

Prevalence of Temporomandibular Joint Disorders in Adults in Jeddah, Kingdom of Saudi Arabia: A Cross-sectional Study

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ABSTRACT

Aim: Assess the prevalence of temporomandibular dysfunction (TMD) in adults in Jeddah, Kingdom of Saudi Arabia.

Materials and methods: This was a cross-sectional study of adults aged 18 years and above during their routine visit to primary care dental centers in the city in 2018. Five-hundred participants enrolled in this study. Primary healthcare centers are clustered geographically in five areas of the city (north, south, west, east, and center) by the ministry of health. One-hundred participants were recruited from each area. The TMD/pain screener questionnaire was completed by participants. The first item used a scoring mechanism of 0–2 ($a = 0, b = 1, c = 2$), and the second and third items were scored 0–1 ($a = 0, b = 1$). A total score of 3 or more indicates the presence of TMD. *t* test was used to evaluate gender differences in TMD prevalence with a significance level of $p < 0.05$.

Results: There were 250 females and 250 males participants. The mean age was 40.6 years (range: 18–89 years; standard deviation: 13.7 years). Answers to the first question showed that 52% of participants had no pain in the temple area, or jaw in the last 30 days, 46% of participants had intermittent pain, and 2% had persistent pain. Twenty-seven percent of participants had pain or stiffness in the jaw upon waking up, whereas 39% of participants had pain while chewing food, 29% experienced pain from opening the mouth or moving the jaw, 34% during jaw habits such as holding the teeth together, clenching, or chewing gum, and 18% during other jaw activities such as talking, kissing, or yawning. A total score of 3 or more was found in 175 participants, indicating a prevalence of 35%. TMD was significantly more prevalent in females (105 participants, 42%) than in males (70 participants, 28%) with $p = 0.0008$.

Conclusion: The prevalence of TMD in adult population in Jeddah is considered high. It is significantly more prevalent in females than in males.

Clinical significance: TMD prevalence is relatively high in adults of Jeddah, Kingdom of Saudi Arabia. Public health efforts should be directed at increasing TMD awareness in patients and healthcare professionals.

Keywords: Temporomandibular dysfunction, Temporomandibular joint.

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INTRODUCTION

Temporomandibular joint dysfunction (TMD) can be defined as the variety of signs and symptoms assigned to the temporomandibular joint (TMJ) and its related structures, including joint noises, tenderness of the muscles of mastication, headaches, TMJ pain, face and neck pain, decrease in mandibular range of motion, wear of dentition, parafunctional habits, tinnitus, and otalgia.¹ The exact etiology of TMD remains controversial, with multiple potential factors involved. These factors include trauma, occlusal imbalances, psychological factors, parafunctional habits (e.g., bruxism), and systemic factors (e.g., rheumatoid arthritis).

There are multiple other definitions in the literature for TMD, which make interpreting research results complicated. Nevertheless, it is a common disease with high prevalence rates. The need for a standardized assessment tool was first approached by Helkimo, who developed a clinical TMD severity index.² In 1992, the research diagnostic criteria for temporomandibular disorders index (RDC/TMD) was introduced with a similar goal of unifying research attempts. Recently, a diagnostic criteria for temporomandibular disorders (DC/TMD) tool was recommended to be used instead, in both clinical and research settings.³ The TMD/pain screener instrument is a self-reported questionnaire (Fig. 1). Given its excellent sensitivity, specificity, and cost-effectiveness, it was chosen to screen the studied population for TMD pain.⁴

TMD pain has been shown to affect the quality-of-life negatively.^{5–7} Pigozzi et al. used the World Health Organization Quality of Life-Brief Version (WHOQL-Bref) and the RDC/TMD

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instruments to evaluate 1643 patients.⁷ They reported that the quality-of-life was significantly worse in patients with TMD (axes I and II of the RDC/TMD) compared to the control group. Resende et al. evaluated the quality-of-life and general health in patient with TMD.⁸ They also used the WHOQL-Bref and found an inverse relation between TMD and the quality-of-life.

TMD signs and symptoms can be confusing for both patients and healthcare providers. Martins et al. reported a lack of knowledge in a sample of professionals in primary healthcare regarding the association of tinnitus and TMD.⁹ Resche et al. surveyed dentists and specialists about their understanding of TMD evaluation and management.¹⁰ They found significant variations in the answers of surveyed practitioners and concluded that TMD diagnosis and treatment was controversial. A similar study was conducted by

TMD-PAIN SCREENER

1. In the last 30 days, which of the following best describes any pain in your jaw or temple area on either side?
 - a. No pain
 - b. Pain comes and goes
 - c. Pain is always present

2. In the last 30 days, have you had pain or stiffness in your jaw on awakening?
 - a. No
 - b. Yes

3. In the last 30 days, did the following activities change any pain (that is, make it better or make it worse) in your jaw or temple area on either side?
 - A. Chewing hard or tough food
 - a. No
 - b. Yes

 - B. Opening your mouth or moving your jaw forward or to the side
 - a. No
 - b. Yes

 - C. Jaw habits such as holding teeth together, clenching/grinding, or chewing gum
 - a. No
 - b. Yes

 - D. Other jaw activities such as talking, kissing, or yawning
 - a. No
 - b. Yes

Items 1-3A represent the short screener, and items 1-3D represent the long screener. An 'a' response is 0 points, a 'b' response is 1 point, and a 'c' response is 2 points. See publication for scoring cutoffs.

Gonzalez YM, Schiffman E, Gordon SM, Seago B, Truelove ET, Slade G, Ohrbach R (2011). Development of a brief and effective temporomandibular disorder pain screening questionnaire: reliability and validity. *JADA* 142:1183-1191.

Fig. 1: Temporomandibular joint dysfunction (TMD) pain screener form

Lee et al. to evaluate dentists' knowledge and beliefs about TMD in Korea.¹¹ They also found a high level of controversy in the diagnosis and management of TMD.

Previous studies about TMD prevalence in Kingdom of Saudi Arabia included a selected subset of the population such as dental students,^{12,13} children and adolescents,¹⁴ and edentulous patients.¹⁵ The aim of this study was to assess the prevalence of TMD in the adult population of Jeddah, Kingdom of Saudi Arabia.

MATERIALS AND METHODS

This was an epidemiological observational cross-sectional study conducted in Jeddah, Kingdom of Saudi Arabia in 2018. The local institution's ethical board review approval was obtained, and all patients signed an informed consent after reading the details of the study. The sample was obtained from adults aged 18 years and above during their routine visit to primary care dental centers in the city. Five-hundred participants enrolled in this study. The primary healthcare centers are geographically clustered in five areas of the city (north, south, west, east, and center) by the ministry of health. One-hundred participants were recruited from each of these areas. Collected data included demographic information as well. The TMD/pain screener (Fig. 1) was translated to Arabic and patients were asked to fill it out themselves. The first item has scores of 0–2 ($a = 0, b = 1, c = 2$). Second and third items are scored as ($a = 0, b = 1$). The sum was computed and values from 0 to 2 indicate the absence of TMD, while a total score of 3 or more indicates the presence of TMD. *t* test was used to evaluate gender differences in TMD prevalence with a significance level of $p < 0.05$.

RESULTS

Five-hundred patients completed the TMD/pain screener. There were 250 females and 250 males. The mean age was 40.6 years (range = 18–89 years; standard deviation = 13.7 years). Answers to the first question showed that 260 participants (52%) had no pain in the temple area or jaw in the last 30 days, 230 participants (46%) had intermittent pain, and 10 participants (2%) had persistent pain (Fig. 2). One-hundred and thirty-five participants (27%) had pain or stiffness in the jaw upon waking up (Fig. 3), whereas 195 participants (39%) had pain while chewing food, 145 participants (29%) experienced pain from opening the mouth or moving the jaw,

170 participants (34%) had pain during jaw habits such as holding the teeth together, clenching, or chewing gum, and 90 participants (18%) had pain during other jaw activities such as talking, kissing, or yawning (Fig. 4). A total score of 3 or more was found in 175 participants (35%). TMD was significantly more prevalent in females (105 participants, 42%) than in males (70 participants, 28%) with $p = 0.0008$ (Table 1).

DISCUSSION

The prevalence of TMD is variable in the literature. This may be the product of the variability in defining TMD. Moreover, researchers used multiple assessment questionnaires or examination methodology, which makes it harder to compare findings. In this study, we used the TMD/pain screener questionnaire form. It is a validated tool to screen for TMD.⁴ It consists of three simple questions in a multiple-choice format. This tool showed a sensitivity of 99%, and specificity of 97% for detecting the presence or absence of TMD. It is a simple and cost-effective instrument for screening patients for TMD. It was developed for use in clinical and research settings.

TMD is a multifactorial disease and multiple causes has been implicated in the literature. Occlusal instability has been speculated to play a major role in the development of TMD,^{16,17} while others found no significant difference in relation to occlusion.¹⁸ Parafunctional habits such as bruxism is believed by many to be a major contributing factor in the development of TMD.¹⁹ Hormones may play a role in TMD. In contrast to testosterone, estrogen was found to elevate the levels of interleukin 1 and interleukin 6.²⁰ A history of trauma to the lower jaw may be linked to TMD. Additionally, systemic diseases such as rheumatoid arthritis, systemic lupus erythematosus (SLE), and ankylosing spondylitis may contribute to the development of TMD.^{21–23}

To the best of our knowledge, this is the first study to assess TMD prevalence in the adult population of Jeddah, Kingdom of Saudi Arabia. Our sample was obtained from the different geographic areas of the city in order to achieve a representative sample. We found TMD prevalence in 35% of the adult population of Jeddah. This is relatively high, but consistent with some of the previous studies conducted in different population subsets of Kingdom of Saudi Arabia. Zwiri and Al-Omiri reported that 49.7% of students

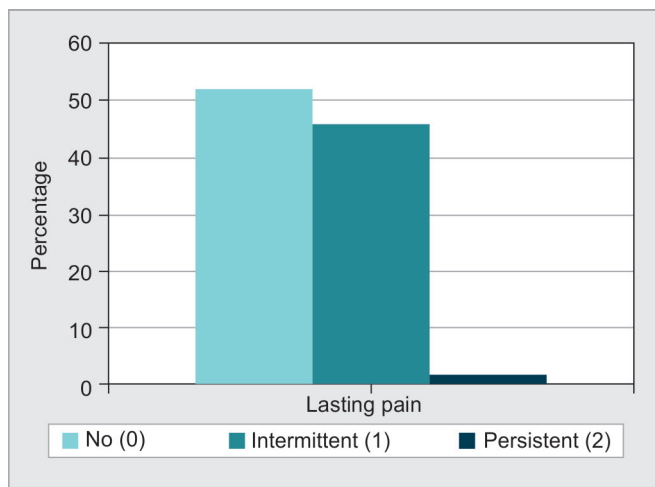


Fig. 2: The chart demonstrates answers to the first question of the TMD pain screener form: in the last 30 days, which of the following best describes pain in your jaw or temple areas in either side?

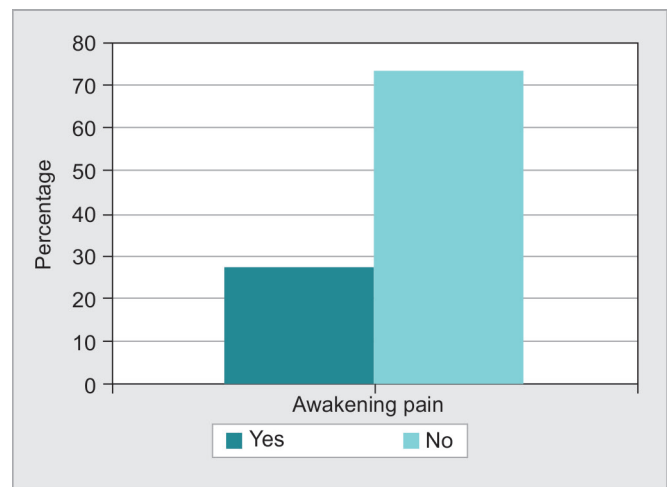


Fig. 3: The chart demonstrates answers to the second question of the TMD pain screener form: in the last 30 days, have you had pain or stiffness in your jaw on awakening?

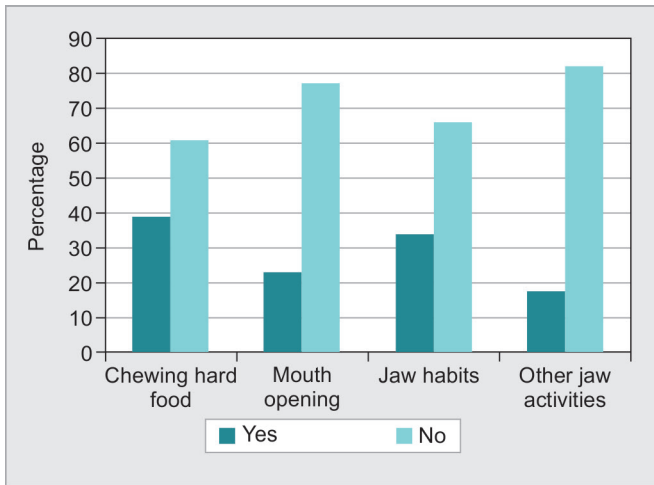


Fig. 4: The chart demonstrates answers to the third question of the TMD pain screener form: in the last 30 days, did the following activities change any pain in your jaw or temple area on either side?

Table 1: A comparison of TMD prevalence between males and females

	Participants with TMD (total score of 3 or more)	Participants without TMD (score < 3)	Total
Males	70 (28%)	180 (72%)	250
Females	105 (42%)	145 (58%)	250
Total	175 (35%)	375 (65%)	500
t test	$p = 0.0008$		

in North Saudi University had at least one sign or symptom of TMD.¹³ They also reported that it was higher in females, which is in agreement with our findings. Contrary to this study, they used a non-validated questionnaire. Al-Khotani et al. did a cross-sectional study on children and adolescents attending schools in Jeddah, Kingdom of Saudi Arabia.¹⁴ They used the TMD/pain screener followed by examination according to the RDC/TMD. They reported that 27.2% were diagnosed with at least one TMD-diagnosis. AlHussaini et al. used an electronic questionnaire to assess prevalence and severity of TMD in female dental students in Riyadh, Kingdom of Saudi Arabia.¹² They used Fonseca’s anamnestic index (FAI), and also evaluated the anxiety level using Zung anxiety self-assessment scale (SAS). They reported that high anxiety level was related to TMD and was present in 62.8% of their sample. The higher prevalence rate in their study could be explained by the gender selection in their examined population. Alzarea et al. evaluated 400 edentulous patients during their visit at Al-Jouf dental school in Skaka, Kingdom of Saudi Arabia. They reported that TMD prevalence in this group of patients was 60.5%.¹⁵ The occlusal instability may explain the high prevalence rate in their findings.

Our results showed that TMD was significantly more prevalent in females ($p = 0.0008$). This is consistent with many previous studies.^{24–28} The exact reason for this gender difference remains unknown. A possible etiology includes differences in joint collagen type in the TMJ retro-diskal zone,²⁹ laxity of joint ligaments,³⁰ hormonal factors,³¹ and higher intra-articular pressure.³² Bueno et al. conducted a systematic review to evaluate the gender difference in TMD prevalence in adults.²⁵ They selected five articles for meta-analysis with a combined total of 2518 patients. They found that females were two times at a greater risk in developing TMD.

The prevalence of TMD in other countries is also variable in the literature. Talaat et al. evaluated the prevalence of TMD incidentally during routine dental examinations using the RDC/TMD.³³ They found a prevalence rate of 10.8% mostly affecting women (65.85%). Jessila et al. examined the prevalence of TMD in a Northern Finland birth cohort at the age of 46 years.³⁴ They used a modified DC/TMD protocol and reported that 34.2% of the sample (1962 subjects) had TMD signs. The prevalence was higher in women than in men. These findings are similar to our results. Bengt et al. published the prevalence of TMD in adult patients attending general dental practice in Sweden using a questionnaire and examining mouth opening range.³⁵ They reported a mean prevalence of 5% and mostly in patients aged 30–45 years; however, they used a non-validated assessment method. Loster et al. examined 260 young polish volunteers selected randomly from high schools at the age of 18 years and found that 26.5% of them had one or more diagnoses on the research diagnostic criteria for temporomandibular disorders (RDC/TMD) axis I.³⁶ Iodice et al. used a self-developed questionnaire to study the prevalence of TMD in adult Italian population sample. They found that 30.7% had TMJ clicking, 16.3% had TMD-pain, and 10.3% had TMJ crepitus.³⁷ Glass et al. conducted a telephone survey asking questions about TMD symptoms in Kansas City metropolitan area.³⁸ That study found that the prevalence of jaw soreness, diurnal clenching, nocturnal bruxism, and joint noises ranged from 10–19%.

A limitation of this study include a relatively small sample size; however, the high prevalence rate of TMD in the adult population of Jeddah, Kingdom of Saudi Arabia warrants further public and professional awareness of TMD.

CONCLUSION

TMD is a multifactorial process with varying prevalence rates in different populations. According to our findings, TMD prevalence in the adult population of Jeddah, Kingdom of Saudi Arabia is considered relatively high. It was significantly higher in females than in males. Public health efforts should be directed at increasing TMD awareness in patients and healthcare professionals. Future studies should include a larger sample size using a validated screening tool such as the TMD/pain screener. It should also investigate the potential etiology in the studied population.

REFERENCES

- Luther F. Orthodontics and the temporomandibular joint: where are we now? Part 1. Orthodontic treatment and temporomandibular disorders. *Angle Orthod* 1998 Aug;68(4):295–304. DOI: 10.1043/0003-3219(1998)068<0295:OATTJW>2.3.CO;2.
- Helkimo M. Studies on function and dysfunction of the masticatory system. II. Index for anamnestic and clinical dysfunction and occlusal state. *Sven Tandlak Tidskr* 1974 Mar;67(2):101–121.
- Schiffman E, Ohrbach R, et al. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications: recommendations of the International RDC/TMD Consortium Network* and Orofacial Pain Special Interest Group. *J Oral Facial Pain Headache* 2014;28:6–27. DOI: 10.11607/jop.1151.
- Gonzalez YM, Schiffman E, et al. Development of a brief and effective temporomandibular disorder pain screening questionnaire: reliability and validity. *J Am Dent Assoc* 2011 Oct;142(10):1183–1191. DOI: 10.14219/jada.archive.2011.0088.
- Resende CM, Alves AC, et al. Quality of life and general health in patients with temporomandibular disorders. *Braz Oral Res* 2013 Mar;27(2):116–121. DOI: 10.1590/S1806-83242013005000006.

6. de Souza Barbosa T, Gavião MBD, et al. Factors Associated with Oral Health-related Quality of Life in Children and Preadolescents: A Cross-sectional Study. *Oral Health Prev Dent* 2016;14(2):137–148.
7. Pigozzi LB, Progiante PS, et al. General Health Quality of Life in Patients with Temporomandibular Disorders in a Population-Based Cross-Sectional Study in Southern Brazil. *Int J Prosthodont* 2019 May;32(3):237–240. DOI: 10.11607/ijp.6072.
8. Resende CM, Alves AC, et al. Quality of life and general health in patients with temporomandibular disorders. *Braz Oral Res* 2013 Mar;27(2):116–121. DOI: 10.1590/S1806-83242013005000006.
9. Martins PFA, Stechman J, et al. Tinnitus and temporomandibular disorders: the knowledge of professionals for primary health care in the city of Curitiba. *Int Tinnitus J* 2016 Jul 22;20(1):18–23. DOI: 10.5935/0946-5448.20160004.
10. Le Resche L, Truelove EL, et al. Temporomandibular disorders: a survey of dentists' knowledge and beliefs. *J Am Dent Assoc* 1993 May;124(5):90–94. DOI: 10.14219/jada.archive.1993.0121, 97–106.
11. Lee WY, Choi JW, et al. A study of dentists' knowledge and beliefs regarding temporomandibular disorders in Korea. *Cranio* 2000 Apr;18(2):142–146. DOI: 10.1080/08869634.2000.11746126.
12. AlHussaini AA, AlHudithy LH, et al. The prevalence and severity of temporomandibular disorder (TMD) among female dental students in Riyadh, Saudi Arabia. *Saudi Dent J* 2019;31(Suppl.):S55–S56. DOI: 10.1016/j.sdentj.2019.02.015.
13. Zwiri AMA, Al-Omiri MK. Prevalence of temporomandibular joint disorder among North Saudi University students. *Cranio* 2016 May;34(3):176–181. DOI: 10.1179/2151090315Y.0000000007.
14. Al-Khotani A, Naimi-Akbar A, et al. Prevalence of diagnosed temporomandibular disorders among Saudi Arabian children and adolescents. *J Headache Pain* 2016 Apr 20;17:41. DOI: 10.1186/s10194-016-0642-9.
15. Alzarea B. Prevalence of temporomandibular dysfunction in edentulous patients of Saudi Arabia. *J Int Oral Health* 2017;9(1):1–6. DOI: 10.4103/jioh.jioh_25_16.
16. Occlusion SKATO, 1988. The temporomandibular joint: problems related to occlusal function. *ci.nii.ac.jp*.
17. Christensen LV, Ziebert GJ. Effects of experimental loss of teeth on the temporomandibular joint. *J Oral Rehabil* 1986;13(6):587–598. DOI: 10.1111/j.1365-2842.1986.tb00682.x.
18. Huber MA, Hall EH. A comparison of the signs of temporomandibular joint dysfunction and occlusal discrepancies in a symptom-free population of men and women. *Oral Surg Oral Med Oral Pathol* 1990;70(2):180–183.
19. Greene CS. Etiology of temporomandibular disorders. *Semin Orthod* 1991;1(4):222–228. DOI: 10.1016/S1073-8746(95)80053-0.
20. Halpern LR, Levine M, et al. Sexual dimorphism and temporomandibular disorders (TMD). *Oral Maxillofac Surg Clin North Am* 2007;19(2):267–277. DOI: 10.1016/j.coms.2007.01.012.
21. Kononen M. 2006, BWTAE-BATD. Systemic conditions affecting the TMJ.
22. Jawaheer D, Olsen J, et al. Sex differences in response to anti-tumor necrosis factor therapy in early and established rheumatoid arthritis—results from the DANBIO registry. *J Rheumatol* 2012;39(1):46–53. DOI: 10.3899/jrheum.110548.
23. Velly AM, Friction J. The impact of comorbid conditions on treatment of temporomandibular disorders. *J Am Dent Assoc* 2011 Feb;142(2):170–172. DOI: 10.14219/jada.archive.2011.0060.
24. Bush FM, Harkins SW, et al. Analysis of gender effects on pain perception and symptom presentation in temporomandibular pain. *Pain* 1993 Apr;53(1):73–80. DOI: 10.1016/0304-3959(93)90058-W.
25. Bueno CH, Pereira DD, et al. Gender differences in temporomandibular disorders in adult populational studies: a systematic review and meta-analysis. *J Oral Rehabil* 2018 Sep;45(9):720–729. DOI: 10.1111/joor.12661.
26. Shaefer JR, Holland N, et al. Pain and Temporomandibular Disorders. *Dent Clin North Am* 2013 Apr 1;57(2):233–262.
27. Solberg WK, Hansson TL. The temporomandibular joint in young adults at autopsy: a morphologic classification and evaluation. *J Oral Rehabil* 1985;12(4):303–321.
28. Schmid-Schwab M, Bristela M, et al. Sex-specific differences in patients with temporomandibular disorders. *J Orofac Pain* 2013;27(1):42–50. DOI: 10.11607/jop.970.
29. Gage JP, Viridi AS, et al. Presence of type III collagen in disc attachments of human temporomandibular joints. *Arch Oral Biol* 1990;35(4):283–288. DOI: 10.1016/0003-9969(90)90044-B.
30. Pereira LJ, Pereira-Cenci T, et al. Risk indicators of temporomandibular disorder incidences in early adolescence. *Pediatr Dent* 2010 Jul;32(4):324–328.
31. Abubaker AO, Raslan WF, et al. Estrogen and progesterone receptors in temporomandibular joint discs of symptomatic and asymptomatic persons: a preliminary study. *J Oral Maxillofac Surg* 1993;51(10):1096–1100. DOI: 10.1016/S0278-2391(10)80448-3.
32. Nitzan DW. Intraarticular pressure in the functioning human temporomandibular joint and its alteration by uniform elevation of the occlusal plane. *J Oral Maxillofac Surg* 1994;52(7):671–679. DOI: 10.1016/0278-2391(94)90476-6.
33. Talaat WM, Adel OI, et al. Prevalence of temporomandibular disorders discovered incidentally during routine dental examination using the Research Diagnostic Criteria for Temporomandibular Disorders. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2018 Mar;125(3):250–259. DOI: 10.1016/j.oooo.2017.11.012.
34. Jussila P, Kiviahde H, et al. Prevalence of Temporomandibular Disorders in the Northern Finland Birth Cohort 1966. *J Oral Facial Pain Headache* 2017 Apr;31(2):159–164. DOI: 10.11607/ofph.1773.
35. Adèrn B, Minston A, et al. Self-reportance of temporomandibular disorders in adult patients attending general dental practice in Sweden from 2011 to 2013. *Acta Odontol Scand* 2018 Oct;76(7):530–534. DOI: 10.1080/00016357.2018.1487076.
36. Loster JE, Osiewicz MA, et al. The Prevalence of TMD in Polish Young Adults. *J Prosthodont* 2017 Jun;26(4):284–288. DOI: 10.1111/jopr.12414.
37. Iodice G, Cimino R, et al. Prevalence of temporomandibular disorder pain, jaw noises and oral behaviours in an adult Italian population sample. *J Oral Rehabil* 2019 Apr 16;28:6. DOI: 10.1111/joor.12803.
38. Glass EG, McGlynn FD, et al. Prevalence of temporomandibular disorder symptoms in a major metropolitan area. *Cranio* 1993 Jul;11(3):217–220. DOI: 10.1080/08869634.1993.11677968.