0.
Extended family	6 (6.7)	5 (5.6)	174
Characteristics	**Mean±SD (Min-Max)**	**Mean±SD (Min- Max)**	**t/p**
Age	27.11±4.38 (18-37)	28.28±4.62 (21-37)	0.600/0. 953

Table 2. Distribution of obstetric characteristics of pregnants in the case and control group (n=180)

Characteristics	Case Group (n =90) n (%)	Control Group(n=90) n (%)	X²/p
Total number of pregnancies			
One	44 (48.9)	49 (54.4)	0.933/
Two	25 (27.8)	24 (26.7)	0.8
Three	12 (13.3)	11 (12.2)	18
Four or more	9 (10.0)	6 (6.7)	
Number of living children			
One	32 (35.6)	29 (32.2)	0.031/
Two	8 (8.9)	8 (8.9)	0.5
None	50 (55.5)	53 (58.9)	41
Number of Miscarriages			
One	16 (18.8)	11 (12.2)	1.089/
No miscarriage	74 (82.2)	79 (87.8)	0.2
			97
Number of abortions			
One	10 (11.2)	9 (10.0)	0.225/
No abortion	79 (87.8)	81 (90.0)	0.6
			35
Planned pregnancy status			
Yes	83 (92.2)	83 (92.2)	0.009/
No	7 (7.8)	7 (7.8)	0.6
			90
Gestational week	34.33±3.75 (28-40)	34.29±3.76 (28-40)	0.079/ 0.9 37

Table 3. Comparison of PSQI total and subscales and mean paı scores of pregnants inthe case and control groups

Scales	Case Group (n =90) Mean±SD (Min-Max)	Control Group (n=90) Mean±SD (Min- Max)	t/p
PSQI			
Subjective sleep quality	2.21±1.12 (0-3)	1.65±0.97 (0-3)	3.213/<0.001
Sleep latency	2.13±0.84 (0-3)	1.42±1.03 (0-3)	4.125/<0.001
Duration of sleep	1.92±0.54 (0-3)	1.13±0.74 (0-3)	4.325/<0.001
Habitualsleep efficiency	0.88±0.42 (0-3)	0.14±0.21 (0-3)	5.963/<0.001
Sleep disturbance	1.85±0.56 (0-3)	1.28±0.63 (0-3)	3.745/0.003
Use of sleeping pills	-	-	
Daytime dysfunction	2.52±0.91 (0-3)	1.94±0.74 (0-3)	3.854/0.002
Total PSQI	11.13±3.25 (0-3)	7.02±2.54 (0-3)	6.125/<0.001
PAI			
Total PAI	37.33±11.20	43.00±12.64	3.183/0.002

Table 4 The Relationship between the total and subscales of PSQI and PAI scores ofpregnant in the case and control group

PSQI	PAI	
	r	p
Case Group (n = 90)		
Sleep latency	-0.813	<0.001
Duration of sleep	-0.861	<0.001
Habitual sleep efficiency	-0.736	<0.001
Subjective sleep quality	-0.745	<0.001
Sleep disturbance	-0.882	<0.001
Use of sleeping pills	-	<0.001
Daytime dysfunction	-0.743	<0.001
Total PSQI	-0.791	<0.001
Control Group (n=90)		
Subjective sleep quality	-0,523	<0.001
Sleep latency	-0.485	<0.001
Duration of sleep	-0.423	<0.001
Habitual sleep efficiency	-0.599	<0.001
Sleep disturbance	-0.347	<0.001
Daytime dysfunction	-0.596	<0.001
Total PSQI	-0.498	<0.001

DISCUSSION

Our study demonstrated a significant association between gestational reflux, impaired sleep quality, and decreased prenatal attachment in pregnant women. These findings align with previous research that has linked reflux to various pregnancy complications (Çoban and Yanıkkerem, 2010; Amanak, 2020; Le et al., 2023). The observed association between reflux and poor sleep quality is consistent with findings from Hu et al. (2024) and aligns with the general understanding that gastrointestinal discomfort significantly disrupts sleep (Nodine and Matthews, 2013; Mindell et al., 2015). Our findings further emphasize the impact of reflux on sleep quality in pregnant women, with the mean PSQI score in the reflux group (11.13±3.25) being notably higher than that reported in other studies of pregnant women (Çoban and Yanıkkerem, 2010; Celik and Kose, 2017; Köybaşı and Oskay, 2017; Dikmen, 2020; Özhüner and Çelik, 2019). In our study, the discomfort and frequent awakenings caused by reflux likely contributed to poor sleep quality in the affected group. Dolua et al. (2020) also emphasized the significant impact of various factors, including physical discomfort, on sleep quality during pregnancy. These findings suggest that sleep disturbances are a significant concern for pregnant women experiencing reflux.

The finding of significantly lower prenatal attachment levels in the reflux group is novel and highlights a potentially crucial impact of reflux on maternal-fetal bonding. While the exact mechanisms remain to be fully elucidated, several pathways may be involved. Firstly, sleep disturbances caused by reflux can lead to increased fatigue, irritability, and anxiety, negatively impacting maternal mood and emotional regulation, which are crucial for establishing a secure attachment with the fetus (Ghanbari-Homaie et al., 2022). Secondly, the constant discomfort and emotional distress associated with reflux may divert maternal attention and energy away from focusing on the developing fetus. Ghanbari-Homaie et al. (2022) also highlighted the significant role of anxiety in influencing pregnancy outcomes, including maternal-fetal attachment. The present study indirectly supports this finding by demonstrating that reflux, which can be a significant source of anxiety during pregnancy, negatively impacting prenatal attachment. Therefore, it is important to conduct studies with different sample groups regarding the problem of reflux in pregnancy, which is predicted to negatively affect maternal and infant health. Our findings underscore the importance of early identification and management of reflux symptoms in pregnant women. Healthcare providers should routinely assess for reflux symptoms, address sleep disturbances, and provide emotional support to pregnant women experiencing reflux. Pregnant women should be questioned about their reflux symptoms and necessary precautions should be taken to raise awareness and manage symptoms, reduce discomfort and improve sleep quality of pregnant women. They should provide pregnant women with education on sleep hygiene, dietary modifications, and relaxation techniques. Healthcare professionals should encourage pregnant women to engage in regular exercise, maintain a healthy weight, and eat small, frequent meals. They should also address potential emotional issues like anxiety and depression that

may arise due to reflux and provide appropriate psychological support.

This study provides valuable insights into the multifaceted impact of gestational reflux on maternal well-being. By highlighting the significant associations between reflux, impaired sleep quality, and decreased prenatal attachment, our findings emphasize the need for comprehensive care for pregnant women with reflux. Early identification, effective management strategies, and continued research are essential to improve maternal health outcomes and promote optimal fetal development.

As a results improve overall health by identifying and treating chronic conditions that existed before pregnancy, to ensure complete mental and physical health during pregnancy, it should be ensured that potentially risky conditions are identified and treated early in the current pregnancy, and early treatment is provided, comprehensive and appropriate assessments of women for reflux, sleep quality, and prenatal attachment should be done, and they should be supported by professional health experts as needed.

Conflict of interest

The authors have no conflicts of interest in reporting.

Ethical approval

Approval for the research protocol was granted by the Non-Invasive Clinical Research Ethics Committee of Faculty Health Sciences, Aydın Adnan Menderes University (No.:2020/035). Subsequently, written permission was obtained from Tunceli Provincial Health Directorate to conduct the study at Tunceli State Hospital.

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REFERENCES

Ağargün MY, Kara H, Anlar Ö. (1996). The validity and reliability of the Pittsburgh Sleep Quality Index. *Turk Psikiyatri Dergisi*, *7*(2), 107-15.

Amanak K, Sevil Ü, Karaçam Z. (2019). The impact of prenatal education based on the Roy adaptation model on gestational hypertension, adaptation to pregnancy and pregnancy outcomes. *JPMA, 69*(1), 11-17.

Amanak K. (2020). Gebelikte yaşanan reflünün yaşam kalitesi ve gebelik uyumuna etkisi: vaka-kontrol çalışması. *Adnan Menderes Üniversitesi Sağlık Bilimleri Fakültesi Dergisi, 4*(3), 188-194.

Belafsky PC, Postma GN, Koufman JA. (2002). Validity and reliability of the reflux symptom index (RSI). *Journal of Voice*, *16*(2), 274– 277.

Bor S. (2017). Consensus report on gastroesophageal reflux disease in Turkey. *The Turkish Journal of Gastroenterology*, 28(Suppl 1), S1– S2.

Celik F, Kose M. (2017). The relationship between sleep quality and trimester in pregnancy. *Kocatepe Medical Journal*, 18, 85–88.

Çoban A, Yanıkkerem E. (2010) Sleep quality and fatigue level in pregnant women. *Aegean Medical Journal*, 49, 87-94.

Dikmen H. (2020). The effect of restless legs syndrome on sleep quality and anxiety level in pregnant women. *Acıbadem University Journal of Health Sciences*, 12(1), 132-138.

Dolua İ, Pirob TJ, Bilgilic N, Safarid K, Eryüze E, Mirkhan H. (2020). Factors affecting subjective sleep quality in the third trimester of pregnancy in urban areas of Turkey and Iraq. *Revista Argentina de Clínica Psicológica*, 29(5), 1750-1765.

Ezerarslan H, Shepherd M, Kuran S, Akmansu SH, Özgüler Z, Beriat G. (2012). The relationship between heterotopic gastric mucosa in the cervical esophagus and laryngopharyngeal reflux. *Ear Nose and Throat Specialization Journal*, 22(1), 6-11.

Ghanbari-Homaie S, Hasani S, Mirghafourvand M. (2022). Correlation of anxiety with pregnancy symptoms and maternal-fetal attachment. *Shiraz E-Medical Journal*, 23(5).

Günel C, Günel S, Ömürlü İ. (2012). Comparison of the symptomatic and endoscopic relationship between laryngopharyngeal reflux and gastroesophageal reflux disease. *ENT Forum*, 11(3), 56-61.

Heidelbaugh J. (2018). Gastroesophageal Reflux Disease (GERD). Ambulatory Clinical Guidelines Oversight. 1-12.

Herregods TV, Bredenord AJ, Smout AJ. (2015). Pathophysiology of gastroesophageal reflux disease: new understanding in a new era. *Neurogastroenterology and Motility*, *27*(9), 1202-1213.

Hu KY, Tseng PH, Hsu WC, Lee PL, Tu CH, Chen CC ET AL. (2024). Association of subjective and objective sleep disturbance with the spectrum of gastroesophageal reflux disease. *Journal of Clinical Sleep Medicine*, jcsm-11028.

Karaaltın B, Develioğlu N, Tarhan Ö, Külekçi M. (2016). The importance of voice analysis in evaluating the effectiveness of reflux treatment. *Ear Nose and Throat Specialization Journal*, 26(4), 207-212.

Karakaş NM, Şahin Dağlı F. (2019). The importance of attachment in infant and influencing factors. *Turk Pediatri Ars, 54*(2), 76–81.

Köybaşı EŞ, Oskay ÜY. (2017). The effect of pregnancy process on sleep quality. *Gulhane Medical Journal*, 59, 1–5.

Le YT, Luu MN, Mai LH, Hoang AT, Nguyen TT, Quach DT. (2023). Prevalence and characteristics of gastroesophageal reflux disease in pregnant women. *Revista de Gastroenterología de México*, 88(4), 341-346.

Mindell JA, Cook RA, Nikolovski J. (2015). Sleep patterns and sleep disturbances across pregnancy. *Sleep Medicine*, *16*(4), 483–488.

Nodine PM, Matthews EE. (2013). Common sleep disorders: management strategies and pregnancy outcomes. *Journal of Midwifery Women's Health*, *58*(4), 368–377.

Ozhuner Y, Celik N. (2019). Sleep quality and quality of life in pregnant women. *Journal of Health Sciences and Professions*, 6 (1), 25–33.

Sezer Yesil E, Ozturk G. (2016). Gastroesophageal reflux and diet. *Current Gastroenterology*, 20/3.

Turan İ, Kitapçıoğlu G, Tavmergen Göker E, Şahin G. (2016). *In vitro* fertilization-induced pregnancies predispose to gastroesophageal reflux disease. *United European Gastroenterology Journal* 4(2), 221-228.

Verim A, Şeneldir L, Naiboğlu B, Tepe Karaca Ç, Kadıoğlu D, Zer Toros S. (2016). Effect of laryngopharyngeal reflux on the improvement of chronic rhinosinusitis without polyposis after primary endoscopic sinus surgery. *Kulak Burun Bogaz İhtisas Dergisi*, 26(2), 65–72.

Yalaki S, Kara B. (2014). Use of proton pump ınhibitors in pregnancy. *Current Gastroenterology*, 18(3), 322-325.

Yanikkerem E, Saruhan A. (2012). The effect of nursing education on sleep and quality of life in pregnant women with gastroesophageal reflux disease. *Firat University Health Sciences Medical Journal*, 26(1), 7 - 14.

Yeşilkaya H. (2018). Determination of Sleep Problems and Healthy Lifestyle Behaviors of Pregnant Women, M.Sc., Sivas Cumhuriyet University, Institute of Health Sciences, Sivas.

Yılmaz S, Beji N. (2010). Coping with stress, depression and prenatal attachment levels of pregnants and factors affecting these. *Journal of General Medicine*, 20(3), 28-33.

Yılmaz S, Beji N. (2013). Adaptation of the prenatal attachment ınventory into Turkish: A reliability and validity study. *Anatolian Journal of Nursing and Health Sciences*, 16(2).