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Original Article

How bruxism and temporomandibular joint disorders relate to anxiety and sleep in pregnant women?

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Abstract

Aim: This study aimed to investigate the relationships among TMD severity, bruxism, anxiety levels, pain perception, and sleep quality in pregnant women, offering insight into the complex biopsychosocial interactions occurring during gestation.
Materials and Methods: A retrospective cross-sectional analysis was conducted on clinical and survey data from pregnant women. Assessment tools included the Fonseca Anamnestic Index, the Pittsburgh Sleep Quality Index (PSQI), the Visual Analog Scale (VAS), and the State-Trait Anxiety Inventory (STAI).
Results: Significant associations were found between TMD severity and age, as well as between trait anxiety levels (STAI-II) and Fonseca scores. A weak but statistically significant correlation was also observed between pain levels and both state and trait anxiety. Conversely, no significant differences were found between TMD groups regarding educational status, number of pregnancies, or functional jaw movements.
Conclusion: The findings suggest that TMD symptoms during pregnancy are not solely a result of hormonal changes but are influenced by a complex interplay of psychological stress, anxiety traits, and parafunctional behaviors. Evaluating TMJ health in prenatal care settings may enhance maternal well-being, and longitudinal studies are needed to further elucidate these relationships across different stages of pregnancy.

Keywords: Temporomandibular joint dysfunction, bruxism, pregnancy, anxiety, sleep quality, parafunctional habits

INTRODUCTION

Pregnancy represents a unique period during which women undergo profound physiological, psychological, and hormonal changes. Elevated anxiety levels, hormonal fluctuations, and disruptions in sleep patterns during this time can significantly impact both maternal health and fetal development. In recent years, there has been growing scholarly interest in exploring the effects of these factors, particularly on the orofacial system [1–4].

Bruxism, characterized by habitual teeth grinding and clenching, is closely associated with temporomandibular joint dysfunction (TMJ), and both conditions can significantly impair an individual's quality of life. Numerous studies have examined the relationship between these disorders and psychological factors, particularly anxiety disorders and sleep quality. However, research focusing specifically on these conditions during pregnancy remains limited [1].

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It has been suggested that elevated levels of hormones such as estrogen and relaxin during pregnancy affect connective tissue integrity, potentially leading to the loosening of ligaments within the temporomandibular joints. This hormonal influence may contribute to an increased susceptibility to temporomandibular dysfunctions during this period [5–7].

An epidemiological study conducted by Fichera et al. (2020) reported that 81% of pregnant participants exhibited notable symptoms of TMJ disorders, compared to 52% in the non-pregnant control group. The most frequently observed symptom was joint clicking sounds. These findings suggest that pregnancy may represent a potential risk factor for the development of TMJ disorders [1].

Pregnancy is also characterized by heightened stress and uncertainty. Women's responses to the gestational period—shaped by factors such as physical changes, lack of economic and social support, and anxieties about parenthood—can significantly influence both anxiety levels and sleep quality. Several studies have indicated that elevated stress during pregnancy is associated with reduced sleep quality, which in turn may exacerbate symptoms of temporomandibular disorders (TMD) [8,9]. Sleep disturbances not only compromise physical well-being, but also diminish psychological resilience, thereby potentially lowering an individual's pain threshold [8].

In addition to hormonal influences, elevated anxiety levels during pregnancy are also believed to contribute to an increased prevalence of bruxism. Heightened anxiety may induce involuntary tension and clenching in the masticatory muscles, potentially leading to structural damage in the temporomandibular joint and a substantial decline in sleep quality [10,11].

In this context, the interplay between physiological changes and psychological stressors during pregnancy appears to create a predisposition for functional disturbances within the temporomandibular system. Therefore, assessments that adopt a holistic approach—considering both psychological and physical health—are of critical importance.

This study examines the interrelationship between TMD, bruxism, anxiety, and sleep quality in pregnant women. It aims to determine the prevalence of TMD and explore its association with anxiety levels, addressing a gap in the literature and contributing to multidisciplinary maternal health research.

MATERIAL AND METHOD

This cross sectional analytical study is conducted through a retrospective analysis of data collected from pregnant women who visited the Obstetrics and Gynecology Outpatient Clinic of Alanya Alaaddin Keykubat University Training and Research Hospital between November 2024 and April 2025. The study involves no interventional procedures; only data obtained from archival records and assessment forms were analyzed.

Ethical Aspects of the Study: The study was approved by the Clinical Researches Ethics Committee of Alanya Alaaddin Keykubat University (Date: 16.04.2025, Decision number: 07/05). Written informed consent, prepared in accordance with the Helsinki Declaration, was obtained from the participants included in the study.

Power Analysis: The prevalence of bruxism during pregnancy was found to be 67% in the reference study. With the unknown sample size formula, the deviation margin was accepted as 10% (d=0.1) and the prevalence of Bruxism during pregnancy was accepted as p=0.67 (67%) and as a result of the calculation made at a 95% confidence level (alpha=0.05), it was calculated that at least 85 samples could be included in the study. Eighty six pregnant women were included in our study. As a result of the power analysis performed for the effect of the relationship between the anxiety levels and bruxism levels obtained from 86 participants (r=0.254), it was calculated that our study reached 78% power at a 95% confidence level (alpha=0.05) [10].

Inclusion Criteria: Healthy pregnant women, willingness to participate in the study, minimum literacy level in reading and writing, presence of teeth clenching and grinding (bruxism), limited mandibular movement.

Exclusion Criteria: Presence of intercurrent vaginal bleeding, diagnosed depression or anxiety disorders.

Criteria for Withdrawal from the Study: Medical conditions requiring intensive care or surgical intervention, pregnant individuals who do not sign the informed consent form.

Assessment Methods

The following variables were evaluated: mouth opening, temporomandibular joint dysfunction and its severity, pain intensity, sleep quality, quality of life, and anxiety levels. The assessment tools employed in the study were: Fonseca Anamnestic Index, Pittsburgh Sleep Quality Index (PSQI), Visual Analog Scale (VAS), State-Trait Anxiety Inventory (STAI).

Opening Movements: During the painless mouth opening task, the pregnant participant was instructed to open her mouth as widely as possible without experiencing any pain. The distance between the incisal edges of the upper and lower central incisors was measured using a millimetric ruler. Additionally, right and left lateral movements of the mandible were measured and recorded [11].

Fonseca Anamnestic Index: The Fonseca Anamnestic Index, consisting of 10 items, will be used to assess the presence and severity of TMD. Participants are asked to respond to each question with "Yes," "No," or "Sometimes." A "Yes" response is scored as 10 points, "Sometimes" as 5 points, and "No" as

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0 points. Each item is scored individually, and the total score determines the severity of TMD. According to the classification: A score of 0–15 indicates no TMD, 20–40 indicates mild TMD, 45–60 indicates moderate TMD, and 70–100 indicates severe TMD [12].

Pittsburgh Sleep Quality Index (PSQI): The Pittsburgh Sleep Quality Index (PSQI) is a self-report assessment tool developed by Buysse et al. in 1989, designed to evaluate sleep quality, types of sleep disturbances, and their severity over the past month. The Turkish validity and reliability study of the PSQI was conducted by Ağargün et al. in 1996.

The PSQI consists of 24 questions, 19 of which are self-reported by the participant. The remaining 5 questions are to be answered by a spouse or roommate. Of the 19 self-report items, 18 contribute to the scoring, which are grouped into seven components: subjective sleep quality (component 1), sleep latency (component 2), sleep duration (component 3), habitual sleep efficiency (component 4), sleep disturbances (component 5), use of sleeping medications (component 6), daytime dysfunction (component 7).

Each component is scored on a scale from 0 to 3. The total PSQI score is the sum of these component scores, ranging from 0 to 21. A global score of 0–4 indicates good sleep quality, while a score of 5 or higher suggests poor sleep quality [9].

Visual Analog Scale (VAS): In this study, a visual scale validated by Bryant (1993) was used to measure the intensity of pain. The scale is 100 mm in length, with one end marked as "0" and the other as "10." A score of 0 indicates "no pain at all," while a score of 10 represents "the most severe pain imaginable." Participants with chronic pain are asked to place a mark on the line that best represents the intensity of their pain. This mark is then measured in millimeters to obtain the VAS score [13].

State-Trait Anxiety Inventory (STAI): The State-Trait Anxiety Inventory (STAI) was originally developed by Spielberger and Gorsuch in 1964 to measure both state and trait anxiety levels in normal and clinical populations [14]. The Turkish adaptation and validation of the scale were conducted by Öner and Le Compte [15] between 1974 and 1977. The inventory consists of two separate subscales, each containing 20 items: The State Anxiety Scale (S-Anxiety) measures how an individual feels at a specific moment and under specific conditions. The Trait Anxiety Scale (T-Anxiety) evaluates how an individual generally feels, independent of specific circumstances. Each item is rated on a 4-point Likert scale. The scale includes both positively worded (reverse-scored) and negatively worded (direct-scored) items. For reverse-scored items (which reflect positive feelings), a response scored as 1 is converted to 4, and a response scored as 4 is converted to 1. For direct-scored items (which reflect negative feelings), higher scores (i.e., 4) indicate greater anxiety. Two separate scoring keys are used: one for direct items and another for reverse items. The total weighted score for reverse items is subtracted from the total score of direct items. A predetermined constant is then added to this result: +50 for the State Anxiety Scale, +35 for the Trait Anxiety Scale. The final score represents the individual's anxiety level. Higher scores indicate higher anxiety, while lower scores reflect lower anxiety. Possible scores range from 20 to 80.

Statistical Analysis: All statistical analyses were performed using SPSS 25.0 software. Continuous variables were defined by the mean±standard deviation, median (IQR: 25th-75th percentiles) and categorical variables were defined by number and percent. Kolmogorov Smirnov and Shapiro Wilk tests were used for determination of normal distribution. For independent groups comparisons, we used One Way Analysis of Variance test (post hoc: Tukey test) when parametric test assumptions were provided. When parametric test assumptions were not provided we used Kruskal Wallis Variance Analysis (post hoc: Mann Whitney U test with Bonferroni correction). Spearman correlation analysis was used for analyzing the relationships between continuous variables. Also, Chi-square test was used to examine differences in categorical variables. Statistical significance was determined as $p<0.05$.

RESULTS

The demographic and clinical characteristics of the participants are presented in Table 1.

An analysis based on TMD group classifications revealed that there were no statistically significant differences among the groups in relation to the following variables: educational level, number of pregnancies, current pregnancy number, number of miscarriages, gestational age (in weeks), self-reported common systemic conditions, presence of missing teeth, mouth opening, right lateral movement (cm), left lateral movement (cm), protrusion (cm), total PSQI score, VAS-rest, VAS-activity, VAS-night, STAI-I, and STAI-II scores (Table 2). A statistically significant difference was found between age and TMD severity groups. Specifically, individuals in the mild TMD group were significantly younger than those in the moderate and severe TMD groups (Table 2).

There was a weak, positive, and statistically significant correlation was found between VAS-rest scores and the Fonseca Anamnestic Index. A weak, positive, and statistically significant correlation was observed between VAS-activity and total PSQI score (Table 3). A weak, negative, and statistically significant correlation was detected between STAI-I scores and both TMD presence and Fonseca Index scores. A weak, positive, and statistically significant correlation was observed between STAI-II scores and the Fonseca Anamnestic Index (Table 3).

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Table 1. Demographic and clinical characteristics of the participants

Variables	Category	n	%
Age	Mean±SD	27.26±5.43	
	Med (IQR)	27 (23-31)	
	Min.-Max.	18-46	
Education level	No formal education	1	1.2
	Primary school	8	9.3
	Middle school	24	27.9
	High school	28	32.6
	University	24	27.9
	Postgraduate	1	1.2
Number of pregnancies	Mean±SD	2.22±1.36	
	Med (IQR)	2 (1-3)	
	Min.-Max.	1-7	
Current pregnancy number	Mean±SD	2.02±1.15	
	Med (IQR)	2 (1-3)	
	Min.-Max.	1-7	
Number of miscarriages	Mean±SD	0.34±0.71	
	Med (IQR)	0 (0-0)	
	Min.-Max.	0-3	
Gestational week	0-12. weeks	16	18.6
	13-24. weeks	27	31.4
	25-39. weeks	43	50.0
Systemic condition	Hypertension	2	14.3
	Cardiac problems	1	7.1
	Neurological problems	1	7.1
	Rheumatic disorders	5	35.7
	Diabetes	5	35.7
Presence of missing teeth	Yes	34	39.5
	No	52	60.5
TMD classification	None	38	44.2
	Mild	39	45.3
	Moderate to severe	9	10.5
Mouth opening (cm)	Mean±SD	5.25±0.99	
	Med (IQR)	5.2 (4.5-6)	
	Min.-Max.	2.5-7.5	

n: frequency; %: percentage; SD: standard deviation; Med (IQR): median (25th–75th percentiles); min–max: minimum–maximum values

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Table 1. Demographic and clinical characteristics of the participants

Variables	Category	n	%
Right lateral movement (cm)	Mean±SD	0.87±0.6	
	Med (IQR)	0.8 (0.5-1.2)	
	Min.-Max.	0-4.5	
Left lateral movement (cm)	Mean±SD	0.87±0.48	
	Med (IQR)	0.95 (0.5-1.33)	
	Min.-Max.	0-2	
Protrusion (cm)	Mean±SD	0.48±0.28	
	Med (IQR)	0.5 (0.3-0.6)	
	Min.-Max.	0-1.2	
FONSECA	Mean±SD	22.21±16.01	
	Med (IQR)	20 (10-30)	
	Min.-Max.	0-80	
PSQI total	Good	31	36.0
	Modarete	43	50.0
	Poor	12	14.0
VAS-rest	Mean±SD	2.8±2.45	
	Med (IQR)	2.5 (0-5)	
	Min.-Max.	0-10	
VAS-activity	Mean±SD	3.65±2.79	
	Med (IQR)	3 (2-5)	
	Min.-Max.	0-10	
VAS-night	Mean±SD	3.64±3.27	
	Med (IQR)	3.5 (0-7)	
	Min.-Max.	0-10	
STAI I	Mean±SD	44.55±6.85	
	Med (IQR)	44 (40-49.25)	
	Min.-Max.	29-60	
STAI II	Mean±SD	49.01±7.12	
	Med (IQR)	47.5 (44-52)	
	Min.-Max.	36-68	

n: frequency; %: percentage; SD: standard deviation; Med (IQR): median (25th–75th percentiles); min–max: minimum–maximum values

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Table 2. Mean scores obtained from the assessment scales

Variables	Category	TMD			p
		None (1)	Mild (2)	Moderate to severe (3)	
Age	Mean±SD	27.11±4.78	26.49±6.1	31.22±3.11	0.02* (kw=7.78) (2-3)
	Med (IQR)	27 (23-31)	26 (22-30)	32 (29-33.5)	
	Min.-Max.	18-38	18-46	25-35	
Education level	No formal education	0 (0%)	1 (2.6%)	0 (0%)	0.748 (kk=6.758)
	Primary school	2 (5.3%)	4 (10.3%)	2 (22.2%)	
	Middle school	12 (31.6%)	11 (28.2%)	1 (11.1%)	
	High school	13 (34.2%)	12 (30.8%)	3 (33.3%)	
	University	11 (28.9%)	10 (25.6%)	3 (33.3%)	
	Postgraduate	0 (0%)	1 (2.6%)	0 (0%)	
Number of pregnancies	Mean±SD	2.29±1.56	2.18±1.27	2.11±0.78	0.955 (kw=0.092)
	Med (IQR)	2 (1-3)	2 (1-3)	2 (1.5-3)	
	Min.-Max.	1-7	1-5	1-3	
Current pregnancy number	Mean±SD	2.03±1.28	2±1.1	2.11±0.78	0.768 (kw=0.527)
	Med (IQR)	2 (1-3)	2 (1-3)	2 (1.5-3)	
	Min.-Max.	1-7	1-5	1-3	
Number of miscarriages	Mean±SD	0.45±0.86	0.31±0.61	0±0	0.224 (kw=2.994)
	Med (IQR)	0 (0-1)	0 (0-0)	0 (0-0)	
	Min.-Max.	0-3	0-2	0-0	
Gestational week	0-12. weeks	5 (13.2%)	8 (20.5%)	3 (33.3%)	0.682 (kk=2.292)
	13-24. weeks	12 (31.6%)	13 (33.3%)	2 (22.2%)	
	25-39. weeks	21 (55.3%)	18 (46.2%)	4 (44.4%)	
Systemic condition	Hypertension	0 (0%)	1 (16.7%)	1 (33.3%)	0.29 (kk=9.655)
	Cardiac problems	0 (0%)	1 (16.7%)	0 (0%)	
	Neurological problems	0 (0%)	0 (0%)	1 (33.3%)	
	Rheumatic disorders	2 (40%)	2 (33.3%)	1 (33.3%)	
	Diabetes	3 (60%)	2 (33.3%)	0 (0%)	
Presence of missing teeth	Yes	11 (28.9%)	18 (46.2%)	5 (55.6%)	0.174 (kk=3.498)
	No	27 (71.1%)	21 (53.8%)	4 (44.4%)	

*p<0.05 indicates a statistically significant difference; SD: standard deviation; Med (IQR): median (25th–75th percentiles); KW: Kruskal-Wallis Variance Analysis; F: One-Way Analysis of Variance (ANOVA)

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Table 2. Mean scores obtained from the assessment scales

Variables	Category	TMD			p
		None (1)	Mild (2)	Moderate to severe (3)	
Mouth opening (cm)	Mean±SD	5.38±0.97	5.13±1.01	5.21±1.06	0.521 (F=0.657)
	Med (IQR)	5.3 (4.73-6)	5.2 (4.5-6)	5.4 (4.5-6)	
	Min.-Max.	3.7-7.5	2.5-7	3.5-7	
Right lateral movement (cm)	Mean±SD	0.88±0.72	0.88±0.5	0.81±0.56	0.805 (kw=0.434)
	Med (IQR)	0.7 (0.5-1)	1 (0.5-1.4)	0.7 (0.4-1.1)	
	Min.-Max.	0-4.5	0-2	0.1-2	
Left lateral movement (cm)	Mean±SD	0.77±0.45	0.93±0.5	1.07±0.52	0.247 (kw=2.799)
	Med (IQR)	0.65 (0.5-1)	1 (0.5-1.5)	1 (0.6-1.5)	
	Min.-Max.	0-1.7	0-2	0.4-2	
Protrusion (cm)	Mean±SD	0.45±0.26	0.48±0.29	0.6±0.31	0.543 (kw=1.22)
	Med (IQR)	0.5 (0.29-0.5)	0.5 (0.3-0.6)	0.5 (0.35-0.95)	
	Min.-Max.	0-1	0-1.2	0.2-1	
FONSECA	Mean±SD	14 (%36.8)	13 (%33.3)	4 (%44.4)	0.88 (kk=1.189)
	Med (IQR)	20 (%52.6)	19 (%48.7)	4 (%44.4)	
	Min.-Max.	4 (%10.5)	7 (%17.9)	1 (%11.1)	
PSQI total	Good	2.37±2.29	2.97±2.35	3.89±3.3	0.252 (kw=2.753)
	Modarete	2 (0-4)	3 (1-5)	4 (0.5-6)	
	Poor	0-8	0-8	0-10	
VAS-rest	Mean±SD	3.05±2.38	4.05±2.79	4.44±4.03	0.291 (kw=2.466)
	Med (IQR)	3 (0-5)	4 (2-6)	4 (0.5-9)	
	Min.-Max.	0-9	0-10	0-10	
VAS-activity	Mean±SD	3.58±3.77	3.54±2.67	4.33±3.61	0.757 (kw=0.557)
	Med (IQR)	2 (0-8)	4 (1-5)	5 (0.5-7.5)	
	Min.-Max.	0-10	0-8	0-10	
VAS-night	Mean±SD	46.11±5.1	42.77±7.3	45.67±9.81	0.088 (F=2.506)
	Med (IQR)	46 (43-50)	41 (38-48)	40 (37.5-55.5)	
	Min.-Max.	33-55	29-58	35-60	
STAI I	Mean±SD	48.37±7.18	48.77±6.67	52.78±8.39	0.235 (kw=2.895)
	Med (IQR)	46 (44-52.25)	48 (43-52)	49 (47.5-59.5)	
	Min.-Max.	38-67	36-64	45-68	

*p<0.05 indicates a statistically significant difference; SD: standard deviation; Med (IQR): median (25th–75th percentiles); KW: Kruskal-Wallis Variance Analysis; F: One-Way Analysis of Variance (ANOVA)

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Table 3. Relationships among tmd, bruxism, anxiety, and sleep quality

Variables		TMD	FONSECA	PSQI total
Age	**r**	0.107	0.061	0.194
	p	0.326	0.577	0.074
Number of pregnancies	**r**	0.018	-0.016	-0.033
	p	0.867	0.886	0.765
Current pregnancy number	**r**	0.056	0.024	-0.007
	p	0.606	0.824	0.949
Number of miscarriages	**r**	-0.147	-0.197	-0.001
	p	0.176	0.069	0.993
Gestational week	**r**	-.0126	-0.007	0.127
	p	0.249	0.949	0.243
Mouth opening (cm)	**r**	-0.083	-0.059	0.207
	p	0.449	0.587	0.056
Right lateral movement (cm)	**r**	0.012	0.052	-0.080
	p	0.913	0.632	0.465
Left lateral movement (cm)	**r**	0.180	0.175	-0.030
	p	0.097	0.108	0.783
Protrusion (cm)	**r**	0.112	0.136	-0.055
	p	0.304	0.212	0.618
VAS-rest	**r**	0.179	0.280*	0.133
	p	0.099	0.009	0.220
VAS-activity	**r**	0.163	0.186	0.369*
	p	0.135	0.086	0.000
VAS-night	**r**	0.076	0.142	0.178
	p	0.485	0.191	0.101
STAI I	**r**	-0.225*	-0.211*	-0.156
	p	0.037	0.05	0.152
STAI II	**r**	0.142	0.254*	0.102
	p	0.192	0.018	0.349
PSQI total	**r**	0.022	0.067	-
	p	0.839	0.540	-

*p<0.05 indicates a statistically significant correlation; r: Spearman correlation coefficient

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DISCUSSION

This study aimed to investigate the relationship between TMD, pain, anxiety levels, and functional status in pregnant women. The findings revealed a statistically significant difference between TMD severity and age. Specifically, the mean age of participants in the mild TMD group was significantly lower than that of individuals in the moderate-to-severe TMD group (p=0.02). This result aligns with previous literature suggesting that the severity of temporomandibular joint disorders may increase with advancing age.

However, no statistically significant differences were found between TMD and other variables such as educational level, number of pregnancies, mouth opening, lateral movements, or protrusive movements of the jaw. This finding highlights the multifactorial nature of TMD, suggesting that it is influenced not only by biomechanical factors but also by psychosocial components. TMD are known to have a higher prevalence among women, a pattern that is often attributed to a combination of hormonal, anatomical, and psychosocial factors [14]. In particular, the effects of estrogen on the temporomandibular joint have been the focus of increasing scientific attention in recent years [7].

In this context, the combination of hormonal changes, psychological stress, and disrupted sleep quality during pregnancy represents a significant set of risk factors for the development of both bruxism and TMD [15]. Although studies addressing these three factors simultaneously are limited in number, the literature increasingly emphasizes the importance of multidisciplinary approaches in understanding and managing these conditions [2,4,7,15,16]

In a systematic review and meta-analysis conducted by Minervini et al. (2023), the prevalence of TMD among pregnant women was reported as 41.8%, compared to 40.8% in non-pregnant women. The meta-analytic results suggested no significant association between pregnancy and TMD (RR=1.12; 95% CI: 0.65–1.93) [17]. In contrast, a study by Fichera et al. (2020) found that 81% of 108 pregnant women exhibited clear symptoms of TMD, while the prevalence in the control group was only 52%. The authors attributed this difference primarily to increased hormone levels during pregnancy.

Taken together, these studies suggest that the development of TMD may not be solely attributed to hormonal changes, but rather emerges from the complex interplay of multiple factors such as psychological stress, individual mental health status, and parafunctional habits [1,4].

The literature suggests that increased levels of estrogen and relaxin during pregnancy contribute to the loosening of connective tissues, which may in turn reduce joint stability. [3,7]. However, a study by Solak et al. (2020) demonstrated that hormonal changes alone are insufficient to fully explain the development of TMD. In that study, the prevalence of TMD was found to be 7.1% among pregnant women and 7.5% among non-pregnant women, with no statistically significant difference between the two groups. Additionally, no association was identified between systemic joint hypermobility and TMD. These findings suggest that pregnancy may not represent a direct risk factor for TMD; rather, individual sensitivity to hormonal changes may exacerbate TMD symptoms in certain women [3].

In our study, a weak but statistically significant positive correlation was identified between Fonseca questionnaire scores and pain levels experienced at rest (r=0.280; p=0.009). Similarly, a significant positive correlation was found between the total PSQI score and pain levels reported during physical activity (r=0.369; p<0.001). These findings indicate that TMD symptoms in pregnant women may become more pronounced both at rest and during movement, potentially leading to a decline in overall quality of life.

Sleep quality appears to play a crucial role in this dynamic. The literature suggests that sleep disturbances can impair muscle relaxation, thereby increasing pain levels and exacerbating TMD symptoms by triggering bruxism [5].

Problems such as insomnia and frequent nighttime awakenings may indirectly exacerbate temporomandibular dysfunctions by increasing the severity of bruxism [11]. However, as noted by LeResche, hormones that rise during pregnancy such as estrogen and progesterone may exert antinociceptive (pain-reducing) effects in certain individuals. This hormonal influence may contribute to interindividual variability in pain perception during pregnancy [18].

In a study conducted by Szylkiewicz (2022), it was reported that the prevalence of TMD increases during pregnancy, with symptoms of TMJ pain being more frequently observed in the first trimester. Among the 231 pregnant women included in the study, 47% reported experiencing TMD. The findings also indicated that TMJ symptoms decreased in severity as pregnancy progressed, suggesting a reduction in symptom intensity across the trimesters (p=0.02) [11].

In our study as well, a significant association was observed between TMD severity and age, with the mean age being significantly higher in the moderate-to-severe TMD group. This finding suggests that hormonal changes, along with the increased biomechanical loading that comes with age, may contribute to the intensification of TMJ symptoms.

Additionally, in Szylkiewicz's study, a high prevalence of parafunctional habits such as lip/cheek biting and teeth clenching was reported (55.8% and 40.3%, respectively), and these behaviors were considered potential triggers for TMD symptoms [11]. Similarly, in our study, indirect associations between TMD and bruxism were observed, with positive correlations identified between Fonseca scores and pain levels [3,11]. The findings from both studies indicate that TMD during pregnancy is influenced not only by hormonal factors, but also through

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interactions with behavioral (e.g., parafunctional habits) and psychological factors, such as anxiety and pain perception [3,11]. In conclusion, the recent findings in the literature, consistent with our data, emphasize that temporomandibular dysfunctions during pregnancy are associated with both physiological and behavioral processes. The variability of symptoms across trimesters further highlights the importance of addressing these conditions in the prenatal period as a significant aspect of maternal health.

Bruxism is a parafunctional habit commonly associated with stress and anxiety disorders. Research indicates that elevated anxiety levels during pregnancy may serve as a trigger for this behavior [6]. In our study, when examining the relationship between anxiety levels and TMD, a significant negative correlation was found between STAI-I (state anxiety) scores and both TMD severity and Fonseca scores ($r=-0.225$ and $r=-0.211$, respectively). This finding suggests that heightened short-term anxiety may potentially suppress the perception of symptoms or influence how individuals express their discomfort. In contrast, a significant positive correlation was observed between STAI-II (trait anxiety) scores and the Fonseca Index ($r=0.254$; $p=0.018$), indicating that long-term anxiety may exacerbate TMD symptoms. Supporting this pattern, a study conducted by Um-e-Farwa et al. (2020) in Pakistan reported that the prevalence of bruxism increased from 50.7% pre-pregnancy to 76% during pregnancy [10]. This rise suggests that heightened physiological stress during pregnancy may trigger parafunctional behaviors, potentially contributing to the development of TMD. Consistent with these findings, our study also revealed a positive correlation between Fonseca scores and pain levels, and a significant association between STAI-II scores and Fonseca scores. Collectively, these results indicate that bruxism and TMD symptoms may share common psychophysiological underpinnings.

Limitations

Several limitations of this study should be acknowledged. First, due to the cross-sectional design, it is not possible to establish causal relationships. Additionally, the assessment of TMD relied on subjective measures and was not supported by objective imaging techniques. Furthermore, variables such as anxiety and pain are inherently influenced by psychological and social factors, which may affect the consistency of self-reported data.

CONCLUSION

In conclusion, this study revealed potential associations between TMD severity and variables such as age, pain, and anxiety levels in pregnant women. The findings highlight the importance of evaluating TMJ health during the prenatal period. Future longitudinal studies are needed to further explore the dynamic effects of TMD throughout pregnancy and enhance our understanding of its progression over time.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

Ethics committee approval for our study was obtained from the Clinical Researches Ethics Committee of Alanya Alaaddin Keykubat University (Date: 16.04.2025, Decision number: 07/05).

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