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## Povezanost u rasprostranjenosti simptoma temporomandibularnih poremećaja kod sportaša i nesportaša u adolescentnoj dobi

### *Correlation of the Prevalence of Signs and Symptoms of Temporomandibular Disorder in Adolescent Athletes and Non-Athletes*

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#### Sažetak

**Svrha:** Željela se odrediti povezanost u rasprostranjenosti simptoma temporomandibularnih poremećaja kod sportaša i nesportaša u adolescentnoj dobi. **Materijali i metode:** U istraživanju je sudjelovalo 90 mladića podijeljenih u dvije skupine – eksperimentalnu (srednjoškolci od 15 do 18 godina koji su trenirali nogomet tri puta na tjedan ili češće) i kontrolnu (također srednjoškolci u istoj dobi, no ne treniraju ništa ili u tjednu vježbaju do jedan sat). Svi sudionici testirani su prema protokolu RDC/TMD Axis I. **Rezultati:** Pronađena je statistički značajna razlika u vertikalnoj dimenziji nepotpomognutog otvaranja usta bez bolova ( $p=0,000$ ), maksimalnog nepotpomognutog otvaranja usta ( $p=0,000$ ) i potpomognutog otvaranja usta kod sportaša ( $p=0,000$ ). Nesportaši su skloniji noćnom škripanju zubima ( $p=0,041$ ) te češće pate od glavobolja i migrena ( $p=0,027$ ). Adolescenti sportaši imali su bolje oralno zdravlje ( $\chi^2=17,390$ ,  $p=0,004$ ) i značajno slabije mišiće ( $\chi^2=6070$ ,  $p=0,048$ ).

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#### Ključne riječi

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#### Uvod

Temporomandibularni poremećaj (TMD) jedna je od najkompliciranijih bolesti modernog doba kad je riječ o dijagnostici, liječenju i ishodu. Njegova različita simptomatologija zahtijeva timski i multidisciplinarni pristup. Zato mnogi znanstvenici i kliničari u stomatologiji surađuju s otorinolaringolozima, ortopedima, neurolozima, radiolozima, reumatolozima i ostalim specijalistima kako bi riješili taj problem. Naime, temporomandibularni poremećaj zajednički je naziv za nekoliko patoloških stanja sa sličnim simptomima, a usmjereni su prema disbalansu stomatognatnog sustava (1). U mnogim epidemiološkim istraživanjima stručnjaci su se bavili tim poremećajima u određenoj populaciji. Tako se zna da danas 60 do 70 posto bilo koje populacije pati od neke vrste temporomandibularnog poremećaja i da omjer toga patološkog stanja između žena i muškaraca iznosi 4:1 (2). Osim toga zastupljene su sve dobne skupine (3), iako su simptomi

#### Introduction

Temporomandibular disorders (TMD) are among the most challenging diseases of modern populations in diagnostic, therapeutic and prognostic terms. Diverse symptomatology requires teamwork and a multidisciplinary approach to this problem, therefore many researchers and clinicians in dentistry, otolaryngology, orthopaedics, neurology, radiology, rheumatology, and other areas deal with this disorder. Temporomandibular disorders is the common name for a number of pathological conditions that can have similar signs and symptoms, which lead to an imbalance of the normal functions of the stomatognathic system (1). Many epidemiological studies have examined the incidence of temporomandibular disorders in certain populations. It is now known that 60-70% of the population has at least one sign of temporomandibular disorder and that the ratio of temporomandibular disorders prevalence between women and men is

najčešći u dobi između 17 i 30 godina ili između 20 i 40 godina (4).

Pregledom znanstvene literature ustanovljeno je pet čimbenika povezanih s temporomandibularnim poremećajima – okluzija, trauma, psihološki čimbenici, duboka bol, parafunkcije i upale (5-7). Trauma je jedan od glavnih uzroka za nastanak i progresiju temporomandibularnih poremećaja. Posebne podskupine ozljeda su one sportske, a svrstane su prema mjestu i načinu nastanka (8,9). U mnogim istraživanjima ističe se da su najčešće povezane s ozljeđivanjem mekih tkiva, i to u prvom redu usnica (više od 50 % svih orofacijalnih ozljeda). Druga najčešća trauma, koja čini 40 posto svih ozljeda, jest ozljeda tvrdih zubnih tkiva. Ostale ozljede, primjerice čeljusti ili TMZ-a, nisu toliko česte i čine oko 10 posto svih ozljeda (10,11). Sportske ozljede, bilo da su nastale tijekom rekreativnog ili profesionalnog bavljenja sportom, a kao posljedicu imaju temporomandibularne poremećaje, zahtijevaju multidisciplinarni pristup u dijagnostici, liječenju i preventivi (12).

Svrha ovog istraživanja bila je odrediti zastupljenost znakova i simptoma temporomandibularnih poremećaja kod sportaša i nesportaša u adolescentnoj dobi.

## Materijal i metode

U istraživanje je bilo uključeno 90 mladića podijeljenih u dvije skupine – eksperimentalnu i kontrolnu. Eksperimentalna se sastojala od srednjoškolaca u dobi od 15 do 18 godina koji su trenirali nogomet tri ili više puta na tjedan.

U kontrolnoj skupini bili su srednjoškolci u istoj dobi, ali nisu se bavili sportom više od jednog sata na tjedan ili uopće nisu trenirali. Svi ispitanici testirani su prema protokolu RDC/TMD Axis I (13). Protokol RCD/TMD sastoji se od dviju osi, a njime se koristimo u dijagnostici i klasifikaciji ispitanika s poremećajima žvačnih mišića i temporomandibularnog zgloba. *Axisom I* istodobno se određuje fizička disfunkcija žvačnih mišića i čeljusnih zglobova. Postoje tri osnovne fizičke dijagnostičke skupine:

1. mišićni poremećaji,
2. dislokacija diska,
3. artralgiya, artritis i artroza.

*Axis II* primjenjuje se kada se treba odrediti ponašanje, te psihološki i psihosocijalni čimbenici iznimno važni za dijagnosticiranje i liječenje temporomandibularnih poremećaja.

Osim osnovnih pitanja iz standardnog protokola RDC/TMD, postavljena su dodatna o općem stanju pacijenta, oralnom statusu, stanju zuba i malokluziji.

## Statistička analiza

Dobiveni podatci analizirani su statističkim paketom SPSS 13,0 (opisna statistika, testiranje distribucije, hi-kvadrat i Mann-Whitney test). Pritom su izračunate srednje vrijednosti i devijacije zavisnih varijabli povezanih s nepotpomognutim

4:1 (2). All age groups are affected (3), although the symptoms are usually expressed in the population at age between 17 and 30 years or in subjects aged 20-40 years (4).

A review of the scientific literature revealed the five major factors associated with temporomandibular disorders, which are: occlusion, trauma, psychological factors, deep pain disorders, parafunctional activities and inflammatory factor (5-7). Trauma is listed as one of the most common factors that precede the occurrence or progression of temporomandibular disorders. Special subgroups of injuries are sports injuries that are characterized by the place of their occurrence and consequences (8, 9). Many studies on sports injuries show that the most common injury is the injury of soft structures, mostly lip (more than 50% of all orofacial injuries). The second most common, with an incidence of about 40%, is the dental injury. Other injuries, for example jaw and TMJ injuries, are less common, and their incidence is about 10% (10, 11). Sports injuries, including temporomandibular injuries and disorders, regardless of whether they are incurred in recreational or competitive sport, require a multidisciplinary approach, both in diagnostics and treatment as well as in preventive measures. (12)

The aim of this study was to determine the prevalence of signs and symptoms of temporomandibular disorders of adolescent athletes and adolescent non-athletes.

## Materials and methods

The study included 90 male subjects who were divided into two groups: experimental and control groups. High school students aged from 15-18 years who practiced soccer, three or more times a week were included in the experimental group.

The control group included high school students aged from 15-18 years who did not practice sports activities for more than one hour a week or they were not involved in sports at all. All subjects were tested according to RDC/TMD protocol, Axis I (13). RDC/TMD protocol includes dual axis system for diagnosis and classification of subjects with disorders of the masticatory muscles and temporomandibular joint. Axis I diagnosis protocol determines physical dysfunction of masticatory muscles and jaw joints that are common. There are three basic physical diagnostic groups: 1 - muscular disorders, 2 - disc dislocation, 3 - arthralgia, arthritis and arthrosis. Axis II is used to evaluate the behavioural, psychological and psychosocial factors that are important for the diagnosis and treatment of temporomandibular disorders patients.

Apart from the questions that are part of the standardized RDC-TMD protocol, general condition of subjects, their oral status, teeth condition and malocclusions were also recorded.

## Statistical analysis

The data were analysed using the SPSS 13.0 statistical package (descriptive statistics, testing the normality of the distribution, chi-square test, Mann-Whitney-test). The mean values and deviations of dependent variables related to un-

otvaranjem usta bez bolova, maksimalno nepotpomognutim otvaranjem, maksimalno potpomognutim otvaranjem i preklupom inciziva. Podatci nisu pokazivali normalnu distribuciju pa je za usporedbu srednjih vrijednosti odabran neparametarski Mann-Whitneyev test sa stupnjem značenja od 0,001. Hi-kvadrat testom određena je razlika između skupina varijabli – općeg zdravlja, oralne higijene, vrste i jakosti bolova, simptoma temporomandibularnih poremećaja, sistemskog artritisa, artritisa u obitelji te mišićnog umora.

## Rezultati

U istraživanje je bilo uključeno 90 mladića – 45 su bili sportaši, a 45 se nije bavilo sportom. Na početku su svi ispunili upitnik s pitanjima o simptomima temporomandibularnih poremećaja.

U skupini sportaša samo je jedan (2,2 %) naveo bolove u licu i zglobu. Jedan je također odgovorio (2,2 %) da ima teškoće dok jede zbog ograničenog otvaranja usta. Trojica (6,67 %) su istaknula da ne mogu otvarati usta, a petorica (12 %) da čuju škljocanje u zglobu. Nitko nije naveo noćno škripanje zubima, ukočenu čeljust nakon buđenja, neuobičajen i nepravilan zagriz, stalnu bol u čeljusti posljednjih godinu dana ili ozljedu čeljusti ili lica. Trojica ispitanika (6,67 %) napisali su da nakon buđenja čuju zvukove ili zvonjavu u ušima. Dvojica (4,44 %) su navela sistemski artritis, a trojica (6,67 %) artritis u obitelji. Četvorica (9 %) sudionika žalili su se na bolove, glavobolje i migrene u posljednjih šest mjeseci.

U skupini nesportaša dvojica ispitanika (4,4 %) prijavila su bol u licu i zglobu. Nitko nije imao teškoća kod jela zbog ograničenog otvaranja usta ili nemogućnosti otvaranja usta. Šestorica ispitanika (13,3 %) navela su škljocanje u čeljusti, četvorica (9 %) noćno škripanje zubima, a šestorica (13,3 %) stiskanje i škripanje zubima danju. Jedan ispitanik (2,2 %) odgovorio je da osjeća ukočenost čeljusti nakon buđenja, petorica da nakon buđenja čuju (12 %) zvukove i zvonjavu u ušima, a dvojica (4,4 %) neuobičajen i nepravilan zagriz. Nitko nije naveo konstantne bolove u posljednjih godinu dana. Trojica ispitanika (6,7 %) istaknula su sistemski artritis, a šestorica (13,3 %) artritis u obitelji. Jedan ispitanik (2,2 %) naveo je nedavnu ozljedu lica i zgloba. Nitko nije odgovorio da su ga prije ozljede boljeli zglobovi, a dvanaestorica su (27 %) naveli bolove, glavobolje i migrene u posljednjih šest mjeseci.

Nesportaši su češće prijavljivali škripanje zubima noću ( $p=0,041$ ) te glavobolje i migrene ( $p=0,027$ ). Hi-kvadrat test pokazao je da nema statistički značajne razlike između dviju skupina kad je riječ o ostalim vrijednostima (tablica 1.).

Drugi dio protokola sastojao se od kliničkog pregleda na kojemu su ispitanici pregledani i izmjereni.

U skupini sportaša njih 29 (64,4 %) nije prijavilo bolove kod maksimalnog nepotpomognutog otvaranja usta, 14 (31,1%) je prijavilo bolove u mišićima, jedan bolove u zglobu te jedan bolove u zglobu i mišićima. Kod maksimalnog potpomognutog otvaranja usta 17 (37,7 %) ispitanika prijavilo je bolove u mišićima, jedan bolove u zglobu, a 28 (62,2

asisted opening without pain, maximum unassisted opening, maximum assisted mouth opening and incisor overbite were calculated. Data were not normally distributed and for comparison of mean values non-parametric Mann-Whitney-test with the significance level of 0.001 was used. Chi-square test was performed to determine group differences for variables: health in general, oral health, type and rate of pain, symptoms and signs of temporomandibular disorders, systemic arthritic disease, arthritic disease in the family, muscle soreness.

## Results

The study included 90 male subjects, out of whom 45 were athletes and 45 non-athletes. The first part of the protocol was to fill out the questionnaire in order to reflect the symptoms of temporomandibular disorders which were reported by the subjects themselves.

In the group of athletes, only one of them (2.2%) reported pain in the face and jaws. One of them (2.2%) had difficulty eating because of the limitation in jaw opening, 3 (6.67%) reported locking jaw, 5 (12%) reported clicking jaw. Nobody reported teeth grinding at night, jaw stiffness upon waking, uncomfortable and unusual bite, persistent pain during the past year and recent jaw or facial injury. Two of them (4.4%) reported jaw clenching and teeth grinding during the day. Three (6.7%) participants reported noises or ringing in the ears during waking. Two (4.4%) participants reported systemic arthritic disease and 3 (6.7%) reported arthritic disease in the family. Four (9%) participants reported pain, headaches and migraines during the last 6 months.

In the non-athletes group, two (2.2%) reported pain in the face and jaws. Nobody had difficulty eating because of the limitation in jaw opening and jaw locking. 6 (13.3%) reported clicking jaw, 4 (9%) reported teeth grinding at night, 6 (13.3%) reported jaw clenching and teeth grinding during day, 1 (2.2%) reported jaw stiffness upon waking, 5 (12%) reported noises or ringing in the ears on waking, 2 (4.4%) uncomfortable and unusual bite. Nobody reported persistent pain during the past year. Three (6.7%) participants reported systemic arthritic disease and 6 (13.3%) reported arthritic disease in the family. One participant (2.2%) reported recent jaw or facial injury; nobody had pain in the jaw before the injury and 12 (27%) participants reported pain, headaches and migraines during the last 6 months.

Non-athletes were more likely to report teeth grinding at night ( $p=0.041$ ), and more headaches and migraines ( $p=0.027$ ). Chi-square test demonstrated no statistically significant difference between two groups for other values (Table 1).

The second part of the protocol consisted of clinical examinations, where subjects were reviewed and certain measurements were made.

In the group of athletes, 29 (64.4%) of them did not report pain at maximum unassisted mouth opening, 14 (31.1%) of them reported muscle pain, one joint pain, and one both muscle and joint pain. As for the maximum assisted opening, 17 (37.7%) of them reported muscle pain, one

**Tablica 1.** Rezultati hi-kvadrat testa: razlike između eksperimentalne i kontrolne skupine prema odgovorima (Upitnik o povijesti bolesti, pitanja od 14. do 18.).**Table 1** Results of Chi-square test: significance of the difference between experimental and control group for answers (History questionnaire, questions from 14a to 18)

Varijable • Variables	Hi-kvadrat • chi-square $\chi^2$	Stupanj slobode • Degree of freedom	Razina značajnosti p • p value
blokirana ili zakočena čeljust • jaw lock or catch	3.103	1	0.078
otežano jedenje zbog zakočenosti čeljusti • difficulty eating because of the limitation in jaw opening	1.011	1	0.315
škljocanje čeljusti • clicking jaw	0.104	1	0.748
škripanje čeljusti • grating or grinding noise	2.045	1	0.153
škripanje zubima po noći • teeth grinding at night	4.186	1	0.041*
škripanje zubima i stiskanje čeljusti po danu • jaw clenching and teeth grinding during day	2.195	1	0.138
ukočenost čeljusti nakon buđenja • jaw stiffness upon waking	1.011	1	0.315
zvukovi i zvonjava u ušima • noises or ringing in the ears during waking	0.549	1	0.459
neudoban i neobičan zagriz • uncomfortable and unusual bite	2.045	1	0.153
sistemske artritičke bolesti • systemic arthritic disease	0.212	1	0.645
artritičke bolesti u obitelji • arthritic disease in the family	1.111	1	0.292
novije ozljede čeljusti ili lica • recent jaw or facial injury	1.011	1	0.315
migrene i glavobolje u zadnjih 6 mjeseci • pain, headaches and migraines during the last 6 months	4.865	1	0.027*

**Tablica 2.** Srednje vrijednosti devijacije i zavisnih varijabli povezane s nepotpomognutim otvaranjem usta, maksimalnim nepotpomognutim otvaranjem usta, maksimalnim potpomognutim otvaranjem usta te preklap inciziva.**Table 2** Mean values and deviations of dependent variables related to unassisted opening without pain, maximum unassisted opening, maximum assisted mouth opening and incisor overbite.

Varijable • Variables	Skupina • Group	Najmanja vrijednost • Minimum	Najveća vrijednost • Maximum	Aritmetička sredina • Mean	Standardna devijacija • Std. deviation	Medijan • Median
Neasistirano otvaranje usta bez boli • Unassisted opening without pain	Kontrolna • Control	12	45	26.51	7.653	25
	Eksperimentalna • Experimental	17	57	34.07	8.561	35
	Ukupno • Total	12	57	30.29	8.923	30
Maksimalno neasistirano otvaranje usta • Maximum unassisted opening	Kontrolna • Control	20	62	41.31	8.453	44
	Eksperimentalna • Experimental	37	61	51.29	4.994	52
	Ukupno • Total	20	62	46.30	8.533	47.5
Maksimalno asistirano otvaranje usta • Maximum assisted mouth opening	Kontrolna • Control	18	54	42.98	6.940	0
	Eksperimentalna • Experimental	40	62	52.87	4.571	0
	Ukupno • Total	18	62	47.92	7.672	0
Vertikalni preklap sjekutića • Vertical incisal overlap	Control	0	8	1.51	1.727	1
	Experimental	0	8	2.93	2.250	2
	Total	0	8	2.22	2.119	2

**Tablica 3.** Rezultati Mann-Whitneyeva U- testa: razlike u veličini vertikalnog iznosa kretnje nepotpomognutog otvaranja usta bez bolova, maksimalnog nepotpomognutog otvaranja usta i maksimalnog potpomognutog otvaranja usta**Table 3** Results of Mann-Whitney U-test: significance of the difference for the size of the vertical range of motion at unassisted opening without pain, at maximum unassisted mouth opening and at maximum assisted mouth opening

Varijable Variables	Mann-Whitneyev U-izraz • Mann-Whitney U	Razina značajnosti p • p values
Neasistirano otvaranje usta bez boli • Unassisted opening without pain	507.000	0.000
Maksimalno neasistirano otvaranje usta • Maximum unassisted opening	274.500	0.000
Maksimalno asistirano otvaranje usta • Maximum assisted mouth opening	194.500	0.000
Vertikalni preklap sjekutića • Vertical incisal overlap	624.500	0.000

**Tablica 4.** Rezultati hi-kvadrat testa: razlike između eksperimentalne i kontrolne skupine prema odgovorima (Upitnik o povijesti bolesti, pitanja od 1. do 13.).  
**Table 4** Results of Chi-square test: significance of the difference between experimental and control group for answers (History questionnaire, questions from 1 to 13)

Varijable • Variables	Hi-kvadrat • chi-square $\chi^2$	Stupanj slobode • Degree of freedom	Razina značajnosti p • p value
opće zdravlje • health in general	7.054	4	0.133
opće oralno zdravlje • oral health in general	18.164	4	0.001 **
bol lica i čeljusti • pain in the face, jaw, temple	0.345	1	0.557
vrsta boli • type of pain	1.333	2	0.513
posjet liječniku, stomatologu • visit to a physician, dentist	1.047	1	0.306
bol u području lica • facial pain	4.000	3	0.261
intezitet boli u zadnjih 6 mjeseci • rate of facial pain in the past six months	4.000	4	0.406
prosjeak inteziteta boli • rate of pain	2.000	3	0.572
USP 10	3.011	3	0.390

%) tijekom pregleda nije prijavilo nikakve bolove. U skupini nesportaša, od 45 mladića njih 12 (26,6 %) prijavilo je bolove u mišićima i jedan (2,2 %) bolove u mišićima i zglobovima kod maksimalnog nepotpomognutog otvaranja usta. Kod maksimalnog potpomognutog otvaranja 39 (86,6 %) ispitanika nije prijavilo bolove.

Srednje vrijednosti i standardna devijacija zavisnih varijabli povezani s nepotpomognutim otvaranjem usta bez bolova, maksimalno nepotpomognuto otvaranje i preklap inciziva prikazani su u tablici 2. (tablica 2.)

Mann-Whitneyev U-test pokazao je statistički značajne razlike između dviju skupina u iznosu vertikalne dimenzije nepotpomognutog otvaranja usta bez bolova ( $p=0,000$  – srednja vrijednost za kontrolnu skupinu = 34,27; srednja vrijednost za eksperimentalnu skupinu = 56,73), kod maksimalnog nepotpomognutog otvaranja ( $p=0,000$  – srednja vrijednost za kontrolnu skupinu = 29,10; srednja vrijednost za eksperimentalnu skupinu = 61,90) i kod maksimalnog potpomognutog otvaranja ( $p=0,000$  – srednja vrijednost za kontrolnu skupinu = 27,32; srednja vrijednost za eksperimentalnu skupinu = 63,68). Statistički značajna razlika bila je i za iznos vertikalnog preklopa inciziva ( $p=0,000$  – srednja vrijednost za kontrolnu skupinu = 36,88; srednja vrijednost za eksperimentalnu skupinu = 54,12) (tablica 3.).

Zabilježena je i statistički značajna razlika u procjeni općeg oralnog zdravlja između dviju skupina ( $\chi^2=18,164$ ,  $p=0,001$ ). Ispitanici iz eksperimentalne skupine imali su bolje oralno zdravlje – samo je jedan ispitanik (2,2 %) imao loše, 9 (20 %) dobro, 18 (40 %) vrlo dobro i 17 (37,7 %) odlično. U kontrolnoj skupini jedan je ispitanik (2,2 %) imao loše oralno zdravlje, 5 (12 %) zadovoljavajuće, 19 (42,2 %) dobro, 15 (33,3 %) vrlo dobro i 5 (12 %) odlično. U skupini sportaša jedan (2,2 %) je imao loše opće zdravlje, 14 (31,1 %) dobro, 19 (42,2 %) vrlo dobro i 11 (24,4 %) odlično. Kod nesportaša je 5 (12 %) ispitanika imalo loše opće zdravlje, 6 (13,3 %) zadovoljavajuće, 16 (35,5 %) dobro, 14 (31,1 %) vrlo dobro i 4 (9%) odlično.

U skupini nesportaša, na ljestvici od 0 do 10 za trenutačne facijalne bolove, jedan ih je ispitanik (2,2 %) ocijenio s 3, a jedan (2,2 %) sa 7. Na ljestvici od 0 do 10 za facijalne bolove u posljednjih šest mjeseci, jedan ih je ispitanik (2,2 %)

joint pain and 28 (62.2%) reported no pain during this test. In the non-athletes group, out of 45 subjects 12 (26.6 %) reported muscle pain and 1 (2.2%) both muscle and joint pain at maximum unassisted mouth opening. As for the maximum assisted opening, 15 (33.3%) reported muscle pain, one (2.2%) muscle and a pain in the joint, while 39 (86.6%) reported no pain.

The mean values and standard deviations of dependent variables related to unassisted opening without pain, maximum unassisted opening, maximum assisted mouth opening and incisor overbite were presented in Table 2.

The Mann-Whitney U-test demonstrated statistically significant difference between two groups for the size of the vertical range of motion at unassisted opening without pain ( $p=0.000$ , mean rank for control group = 34.27; mean rank for experimental group = 56.73), at maximum unassisted mouth opening ( $p=0.000$ , mean rank for control group = 29.10 ; experimental group = 61.90), at maximum assisted mouth opening ( $p=0.000$ , mean rank for control group = 27.32 ; mean rank for experimental group = 63.68). Also there was a statistically significant difference for vertical incisal overlap ( $p=0.000$ , mean rank for control group = 36.88; mean rank for experimental group = 54.12). Larger mouth opening during all three movements appeared in the group of adolescent athletes (Table 3).

There is a statistically significant difference in the assessment of general oral health between the experimental and control groups ( $\chi^2=18.164$ ,  $p=0.001$ ). Subjects from the experimental group had better assessments regarding oral health. One (2.2%) participant reported poor, nine (20%) good, 18 (40 %) very good, 17 (37.7%) excellent oral health. In the control group, one (2.2%) participant reported poor, 5 (12%) fair, 19 (42.2%) good, 15 (33.3 %) very good, and 5 (12%) excellent oral health. In the group of athletes, one (2.2%) reported poor, 14 (31.1%) good, 19 (42.2%) very good and 11 (24.4%) excellent health in general. In the non-athletes group, 5 (12 %) participants reported poor, 6 (13.3%) fair, 16 (35.5%) good, 14 (31.1%) very good and only 4 (9%) reported excellent health in general.

In the group of non-athletes, on a 0 to 10 scale of facial pain at the present time, one (2.2%) rated 3 and one

ocijenio s 2, a jedan (2,2 %) s 9.

Nitko od ispitanika iz obiju skupina nije odgovorio da osjeća neprestane bolove tijekom posljednje godine dana i nitko nije bio kod liječnika, stomatologa ili kiropraktičara. Također nitko nije potražio drugu vrstu profesionalne pomoći zbog facijalnih bolova (tablica 4.).

Ispitanici iz kontrolne skupine češće su patili od glavobolja ( $\chi^2 = 9620$ ,  $p = 0,047$ ) i mučnina ( $\chi^2 = 8987$ ,  $p = 0,029$ ) u usporedbi s onima iz eksperimentalne skupine. Razlika se pokazala kao statistički značajna. Sportaši su prijavili znatno veći umor mišića ( $\chi^2 = 6070$ ,  $p = 0,048$ ). Trinaestorica (29 %) su zbog toga bili zabrinuti. Petorica ispitanika (12 %) iz kontrolne skupine prijavila su minimalni umor mišića, a dvojica (4 %) umjeren.

## Rasprava

Prepoznavanje znakova i simptoma temporomandibularnih poremećaja vrlo je važno zbog ispravne dijagnoze i odabira pravilnog tretmana. U ovom istraživanju, od dijagnostičkog kriterija RDC/TMD za temporomandibularne poremećaje, koristili smo se *Axisom I*. Taj kriterij čest je u istraživanju tih patoloških stanja. Razvijen je kako bi se objektivno identificirali, zabilježili i klasificirali simptomi i znakovi povezani s temporomandibularnim poremećajima te odredili točni dijagnostički i istraživački kriteriji za klasifikaciju i prepoznavanje takvih stanja.

Rasprostranjenost specifičnih simptoma u svakoj skupini nije dala značajne rezultate, iako su neki simptomi zabilježeni češće od ostalih. Na pitanje 15 a: *Škljoca li vam čeljust kad otvorite ili zatvorite usta ili dok žvačete*, 12 posto sportaša i 13,3 posto nesportaša odgovorilo je da čuju škljocanje čeljusti. To je vrlo važno jer je škljocanje jedan od simptoma temporomandibularnih poremećaja.

Ni jedan od sportaša nije zaokružio u odgovorima ozljedu čeljusti ili lica u posljednjih šest mjeseci, što je također vrlo važno jer je u dosadašnjim istraživanjima ustanovljeno da su ozljede kod sportaša najčešći uzrok nekih simptoma temporomandibularnih poremećaja (14,15). Iako se u dosadašnjim istraživanjima tvrdi da su ozljede kod sportaša česte, u našem se istraživanju ističe da ni jedan sportaš nije pretrpio ozljedu u posljednjih šest mjeseci. Ta činjenica dovodi u pitanje reprezentativnost uzorka (16 – 21).

Ustanovljena je statistički značajna razlika između dviju skupina kad je riječ o oralnom zdravlju. To se može objasniti činjenicom da sportaši odlaze na niz rigoroznih pregleda i da bi mogli trenirati moraju imati sanirane zube i visoku razinu oralnoga zdravlja.

U istraživanju Dworkina i njegovih suradnika (22) napominje se da su znakovi temporomandibularnih poremećaja rašireniji nego što se misli, ali samo rijetki slučajevi prerastaju u simptome. No važno je znati da prisutnost znakova može biti dovoljna da bi se ocijenio mogući razvoj temporomandibularnih poremećaja. Koristeći se protokolom RDC/TMD

(2.2%) rated 7. On a 0 to 10 scale of facial pain in the past six months, one (2.2%) participant rated 2, and one (2.2%) rated 9.

Nobody (athletes and non-athletes) reported persistent pain in the last year and nobody had gone to a physician, dentist, chiropractor or other health professionals for facial ache or pain (Table 4).

Subjects from the control group reported more frequent headaches ( $\chi^2 = 9620$ ,  $p = 0,047$ ) and nausea ( $\chi^2 = 8987$ ,  $p = 0,029$ ) compared to the subjects in the experimental group, the difference was statistically significant. Athletes had significantly higher muscle soreness ( $\chi^2 = 6070$ ,  $p = 0,048$ ). 13 (29%) of them were distressed by a little soreness of the muscles. 5 (11%) non-athletes had little and 2 (4%) had moderate soreness of muscles.

## Discussion

Identification of signs and symptoms of temporomandibular disorders is crucial for the same diagnosis and subsequent therapeutic treatment. In this study, we used Axis I of RDC-TMD-diagnostic research criteria for temporomandibular disorders, which is an internationally accepted and widely used diagnostic criteria for temporomandibular disorders. It was developed in order to objectify the identification, recording and classification of symptoms and signs related to temporomandibular disorders, and set clear diagnostic and research criteria for the classification and recognition of such disorders.

Prevalence of specific symptoms for each group did not lead to significant results, although the subjects of certain groups reported some symptoms more frequently than others. On question 15a "Does your jaw click or pop when you open or close your mouth or when chewing?", 12% athletes and 13.3% non-athletes reported jaw clicking. This is very important, because clicking is one of the symptoms of temporomandibular disorders.

None of the 45 athletes reported injury to the jaw and face in the last 6 months, which is essential, because previous research has proved that the injuries in athletes are the most common causes of some of the signs and symptoms of temporomandibular disorders (14,15). Although previous studies suggest that the injuries are common in athletes, our research has shown that no athlete had an injury in the last 6 months, although it raises the question of the representativeness of the sample (16-21).

Statistically significant difference was found between the two groups at the level of oral health. This can be explained by the fact that athletes had undergone rigorous examination and by the fact that they had received treatments of the teeth and mouth to improve their condition before the training.

Previous researches by Dworkin et al. (22) have shown that the signs of temporomandibular disorders are much more widespread and that only a small number of cases develop symptoms. However, even the signs themselves are sufficient to assess the potential temporomandibular disorders development. Using RDC-TMD protocol we can objectify the identification of signs related to temporomandibular dis-

možemo objektivno identificirati simptome povezane s temporomandibularnim poremećajima i usporediti ih s rezultatima studija Jerolimova, Seiferta i Careka (23).

Važno je istaknuti da kod sportaša nismo pronašli statistički značajnu razliku kod škljocanja i krepitacija u zglobovima tijekom auskultacije i palpacije, što se razlikuje od rezultata istraživanja Baumanna i Lotzmanna (2002.) te Jerolimova i ostalih (2000.) (24, 25). U našem istraživanju samo su trojica ispitanika iz eksperimentalne skupine i petorica iz kontrolne prijavili zvukove i zvonjavu u ušima.

Pojačana osjetljivost mišića sportaša vjerojatno je posljedica napora i povećanog mišićnog tonusa zbog fizičkog napora, trauma i ozljeda kojima su više izloženi nego nesportaši. Ta činjenica u skladu je s istraživanjima Melite Valentić-Peruzović, Vjekoslava Jerolimova (26) i I. M. Nilssona (27).

Weiler i sur. (28) u svojem su istraživanju pokušali pronaći rasprostranjenost simptoma temporomandibularnih poremećaja kod maloljetnih košarkaša i nesportaša. Ispitanici su bili podijeljeni u dvije skupine. U prvoj su bili oni sa znakovima temporomandibularnih poremećaja, a u drugoj ispitanici samo s ponekim simptomom toga stanja. Nisu pronađene statistički značajne razlike između maloljetnih sportaša i nesportaša.

## Zaključak

Ovo istraživanje nije pokazalo statistički značajnu zastupljenost simptoma temporomandibularnih poremećaja kod maloljetnih sportaša i nesportaša. Prema našim rezultatima sportske aktivnosti ne utječu na pojavu znakova temporomandibularnih poremećaja niti između dviju skupina postoji razlika u njihovoj rasprostranjenosti. Kod sportaša je pronađena statistički značajna razlika u veličini vertikalnog raspona pokreta kod nepotpomognutog otvaranja usta bez bolova i kod maksimalnog potpomognutog otvaranja usta zato što je njihov raspon pokreta znatno veći. Ovo istraživanje pokazalo je da postoji razlika između dviju skupina u oralnom zdravlju te je zaključeno da ga sportaši bolje održavaju.

orders and compare our results with similar studies of Jerolimov, Seifert, Carek (23)

It is important that we did not find a statistically significant occurrence of clicking and crepitus sounds in the temporomandibular region during auscultation and palpation among athletes, which differs from other studies by Bumann and Lotzmann in 2002 and Jerolimov et al. in 2000 (24, 25). In our study, only 3 subjects from the group of athletes and 5 from the group of non-athletes reported noises or ringing in the ears.

Increased sensitivity of muscles in athletes is probably due to overload and increased muscle tone that occur as a result of physical exertion, possibly as a result of trauma and injuries to which they are exposed more often than non-athletes, which is consistent with previous studies of Valentić-Peruzović, Jerolimov (26) and Nilsson (27).

Weiler et al. (28) investigated the prevalence of signs and symptoms of temporomandibular disorders in adolescent athletes-basketball players and adolescent non-athletes. Subjects were divided into two groups: the first group consisted of subjects without signs or symptoms of temporomandibular disorders, and the second group consisted of subjects with some of the signs or symptoms of temporomandibular disorders. They did not find statistically significant differences between adolescent athletes-basketball players and adolescent non-athletes.

## Conclusion

This study did not reveal statistically significant higher prevalence of signs and symptoms of temporomandibular disorders in adolescent athletes or adolescent non-athletes. According to our research, sports activities do not affect the appearance of signs and symptoms of temporomandibular disorders and there was no difference in prevalence of signs and symptoms between the two groups. Statistically significant difference was found in the size of the vertical range of motion at unassisted opening without pain, at maximum unassisted mouth opening and at maximum assisted mouth opening in athletes, because the size of movements in athletes was significantly higher. This study has shown that there is a difference between the two groups at the level of oral health, and it was determined that the athletes look after their oral health more.

### Abstract

The aim of this study was to determine the prevalence of signs and symptoms of temporomandibular disorders of adolescent athletes and adolescent non-athletes. **Material and methods:** The study included 90 male subjects who were divided into two groups: experimental (high school students aged from 15-18 years who practiced soccer, three or more times a week) and control (high school students aged from 15-18 years who do not practice sports activities for more than one hour a week or they are not involved in sports at all) groups. All subjects were tested according to Axis I of RDC/TMD protocol. **Results:** Statistically significant difference was found in the size of the vertical range of motion at unassisted opening without pain ( $p=0.000$ ), at maximum unassisted mouth opening ( $p=0.000$ ) and at maximum assisted mouth opening in athletes ( $p=0.000$ ). Non-athletes were more likely to report teeth grinding at night ( $p=0.041$ ), and more headaches and migraines ( $p=0.027$ ). Adolescent athletes had better oral health ( $\chi^2=17,390$ ,  $p=0.004$ ) and significantly higher muscle weakness ( $\chi^2=6070$ ,  $p=0.048$ ).

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### Key words

Temporomandibular Joint Disorders;  
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