

TEMPOROMANDIBULAR DISORDERS IN YOUNG SERBIAN POPULATION: AN EPIDEMIOLOGICAL STUDY

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Temporomandibular disorders are a common problem in everyday dental practice. This study aimed to evaluate the prevalence of signs and symptoms of temporomandibular disorders (TMDs) in the young Serbian population. The study comprised 500 participants between 18 and 25 years of age from various regions of Serbia. Among this sample, 325 persons were males, and 175 were females. All participants were subject to a clinical examination: assessment of mandibular mobility and temporomandibular joint (TMJ) function, and recording any tenderness or pain during mandibular movements or palpation. The presence of signs and symptoms of TMDs was confirmed using the Helkimo's dysfunction index (Di). According to the values of the Helkimo's Di, the presence of signs or symptoms of TMD was confirmed in 327 (64.5%) examined subjects. The most prevalent signs were: disturbed mandibular kinematics (restricted mandibular opening, deviation or deflection at mouth opening) found in 74.5 % of the examined subjects; TMJ sounds during mandibular opening/ closing were found in 38.5% of subjects; sensitivity of masticatory muscles was confirmed in 10.4 %. Pain as the most severe symptom of TMD was found in only 5.2 % of the examined subjects. The signs and symptoms of TMDs were more prevalent in females than in males, the ratio being 3:1. The recorded signs and symptoms of TMD in this population group were of a mild nature. The severe symptoms of TMD (pain) were found in only 5.2 % of the examined persons.

Keywords: Helkimo's index, prevalence, signs, symptoms, temporomandibular disorders

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INTRODUCTION

The term temporomandibular disorders (TMDs) refers to various functional disturbances involving the orofacial muscles, the temporomandibular (TM) joints or both (1).

The essential symptoms and signs of these disturbances are pain and tenderness around the TM joints or chewing muscles, impaired mandibular mobility and TM sounds during mandibular movements. The etiology of TMD remains a subject of controversy and is generally considered to be multifactorial. Thus, the influence of occlusal condition in the onset of TMDs has been intensely debated for many years. Until the 1980s, occlusal factors, such as the presence of uncured malocclusions, discrepancies between the intercuspal and retruded contact position of more than two millimetres, retrusive and non-working side interferences and loss of posterior teeth were considered to be the primary causes of TMD. Many researchers supported this hypothesis (1-7).

However, contemporary scientific and clinical evidence has not confirmed any direct correlation between occlusal factors and TMDs symptoms. In fact, numerous scientists deny any influence of occlusal factors in the onset of TMDs. It appears that many individuals can adapt to occlusal disturbances and function within tolerable limits without the onset of TMD signs and symptoms (8-12).

Between these opposing camps are those who believe that occlusion does not play a primary role in the etiology of TMD but has a secondary influence and can exacerbate symptoms caused by other sources after the onset of TMD, such as trauma, congenital deformities, systemic diseases or emotional stress (13-17).

In order to determine the prevalence of TMDs in different population groups, numerous epidemiologic studies from different nations were conducted starting in the 1980s, and a number of indices and criteria were created (22-25). It is challenging to determine the true prevalence of TMDs in the general population due to the many approaches and interpretations of the signs and symptoms employed in these studies.

Opinions concerning the treatment needs of TMD patients vary greatly in the relevant literature. Contrary to earlier studies, which estimated that 20%–25% of the general population had severe signs of dysfunction (26), according to recent studies, the demand for active treatment seems to decrease to about 10% (27). The presence of malocclusion and craniofacial deformities may provoke the signs and symptoms of TMDs (28), which tend to increase with age, according to various reports. It was found that TMDs were

more prevalent in females than in males (29).

To date, there have been only a few studies dealing with the prevalence of TMDs in the Serbian population (30, 31). The purpose of this study was therefore to determine the prevalence of signs and symptoms of TMDs in a young Serbian adult population and the possible connection between the present occlusal discrepancies and the presence of signs and symptoms of TMDs.

METHODS

The investigation included 325 males and 175 females between 18 and 25 years of age, from various regions of the Republic of Serbia (101 from Vojvodina, 193 from central Serbia, and 206 from Belgrade). Trained physicians from the Clinic for Dental Prosthetics conducted the study in Belgrade and Novi Sad as part of the project of the Ministry of Science and Technology of the Republic of Serbia No. 1549.

For data collection, the special questionnaire according to Helkimo's (21) was used and adapted for digital evaluation of the Helkimo's dysfunction index (Di), anamnestic index, and occlusal index (Oi) (26). The anamnestic examination was based on the symptoms reported by the subjects and classification according to the anamnestic dysfunction index (Ai) as 0, I or II. The subjects were grouped according to the criteria of the clinical dysfunction index, which included the following variables: range of mandibular movements, function of TM joints, muscle pain on palpation, TM joint pain on palpation and pain on movements of the mandible. Each finding was judged according to a three-point scale of severity as 0, 1 or 5 points. No symptom was registered as 0, a mild symptom as 1, and a severe symptom as 5 points. The scores awarded for the five signs/ symptoms of TMD were added together to give a total dysfunction score, which formed the basis for classification into the clinical dysfunction index group. The dysfunction index $Di > 0$ denoted the presence of signs/symptoms of TMD (Di I denoted mild dysfunction, Di II indicated moderate dysfunction, and dysfunction index Di III pointed to severe dysfunction). The dysfunction index $Di = 0$ denoted a clinically symptom-free subject.

The Helkimo's occlusal index (Oi) was calculated from data obtained by clinical examination of the occlusal complex, which included the following variables: reduced number of natural teeth, reduced number of teeth in contact, the presence of the RCP-ICP slide and the presence of protrusive, laterotrusive and mediotrusive interferences. The severity of occlusal discrepancies was judged on a

three-point scale as 0, 1 or 5. The awarded scores formed the basis for calculating the occlusal index O_i according to Helkimo's. The occlusal index $O_i > 0$ pointed to the presence of certain occlusal discrepancies, and $O_i = 0$ denoted discrepancy-free subjects (26). All data were input into a personal computer, which enabled the calculation and statistical evaluation of the obtained values. The statistical software was SPSS 15.0.

RESULTS

The prevalence of signs and symptoms of TMD according to the Helkimo's dysfunction index (D_i)

According to the Helkimo's dysfunction index (D_i), the values calculated for the complete sample and selected regions of Serbia, signs/symptoms of TMD were present in 72.3% of subjects from Vojvodina, 56.3% from Belgrade, and 71.5% from central Serbia. An average of 65.4% of young adults in the Republic of Serbia had at least one sign or symptom of TMD ($D_i > 0$), and 34.6% of subjects were symptom-free ($D_i = 0$) (Figure 1).

The most prevalent signs/symptoms of TMD found in 327 (65.4%) of subjects with the positive dysfunction index ($D_i > 0$) were:

- Limitations of mandibular movement and deviations during mandibular opening in 245/327 (74.9%) subjects.
- TMJ sounds in 126/327 (38.5%) subjects.
- Pain on mandibular movements in 17/327 (5.2%) subjects.
- Muscle sensitivity to palpation in 34/327 (10.4%) subjects.
- TMJ sensitivity to palpation in 19/327 (5.8%) subjects.

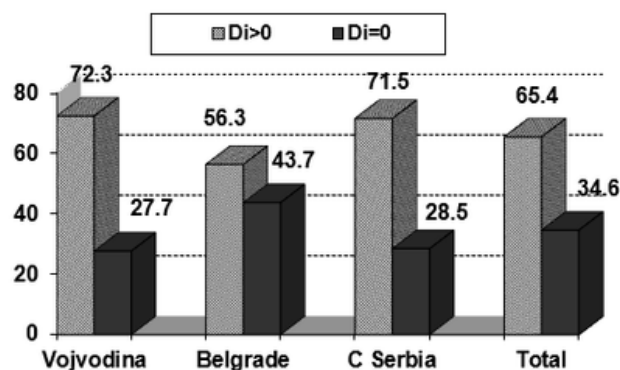


Figure 1. The prevalence of signs and symptoms of TMDs in young adults of the Republic of Serbia, and selected regions according to the Helkimo's dysfunction index

The prevalence of symptoms of TMD according to the Helkimo's anamnestic index (A_i)

According to the Helkimo's anamnestic index (A_i) values calculated for the complete sample (500) and selected regions of Serbia, the presence of TMD symptoms was confirmed in 17.8% of subjects in Vojvodina, 37.9% in Belgrade, and 15.5% in central Serbia. On average, 25.2% of young adults in the Republic of Serbia had at least one symptom of TMD/ $A_i > 0$, whereas 74.8% of subjects were symptom-free ($A_i = 0$) (Figure 2).

The prevalence of occlusal disturbances according to the Helkimo's occlusal index (O_i)

According to the values of the Helkimo's occlusal index ($O_i > 0$), occlusal disturbances were confirmed in 58/271 (57.4%) subjects from Vojvodina, 93/271 (45.1%) subjects from Belgrade and 120/271 (62.1%) subjects from central Serbia. Evaluation of the Helkimo's occlusal index (O_i) in the complete sample confirmed the presence of occlusal disharmonies in 229 (45.5%) young adults (Figure 3).

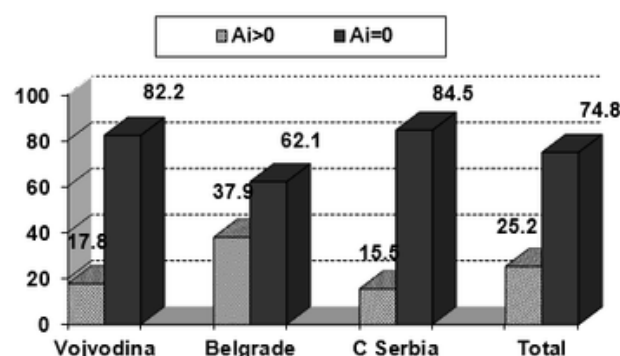


Figure 2. The prevalence of signs and symptoms of TMDs in the young population

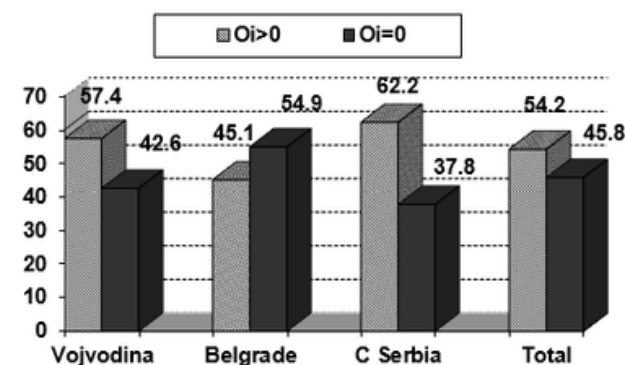


Figure 3. The prevalence of occlusal disharmonies in young adults of the Republic of Serbia according to Helkimo's occlusal index (O_i)

Analysis of the occlusal parameters needed to calculate the Helkimo's occlusal index showed that 17.8% of young adults from Serbia had fewer natural teeth, 28.4% of subjects had fewer teeth in contact with the antagonists, 23.4% had an outstanding RCP-ICP slide, and 28.6% of subjects had mild or severe protrusive, laterotrusive or mediotrusive interferences during mandibular movements (Table 1).

DISCUSSION

A significant number of epidemiological studies demonstrate that the prevalence of signs and symptoms of TMDs is exceedingly high. The prevalence of signs and symptoms of TMD in the population ranges from 60% to 70% among individuals aged 20 to 40 years, with a significantly higher prevalence in women than in men (25). The prevalence of signs and symptoms of TMD in the community varies from 60% to 70% among individuals aged 20 to 40 years, with a markedly higher incidence in women compared to men (25,26, 32-37).

In the present study, conducted on 500 young adults from various regions of Serbia, the special questionnaire adopted for the calculation of the Helkimo's dysfunction and occlusal indexes was used to establish the prevalence of TMDs in this population group and to evaluate the possible influence of the occlusal condition on the onset of TMDs. Comparable research conducted by Helkimo, Dworkin and Magnuson used the identical methodology (25-27).

The signs and symptoms of TMD were confirmed in 65.4% of subjects, with the highest prevalence in the region of Vojvodina, where 72.3% of subjects had at least one clinical sign/symptom of TMD. These results are in line with the results of previous studies examining the prevalence of TM dysfunction in adolescents and young adults, particularly when the severity of signs/symptoms is concerned (32-37, 39-41).

According to the Helkimo's dysfunction index scale (Di I, II, III), mild dysfunction signs (disturbed mandibular kinematics, TMJ sounds, Di I) were the most prevalent signs, found in

74.9% and 38.5% of the subjects in this study. Severe symptoms (tender to muscle palpation, tender to TMJ palpation, corresponding to Di III) were confirmed in 10.4% and 5.8% of subjects, respectively, and pain on mandibular movements, categorized as Di III, was confirmed in only 5.2% of subjects. These results can be explained by the fact that the sample consisted of healthy young adults, presumably with only the initial stages of mandibular dysfunction, which is consistent with research and meta-analyses regarding the frequency of TMD symptoms and indicators (42, 43).

Evaluation of the Helkimo's occlusal index (Oi) confirmed the presence of occlusal discrepancies in 45.5% of young adults, most frequently in the central part of Serbia— 62.1%, mostly caused by presumably poorer hygiene habits, a consequently higher percentage of missing teeth due to caries, periodontal diseases or irresponsible and early tooth extractions. The relevant literature contains no reliable evidence for an occlusal contribution to TMD (8-10, 13, 16, 17), but an absence of any relationship should not be inferred because this would imply an absence of any relationship between form and function (39-41).

The comparative analysis of the values of the Helkimo's Di and Oi in this study points to a certain association between occlusal factors and TMD signs/symptoms; however, this association should not be overstated because the signs/symptoms of TMD were confirmed in 70.85% of subjects with occlusal discrepancies, as well as 58.45% of subjects without such discrepancies. According to the X-Test analysis, differences between these findings, significant at the level of $p < 0.01$, point to a certain occlusal association because the prevalence of TMD signs/symptoms was considerably higher in the group with occlusal discrepancies. This association can only be declared because of the lack of a clear etiologic background of confirmed TMD signs/symptoms in the examined groups and because of unsatisfactory differentiation between patients and normal controls.

Within the limits of this study, the following conclusions can be drawn:

1. The results point to the considerable prevalence of TMDs in the population of 500 young adults in the Republic of Serbia. It was confirmed that 327/500 (65.4%) of the examined subjects had at least one sign/symptom of TMD. The prevalence was somewhat higher in samples from Vojvodina—73/101 (72.3%) and the central part of Serbia—137/193 (71.5%), and somewhat lower in the sample from Belgrade 116/206 (56.3%).

Table 1. *The prevalence of occlusal disharmonies in young adults of the Republic of Serbia*

Occlusal variables	The number of examinees	Percent
Reduced number of natural teeth	98	19.6
Reduced number of teeth which contact the antagonists	142	28.4
Outstanding RCP-ICP slide	117	23.4
Protrusive, laterotrusive and mediotrusive interferences	143	28.6

2. The most prevalent signs and symptoms of TMDs in the examined population group were:
 - Disturbed mandibular kinematics (deviations, deflections on mouth opening, restricted mouth opening) confirmed in 245/327 (74.9%) subjects in the complete sample.
 - TMJ sounds on mandibular opening/closing confirmed in 126/327 (38.5%) subjects.
 - Masticatory muscle tender to palpation, confirmed in 34/327 (10.4%) subjects.
 - TMJ tender to palpation, confirmed in 18/327 (5.8%) subjects.
 - Pain during mandibular movements confirmed in 17/327 (5.2%) subjects.
3. According to the Helkimo's dysfunction index scale, the majority of signs/symptoms of TMDs observed in the examined population group were of mild intensity and corresponded mainly with the Di I and Di II values of the dysfunction index. The severe symptoms, like pain on mandibular movements (Di III), were observed in only 17/327 (5.2%) of the subjects. Although high in prevalence, the signs/symptoms of TMDs in this population group seem to present the mild or initial stages of TMDs.
4. According to the values of the Helkimo's occlusal index (Oi), occlusal disturbances were found in 54.2% of young adults in the total sample. The prevalence of occlusal disturbances was somewhat higher in the sample from the central part of Serbia, where 62.1% of subjects presented some kind of occlusal disharmony. The majority of subjects had mild or severe protrusive, laterotrusive or mediotrusive interferences (23.4%–28.6%) and a reduced number of natural teeth contacting the antagonists (17.8%–28.4%).

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Author Contributions

Conceptualization, methodology, investigation, formal analysis, and writing—original draft preparation, S.D.; Data curation, formal analysis, and validation, V.S.; Investigation, data curation, visualization, writing—review, editing, and supervision, S.D.P.

Statement of Ethics

This study was part of a project of the Ministry of Science and Technology of the Republic of Serbia No. 1549. Participation was voluntary and uncompensated. All participants provided written informed consent prior to completing the questionnaire.

Statement of Competing Interest

The authors declare no conflict of interest.

Statement of Data Availability

The data supporting the findings of this study are included in the article.

Statement of Generative AI Use

No generative AI was used.

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