ORIGINAL ARTICLE

Annals of Agricultural and Environmental Medicine
www.aaem.pl

Prevalence of temporomandibular disorders in the adult population of Eastern Europe

Grzegorz Zieliński[1,A-F] ✉, Aleksandra Dolina[2,A-C,E-F], Michał Ginszt[3,A-C,E-F], Jacek Szkutnik[4,B,F], Justyna Pałka[2,B,F], Michał Baszczowski[2,B,F], Marcin Wójcicki[4,B,F], Monika Litko-Rola[4,B,F], Piotr Gawda[1,E-F]

[1] *Department of Sports Medicine, Medical University, Lublin, Poland*
[2] *Interdisciplinary Scientific Group of Sports Medicine, Department of Sports Medicine, Medical University, Lublin, Poland*
[3] *Department of Rehabilitation and Physiotherapy, Medical University, Lublin, Poland*
[4] *Independent Unit of Functional Masticatory Disorder, Medical University, Lublin, Poland*
A – Research concept and design, B – Collection and/or assembly of data, C – Data analysis and interpretation, D – Writing the article, E – Critical revision of the article, F – Final approval of the article

Zieliński G, Dolina A, Ginszt M, Szkutnik J, Pałka J, Baszczowski M, Wójcicki M, Litko-Rola M, Gawda P. Prevalence of temporomandibular disorders in the adult population of Eastern Europe. Ann Agric Environ Med. doi: 10.26444/aaem/193947

Abstract

Introduction and Objective. Temporomandibular disorders (TMDs) are disorders of the temporomandibular joint and the masticatory muscles. The most common symptom associated with TMDs is pain. The aim of the study is to assess the prevalence of TMDs in the adult population of Eastern Europe.

Materials and Method. The study included individuals aged 20–30 years at the time of examination. A total of 440 were enrolled in the study, including 339 women and 101 men, with an average age of 24 ± 2 years. Data analyzed included gender, age, and the type of TMD, divided into three groups: Group 1: Myofascial pain disorders, Group 2: Arthralgia, arthritis, and joint degeneration and Group 3: Disc displacement disorders.

Results. It was found that 277 individuals (62.95%) were healthy and did not have TMDs. Conversely, 163 (37.05%) exhibited at least one form of TMDs. Among the women, 133 had TMDs symptoms (representing 39.23% of the female population). Group 1 (Myofascial pain disorders): 83 individuals (50.92% of those with TMDs) were classified into this group – 72 women and 11 men. Group 2 (Arthralgia, arthritis, and joint degeneration): 29 individuals (17.79% of those with TMDs) were classified into this grou – 27 women and 2 men. Group 3 (Disc displacement disorders): 92 individuals (56.44% of those with TMDs) were classified into this group – 74 women and 18 men. The provided data includes individuals with mixed TMDs.

Conclusions. The prevalence of TMDs was observed at 37.05% of those examined. The most common forms of TMDs were the disc form, followed by the muscular form. The ratio of women to men was 4.4 to 1.

Key words

TMD, TMJ, temporomandibular disorders, prevalence, epidemiology, Europe

INTRODUCTION

Temporomandibular disorders (TMDs) affect the temporomandibular joint and the masticatory muscles. The most common symptom associated with TMDs is pain. It is estimated that TMDs affect 34% of the global population [1]. Recent meta-analyses have observed varying prevalence rates depending on the continent: in South America, TMDs affect 47% of the population, in Asia – 33%, in Europe – 29%, and in North America – 26% [1]. All studies confirm that TMDs are more common in women than in men [1, 2]. The World Health Organization (WHO) recognizes TMDs as the third most common dental condition after dental caries and periodontal disease [3]. Valesan et al. suggest that TMDs affect 31% of adults and the elderly, and 11% of children and adolescents [4]. Zieliński et al. report a prevalence of 41% in Europe for the 18–60 age group, and 18% for those under 18 years of age [1].

Over the years, many diagnostic tools have been introduced to help patients, clinicians, and researchers evaluate TMDs in an effort to improve the quality of diagnosis and research [5]. These tools include, among others, the Diagnostic Criteria for TMD (DC/TMD) introduced in 2014, the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD), the Fonseca Anamnestic Index (FAI) and its Short-Form version, and Helkimo Indexes [1, 6]. The DC/TMD is currently the most widely-used tool in TMD research [1, 6]. The DC/TMD is currently the most widely used tool in TMDs research [7–9].

A study was conducted to assess the prevalence of TMDs in the adult population of Eastern Europe. Based on the gathered literature, a research hypothesis was formulated that the prevalence of TMDs in the studied population would be around 35%, with women reporting symptoms more frequently than men.

MATERIALS AND METHOD

The population study was conducted based on the synergy of results from three separate studies. Ethical approval for each study was obtained from the Bioethics Committee of the Medical University of Lublin (KE-0254/346/2016; KE-0254/229/2020; KE-0254/256/12/2022). All participants provided informed consent to take part in the studies.

The first study took place in 2017, and the last in 2024, in which a total of 489 individuals participated. The study

✉ Address for correspondence: Grzegorz Zieliński, Department of Sports Medicine, Medical University, Lublin, Poland
E-mail: grzegorz.zielinski@umlub.pl

Received: 09.07.2024; accepted: 30.09.2024; first published: 16.10.2024

included individuals aged 20–30 years during the study. The exclusion criteria were stringent and included the absence of malocclusion, absence of Class II and III Angle's malocclusion, absence of neurological disorders, neuropathic pain, autonomic headaches, psychogenic pain, diseases such as fibromyalgia, dystonia, myositis, infections, or any head and neck injuries, and absence of any head and neck surgeries [10–12].

The examination for TMDs was conducted based on the RDC/TMD using a validated Polish version of the tool [13]. All assessments for TMDs prevalence were performed by the same three-person team (J.S., M.W., M.L-R.) under the primary supervision of J.S. The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) were not used because the Polish version not was validated and published until 2024 [9]. Cochran's formula was used to calculate the sample size [14, 15]:

$$n_0 = \frac{z^2 p(1-p)}{e^2}$$

In the formula, n_0 represents the desired sample size, Z corresponds to the desired confidence level, which is typically set at 95% (Z=1.96) [16]; p is the estimated proportion, which is set to p=0.5 since the true proportion is unknown [14]; and 'e' is the margin of error, traditionally set at 5% [10–12, 15]. By substituting these values into the formula, we obtain:

$$n_0 = \frac{(1.96)^2 \times 0.5 \times (1-0.5)}{(0.05)^2} = \frac{0.9604}{0.0025} \approx 384$$

Data analyzed included gender, age, and the type of TMDs, divided into three groups:
- Group 1: Myofascial pain disorders.
- Group 2: Arthralgia, arthritis, and joint degeneration.
- Group 3: Disc displacement disorders.

RESULTS

A total of 440 individuals were qualified for the study – 339 women and 101 men, with an average age of 24 ± 2 years. It was found that 277 individuals (62.95%) were healthy and did not have TMDs. Conversely, 163 (37.05%) exhibited at least one form of TMDs. Among the women, 133 had TMDs symptoms (representing 39.23% of the female population). Among the men, 30 had TMDs symptoms (representing 29.70% of the male population), resulting in a female-to-male ratio of 4.4 to 1 (Fig. 1).

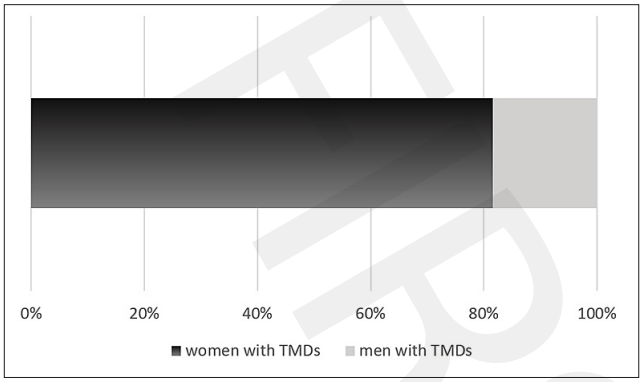

Figure 1. Ratio of women to men with TMDs

- **Group 1 (Myofascial pain disorders)** – 83 individuals (50.92% of those with TMDs) were classified into this group – 72 women and 11 men.
- **Group 2 (Arthralgia, arthritis, and joint degeneration)** – 29 individuals (17.79% of those with TMDs) were classified into this group, including 27 women and 2 men.
- **Group 3 (Disc displacement disorders)** – 92 individuals (56.44% of those with TMDs) were classified into this group – 74 women and 18 men.

The provided data includes individuals with a mixed form (Fig. 2).

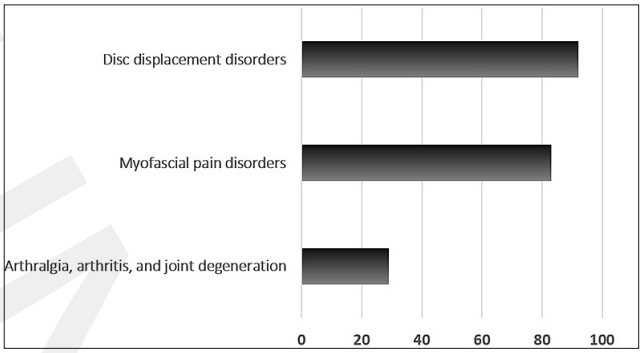

Figure 2. Graphical representation of individuals with the studied types of TMDs

- **Mixed forms** – 20 individuals (12.27% of those with TMDs) experienced mixed forms of TMDs. This group consisted of 19 women and 1 man. Among them:
  - 14 individuals (13 women and 1 man) experienced symptoms from both Group 1 and Group 2.
  - 2 women experienced symptoms from both Group 2 and Group 3.
  - 4 women experienced symptoms from all three groups.

DISCUSSION

The aim of this study was to assess the prevalence of TMDs in the adult population of Eastern Europe. Based on the literature, the research hypothesis was that the prevalence of TMDs in the studied population would be around 35%, with women reporting symptoms more frequently than men.

The study found a TMDs prevalence of 37.05%. According to the latest meta-analysis (2024), the global prevalence of TMDs is estimated at 34%, and for adults in Europe – 41% [1]. Additionally, Minervini et al. reported a TMDs prevalence of 38.4%, with 44.7% among women and 30% among men [2]. A meta-analysis by Minervini et al. included studies that used the Diagnostic Criteria for Temporomandibular Disorders [2]. In both cases, the results from the current study are similar, confirming our hypothesis.

Women were more affected than men, with a ratio of 4.4 to 1, a higher prevalence in women which is consistent with other studies [1,2]. The ratio reported in Zieliński's meta-analysis was 1.09:1, but this ratio pertains to the entire European population, regardless of age [1]. It is noteworthy that the observed ratio of 4.4 to 1 in the current study is very close to the ratio of 4.1:1 reported by Martins-Júnior [17].

Valesan et al. observed that the most common TMD was disc displacement with reduction, approximately 26% in adults/elderly [4]. Analysis of the current study did not

distinguish between reduction and non-reduction, but simply classified it as Group 3 – disc displacement disorders. It was also found that this was the leading group of TMDs, with 92 individuals (56.44% of those with TMDs), representing 20.91% of the global population.

Limitations of the study. The first limitation is that the study only included the adult population, excluding studies on older adults and children. The study was conducted during the period 2017–2024. Studies conducted during the COVID-19 pandemic may have shown a higher percentage of individuals with TMDs, potentially affecting the results [18, 19]. However, based on previously published meta-analyses and study results showing similar prevalence rates [1, 2, 17], this suggests that the potential impact of conducting the study during the COVID-19 pandemic was minimal. The final limitation is the use of the RDC/TMD questionnaire; however, as noted in the methods section, the latest version of the DC/TMD was not validated and translated until 2024 [9].

CONCLUSIONS

In the studied group of Eastern European residents, the prevalence of TMDs was observed at 37.05%. The most common form of TMDs was disc displacement disorder, followed by myofascial pain disorder. The ratio of women to men was 4.4 to 1.

REFERENCES

1. Zieliński G, Pająk-Zielińska B, Ginszt M. A Meta-Analysis of the Global Prevalence of Temporomandibular Disorders. J Clin Med. 2024;13(5):1365. https://www.mdpi.com/2077-0383/13/5/1365
2. Minervini G, Franco R, Marrapodi MM, et al. Prevalence of Temporomandibular Disorders in Children and Adolescents Evaluated with Diagnostic Criteria for Temporomandibular Disorders: A Systematic Review with Meta-Analysis. J Oral Rehabil. 2023;50(6):522–530. https://onlinelibrary.wiley.com/doi/10.1111/joor.13446
3. Ey-Chmielewska H, Teul I, LorkowskI J. Functional Disorders Of The Temporomandibular Joints As A Factor Responsible For Sleep Apnoea. Ann Acad Med Stetin. 2014;60(2):65–68. https://ojs.pum.edu.pl/pomjlifesci/article/view/35
4. Valesan LF, Da-Cas CD, Réus JC, et al. Prevalence of Temporomandibular Joint Disorders: A Systematic Review and Meta-Analysis. Clin Oral Investig. 2021;25(2):441–453. https://link.springer.com/article/10.1007/s00784-020-03710-w
5. Zieliński G, Gawda P. Surface Electromyography in Dentistry—Past, Present and Future. J Clin Med. 2024;13(5):1328. https://www.mdpi.com/2077-0383/13/5/1328
6. Giannakopoulos NN, Rammelsberg P, Eberhard L, et al. New Instrument for Assessing the Quality of Studies on Prevalence. Clin Oral Investig. 2012;16(3):781–788. https://link.springer.com/article/10.1007/s00784-011-0557-4
7. Minervini G, Marrapodi MM, Siurkel Y, et al. Accuracy of Temporomandibular Disorders Diagnosis Evaluated through the Diagnostic Criteria for Temporomandibular Disorder (DC/TDM) Axis II Compared to the Axis I Evaluations: A Systematic Review and Meta-Analysis. BMC Oral Health 2024;24(1):299. https://bmcoralhealth.biomedcentral.com/articles/10.1186/s12903-024-03983-7
8. Warzocha J, Gadomska-Krasny J, Mrowiec J. Etiologic Factors of Temporomandibular Disorders: A Systematic Review of Literature Containing Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) and Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) from 2018 to 2022. Healthc. Basel Switz. 2024;12(5):575. https://www.mdpi.com/2227-9032/12/5/575
9. Osiewicz M, Ciapała B, Bolt K, Kołodziej P, Więckiewicz M, Ohrbach R. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD): Polish Assessment Instruments. Dent Med Probl. 2024;61(5):5–8. https://dmp.umw.edu.pl/en/article/2024/61/1/5/
10. Osiewicz MA, Lobbezoo F, Loster BW, et al. Frequency of Temporomandibular Disorders Diagnoses Based on RDC/TMD in a Polish Patient Population. CRANIO® 2018;36(5):304–310. https://www.tandfonline.com/doi/full/10.1080/08869634.2017.1361052
11. Zieliński G, Matysik-Woźniak A, Baszczowski M, et al. Myopia & Painful Muscle Form of Temporomandibular Disorders: Connections between Vision, Masticatory and Cervical Muscles Activity and Sensitivity and Sleep Quality. Sci Rep. 2023;13(1):20231. https://www.nature.com/articles/s41598-023-47550-6
12. Ginszt M, Szkutnik J, Zieliński G, et al. Cervical Myofascial Pain Is Associated with an Imbalance of Masticatory Muscle Activity. Int J Environ Res Public Health. 2022;19(3):1577. https://www.mdpi.com/1660-4601/19/3/1577
13. Osiewicz M, Lobbezoo F, Loster B, et al. Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) – The Polish Version of a Dual-Axis System for the Diagnosis of TMD.* RDC/TMD Form. Open J Stomatol. 2013;66(5):576–649. http://jstoma.com/abstracted.php?level=5&ICID=1065048
14. Charan J, Biswas T. How to Calculate Sample Size for Different Study Designs in Medical Research? Indian J Psychol Med. 2013;35(2):121–126. https://journals.sagepub.com/doi/10.4103/0253-7176.116232
15. Zieliński G, Gawda P. Analysis of the Use of Sample Size and Effect Size Calculations in a Temporomandibular Disorders Randomised Controlled Trial—Short Narrative Review. J Pers Med. 2024;14(6):655. https://www.mdpi.com/2075-4426/14/6/655
16. Pourhoseingholi MA, Vahedi M, Rahimzadeh M. Sample Size Calculation in Medical Studies. Gastroenterol. Hepatol Bed Bench 2013;6(1):14–17. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4017493/
17. Martins-Júnior RL, Palma AJG, Marquardt EJ, et al. Temporomandibular Disorders: A Report of 124 Patients. J Contemp Dent Pract. 2010;11(5):071–078. https://pubmed.ncbi.nlm.nih.gov/20978727/
18. Scelza G, Amato A, Rongo R, et al. Changes in COVID-19 Perception and in TMD Prevalence after 1 Year of Pandemic in Italy. Eur J Dent. 2023;17(3):771–776. https://www.thieme-connect.com/products/ejournals/abstract/10.1055/s-0042-1755192
19. Medeiros RAD, Vieira DL, Silva EVFD, et al. Prevalence of Symptoms of Temporomandibular Disorders, Oral Behaviors, Anxiety, and Depression in Dentistry Students during the Period of Social Isolation Due to COVID-19. J Appl Oral Sci Rev. FOB 2020;30(28):e20200445. https://www.scielo.br/j/jaos/a/dhW4HtZGYFKh97bgQmHy3ZB/?lang=en.