Prevalence and Overlaps of Headaches and Pain-Related Temporomandibular Disorders Among the Polish Urban Population

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Aims: To investigate the prevalence and overlaps of headaches and pain-related temporomandibular disorders (TMD) among the Polish urban population. **Methods:** The study was conducted in four Polish cities (Wroclaw, Lublin, Katowice, and Lodz) between February and November 2017. Participation in the study was voluntary. The examination consisted of two parts: a clinical examination of TMD using the Diagnostic Criteria for TMD Examination Form and the Head-HUNT Study questionnaire filled in by the participants to determine the occurrence and type of headaches. An experienced and qualified clinician trained all the examiners in the clinical examination protocol. Statistical analyses were based on descriptive and nonparametric statistics. In addition, univariate logistic regression was used. The significance level was set at $\alpha = .05$. **Results:** Overall, 213 individuals were examined (149 women and 64 men). The mean age of the participants was 37 ± 15.82 years. The diagnosis for 55.9% of the participants was pain-related TMD, including myalgia (47.4%), myofascial pain (14.1%), arthralgia (21.1%), or headache attributed to TMD (10.3%). In the study population, 48.8% were diagnosed with temporomandibular joint disorders, most frequently disc displacement with reduction (47.9%). A total of 73% of the individuals had experienced headaches in the previous 12 months. The majority of the participants described the headache episodes as occurring less than 7 days/month and lasting less than 4 hours. Among people with painful TMD, the frequency of headaches was almost twice as high as that in nondisordered individuals (48.35% and 25.35%, respectively; $P < .0001$). The logistic regression model confirmed a significant overlap between headache and painful TMD (OR = 4.77, 95% CI 2.44–9.32, $P = .0000$). For the entire studied population, no statistically significant connections were established between the occurrence of identified TMJ disorders and headache reports or diagnoses ($P > .05$). **Conclusion:** Headaches and pain-related TMD are major problems among the Polish urban population. Headache was a much more frequent problem for participants with painful TMD. This issue requires further research and identification of cause-and-effect relationships. Considering the entire studied population, the relationship between identified TMJ disorders and headache is negligible. *J Oral Facial Pain Headache 2020;34:31–39. doi: 10.11607/ofph.2386*

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As social and economic development occur, new health care problems arise. In modern societies, temporomandibular disorders (TMD) and headaches (HA) are highly prevalent and pose a serious challenge for clinicians. TMD are the second most commonly occurring musculoskeletal conditions that result in pain and disability (after chronic low back pain), affecting approximately 5% to 12% of the population.[1] Among the global population, 47% of adults suffer from HA in general, 10% from migraine, 38% from tension-type headaches (TTH), and 3% from chronic HA that lasts for more than 15 days per month.[2] The literature indicates co-occurrence of these disorders in the same patients; however, their causality remains difficult to establish. Although TMD and HA are a heterogenous group of disorders, both conditions have multifactorial origins; they are biologically linked and related to similar anatomical areas and symptoms.[3,4]

Notably, caution is advised because most studies are only observational; thus, coincidental epidemiologic comorbidity cannot be excluded.[5–8] In linking TMD and HA, the literature underlines the role of sensitization in the central and peripheral nervous system, impairment of the descending modulatory pain pathways, and referral of pain.[3,4] This association concerns primary headaches (such as migraine and TTH) and secondary headaches attributed to TMD recognized in the International Classification of Headache Disorders, third edition, (ICHD-3)[9] and in the new Diagnostic Criteria for Temporomandibular Disorders (DC/TMD).[10,11] The ICHD-3 and DC/TMD are the international standards currently validated for both clinics and research establishments.[9,10] Ignoring the co-occurrence of HA and painful TMD in the same patient may result in a poor clinical outcome. In eastern European countries, the number of large and reliable epidemiologic studies concerning the prevalence and overlaps of TMD and HA is limited. It has been reported that oral health and quality of life are associated,[12] but neither cross-sectional studies in this research area nor studies focused on particular social/economic groups are available for this region. Therefore, the aim of this study was to assess the prevalence and overlaps between HA and pain-related TMD among the Polish urban population.

Materials and Methods

Participants and Study Design

This cross-sectional study was conducted in four Polish cities—Wroclaw (638,586 inhabitants), Lublin (339,850 inhabitants), Katowice (296,262 inhabitants), and Lodz (690,422 inhabitants)—between February and November 2017.[13] Participants were inhabitants of the cities who came forward at temporary booths created in shopping malls for collecting data. All the participants were ≥ 18 years old and gave informed written consent for participation in the study. The study was conducted in accordance with the principles of the Helsinki Declaration and received prior approval from the appropriate committee for ethics in medical research (acceptance no. KB—5/2017). The examination consisted of two parts: clinical examination of TMD and a questionnaire concerning headaches. Candidates who were not able to communicate in Polish or cooperate during the examination were excluded from the study.

Data Collection

DC/TMD Examination (Axis I). Clinical examination was carried out in accordance with DC/TMD specifications.[10] First, all examiners were trained and calibrated in accordance with the protocol available on the official website of the International Network for Orofacial Pain and Related Disorders Methodology[14] by a clinician with 9 years of experience in TMD and orofacial pain management and who was familiar with the DC/TMD examination protocol. As the original DC/TMD examination form, international version (12 May 2013) was used in the study (available at http://www.rdc-tmdinternatonal.org), examiners had a good knowledge of English and professional terminology in English. In addition, each examiner had access to the official DC/TMD examination instructional video in English (https://www.mededportal.org/publication/9946/).

The possible diagnoses comprised pain-related TMD: myalgia, myofascial pain with referral, right arthralgia, left arthralgia, and headaches attributed to TMD. Temporomandibular joint (TMJ) disorders were also screened, and possible diagnoses included: disc displacement with reduction; disc displacement with reduction with intermittent locking; disc displacement without reduction with limited opening; disc displacement without reduction without limited opening; degenerative joint disease; and dislocation. For a deeper understanding of the studied problem, the authors decided to create an additional group for individuals diagnosed with joint pain on at least one side; that is, right or left arthralgia or both sides. Furthermore, as the DC/TMD examination form originally considered TMJ disorders separately for right and left joints, a group comprising cases with a TMJ disorder on at least one side was also created for statistical purposes.

Q2 Questionnaire. To fulfill the purpose of the study, a modified version of the Q2 questionnaire was used to estimate the prevalence of different HA disorders. This self-administered questionnaire was published in Norway's epidemiologic project, the Head-HUNT Study, in 2000.[15] The Q2 was translated into Polish by a native speaker specialized in medical English terminology and was double-checked by a physician specialized in HA. To date, many studies have been conducted using this questionnaire to investigate the epidemiology and relationship between HA and various disease entities.[16–19] The Q2 includes 13 questions that aim to determine whether a person is suffering from headaches, and, if so, what type, how often, and what the nature of the pain is. To adapt the questionnaire to the criteria given in the ICHD-3,[9] nausea and/or vomiting (originally only nausea) was added to the HA-accompanying symptoms section. Participants completed the Q2 before the clinical examination and were not informed of the intention to investigate the coexistence of HA and painful TMD. The HA questions are presented in Table 1. The nature of the pain and co-occurrence of HA-accompanying symptoms were recognized as occurring only when

Table 1 Headache Questions in the HUNT Questionnaire

Have you suffered from headache during the last 12 months?			
Yes, in attacks (migraine)			
Yes, another type of headache			
No			
How many attacks have you had during the last 12 months?			
Approximately how many days per month do you suffer from headache?			
Less than 7 days			
7–14 days			
More than 14 days			
For how long does the headache attack usually last?			
Less than 4 h			
4 h to 3 days			
More than 3 days			
How often is your headache accompanied or dominated by: *(One mark on each line)*	Seldom or never	Sometimes	Often
Pulsating pain			
Pressing pain			
One side, always on the same side			
One side, alternately on the left and right sides			
Pain in the whole head			
Nausea and/or vomiting			
Increased sensitivity to light and/or sound			
Getting worse by physical activity			
Visual disturbances prior to headache			

the respondent marked the answer "sometimes" or "often." Individuals checking "seldom" or "never" were considered symptom-free (Table 1). Based on the obtained responses, participants were classified into groups according to the ICHD-3[9] and the criteria applied in the Head-HUNT Study.[15–18] Thus, similar to other related works,[9,17] respondents were classified as migraineurs if the answers in the Q2 indicated migraine and if they fulfilled the following three criteria in accordance with the ICHD-3: *(1)* HA attacks lasting 4 to 72 hours (could be < 4 hours when visual disturbances were often reported before headache; criterion adopted from the Head-HUNT Study[15]); *(2)* HA with at least one of the following three characteristics: pulsating, unilateral, or aggravated by physical activity; and *(3)* during HA, at least one of the following symptoms: nausea and/or vomiting, photophobia, and/or phonophobia. Diagnostic criteria for TTH were: *(1)* HA with at least two of the following characteristics: bilateral, pressing (nonpulsating) pain, and not aggravated by physical activity; *(2)* no nausea or vomiting during HA; and *(3)* no more than one of photophobia or phonophobia reported. In this questionnaire, all three possible variants of the answer regarding the duration of the pain (< 4 hours, 4 hours to 3 days, and > 3 days) were not diagnostically specific to potential TTH sufferers; thus, the duration criterion adopted in the ICHD-3 was omitted. In cases where a certain diagnosis of the participants could not be reached since symptoms were not sufficient (ie, all but one of the above-mentioned criteria were missing), they were diagnosed as suffering from a probable migraine or TTH. Participants who reported suffering from headache during the previous 12 months for more than 14 days per month were diagnosed as belonging to the chronic headache group.[2,17]

Statistical Analyses

Data analyses were performed using STATISTICA PL Version 12 software. The level of significance was set at $P < .05$. Descriptive statistics were used to characterize the studied population. Because of the dichotomous variables and nonnormal data distribution, nonparametric statistical tests (Mann–Whitney *U* test, Friedman test), odds ratios (OR), and univariate logistic regression were used in the analysis. The null hypothesis assumed no statistical differences between the studied groups.

Results

Overall, 213 Caucasian participants (149 women, 64 men) with a mean age of 37 ± 15.84 years (range 18 to 84) who fully and correctly filled out the questionnaire and took part in the clinical examination were included in the analysis. Participants from particular cities did not differ in terms of sex or age. The percent distribution and demographic data of the study population in individual cities were as follows: Wroclaw, n = 110 (72 women, 38 men) with a mean age of 37 ± 14.83 years; Lublin, n = 38 (31 women, 7 men) with a mean age of 36 ± 17.51 years; Katowice, n = 34 (25 women, 9 men) with a mean age of 40 ± 13.81 years; and Lodz, n = 31 (21 women, 10 men) with a mean age of 34 ± 18.89 years.

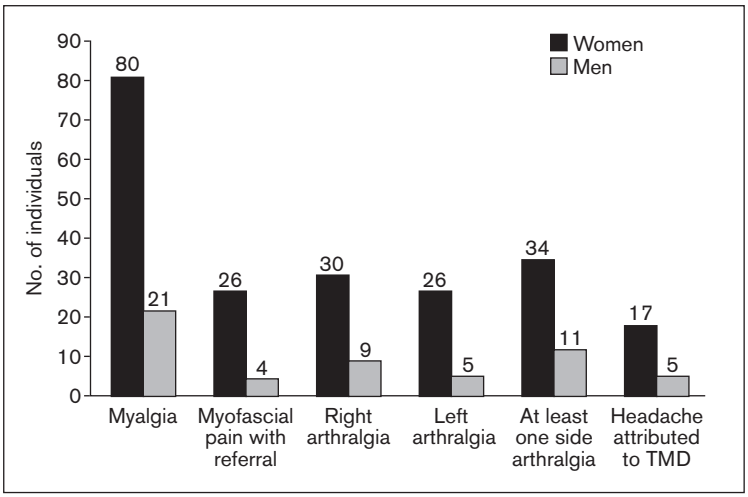

Fig 1 Distribution of pain-related TMD diagnoses.

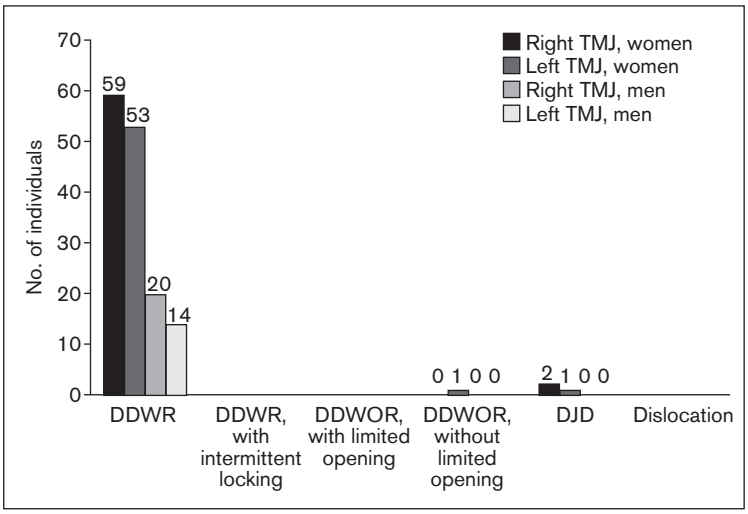

Fig 2 Distribution of TMJ disorders diagnoses. DDWR = disc displacement with reduction; DDWOR = disc displacement without reduction; DJD = degenerative joint disease.

Pain-Related TMD Diagnoses

In more than half of the participants (55.7%; n = 119), at least one type of pain-related TMD was diagnosed. The number of individuals diagnosed with a particular pain-related TMD is presented in Fig 1. The most common pain diagnosis in both sexes was myalgia ($P < .001$). It was found that diagnosis of at least one pain-related TMD was more frequent among women than men ($P = .0034$), specifically myalgia and myofascial pain ($P = .0053$ and $P = .0318$, respectively). Women and men did not statistically differ in the frequency of arthralgia diagnoses, for at least one side or independently for right and left joint pain ($P > .05$). Similarly, there were no differences between men and women in regard to headaches attributed to TMD ($P > .05$). Considering a 10-year age interval, most of the people who reported painful TMD were between 20 and 30 years of age (40.3%; n = 48). More than half of the participants (54.6%; n = 65) were between 20 and 40 years of age.

TMJ Disorders

In the studied population, 48.8% (n = 104) were diagnosed with some form of TMJ disorder, involving the right joint in 38% (n = 81) and the left joint in 32.4% (n = 69). The most frequent TMJ disorder was disc displacement with reduction (47.9%, n = 102), involving the right joint in 37% (n = 79) and the left joint in 31.5% (n = 67). None of the participants had disc displacement with reduction with intermittent locking; dislocation; or disc displacement without reduction with limited opening. Only occasionally were there diagnoses of disc displacement without reduction without limited opening (n = 1) and degenerative joint disease (n = 3). The distribution of individuals diagnosed with particular TMJ disorders is presented in Fig 2. Women and men did not statistically differ in the frequency of TMJ disorder occurring at least on one side and independently for the right and left joint. Age distribution did not differ between the participants with and without TMJ disorders.

Headache Diagnosis

A total of 74% of the participants (n = 157) reported experiencing at least one headache episode in the previous 12 months. Ten participants (4.7%) suffered from chronic headaches (more than 14 days/month). Although there were no significant sex differences with regard to frequency and length of headaches, women generally reported headaches more often than men ($P = .037$). The frequency and length of headache episodes in the studied population are presented in Figs 3 and 4. An average headache sufferer was defined as an individual reporting less than seven headache episodes lasting less than 4 hours per month. Among participants who reported headaches during the previous 12 months, 42.7% (n = 67) were between 20 and 30 years of age, and 66.24% (n = 104) were between 20 and 40 years of age. There was a constant drop in the number of headaches after 30 years of age. Among headache nonsufferers, no age-specific pattern was observed. The average number of attacks in the previous 12 months among people reporting headaches was 21.66 ± 38.21 (range 1 to 365). Table 2 presents the

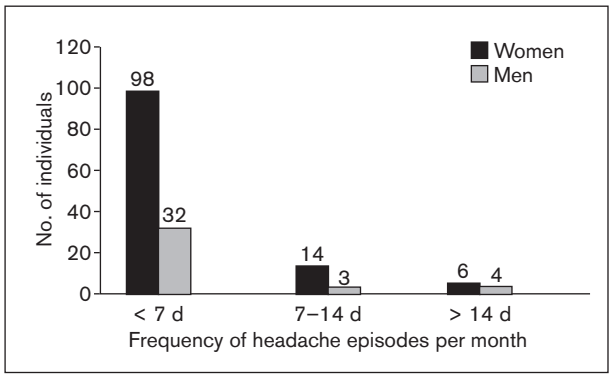

Fig 3 Frequency of headache episodes per month in study population.

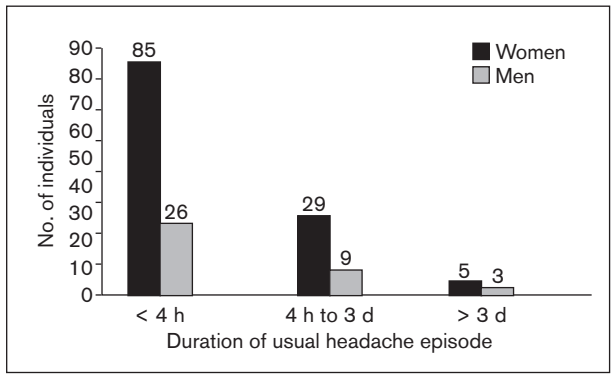

Fig 4 Duration of headache episodes in study population.

reported symptoms that accompany headaches. Women more often than men experienced pain in the whole head and visual disturbances prior to headaches (P = .046 and P = .013, respectively). Among these individuals, 40 were classified as only migraineurs, 31 as only TTH sufferers, 4 had symptoms of both migraine and TTH, and 32 were diagnosed as neither suffering from migraine nor TTH (Table 3). In addition, there were no significant sex differences with regard to the prevalence of migraine or TTH.

DC/TMD Diagnosis and Headache Overlaps

In general, migraine and TTH were associated with pain-related TMD diagnosis (P < .0001 and P = .005, respectively). Individuals suffering from any form of painful TMD were almost 5-fold more likely to have reported headaches in the previous 12 months (OR = 4.77, 95% confidence interval [CI] 2.44 to 9.33, P = .0001), while being almost 5-fold more likely to be classified as migraineurs and almost 3-fold more likely to be diagnosed with TTH (OR = 4.53, 95% CI 2.06 to 9.95, P = .0001; OR = 2.8, 95% CI 1.31 to 5.97, P = .005, respectively).

Table 4 shows the associations between specific diagnoses of HA among individuals and symptoms of TMD according to univariate analysis. The logistic regression showed that the diagnoses of right arthralgia, left arthralgia, or both increased the risk of headache reports; however, this did not influence the risk of migraine or TTH. Women were approximately 2-fold more likely than men to have migraine (but not TTH) and to report headaches in the previous 12 months (OR = 2.27, 95% CI 1.00 to 5.15, P = .038; OR = 1.97, 95% CI 1.03 to 3.76, P = .039, respectively). Among the studied population, the age of individuals had no effect on the risk of migraine or TTH; however, with growing age, the risk of a 1-year prevalence of headache decreased (OR = 8.76, 95% CI 2.24 to 34.18, P = .002). Table 5 presents symptoms of TMJ disorders among individuals with specific diagnoses of headache at univariate analysis. For the entire studied population, no statistically significant findings were established between the occurrence of identified TMJ disorders and headache reports and diagnoses (P > .05). The relationships remained insignificant in comparisons performed among women as well. However, in men, disc displacement on at least one side increased the risk of headache reports in the previous 12 months (OR = 4.99, 95% CI 1.41 to 17.67, P = .006). Univariate analyses for other TMJ disorders could not be performed due to the lack of data.

Table 2 Number of Individuals with Symptoms Accompanying Headaches

	No. (%)	Women	Men
Accompanying symptoms			
Pulsating pain	115 (73.2)	86	29
Pressing pain	105 (66.9)	80	25
One side, always on the same side	72 (45.9)	52	20
One side, alternately on the left and right sides	56 (35.7)	47[a]	9
Pain in the whole head	92 (58.6)	71[b]	21
Nausea	45 (28.7)	36	9
Increased sensitivity to light and/or sound	85 (54.1)	65	20
Getting worse by physical activity	75 (47.8)	56	19
Visual disturbances prior to headache	58 (36.9)	48[c]	10

[a] P = .0081. [b] P = .046. [c] P = .013.

Table 3 Number of Individuals Classified Into Headache Groups

Headache diagnosis	TTH No	TTH Yes	TTH Probable	Total no. (%)
Migraine no	32	31	6	69 (43.9)
Migraine yes	40	4	4	48 (30.6)
Migraine probable	31	8	1	40 (25.5)
Total no. (%)	103 (65.6)	43 (27.4)	11 (7.0)	157 (100)

TTH = tension-type headache.

Table 4 Associations of Headache Reports and Diagnoses with Gender and Symptoms of Pain-Related Temporomandibular Disorders (TMD) According to Univariate Analysis

		Headache reports (last 12 mo)				Migraine[a]				TTH[a]			
Variables	No.	No.	OR	95% CI	$P(\chi^2)$	No.	OR	95% CI	$P(\chi^2)$	No.	OR	95% CI	$P(\chi^2)$
Any pain-related TMD													
Yes	119	103	4.77	2.44–9.33	.000	38	4.53	2.06–9.95	.000	32	2.80	1.31–5.97	.005
No	94	54				10				11			
Myalgia													
Yes	101	88	4.22	2.10–8.49	.000	34	4.17	2.02–8.62	.000	28	2.56	1.27–5.19	.007
No	112	69				14				15			
Myofascial pain with referral													
Yes	30	27	3.67	1.06–12.70	.018	13	4.79	1.88–12.22	.001	8	1.50	0.61–3.70	.383
No	183	130				35				35			
Right arthralgia													
Yes	39	35	3.73	1.25–11.10	.007	10	1.30	0.56–3.04	.541	11	1.68	0.75–3.76	.213
No	174	122				38				32			
Left arthralgia													
Yes	31	29	6.12	1.40–26.77	.002	5	0.69	0.24–1.99	.480	10	2.11	0.90–4.95	.095
No	182	128				43				33			
Any arthralgia													
Yes	45	41	4.59	1.55–13.58	.001	10	1.05	0.46–2.41	.903	14	2.08	0.97–4.42	.062
No	168	116				38				29			
Headache attributed to TMD													
Yes	22	20	3.94	0.88–17.59	.07	9	4.57	1.52–13.78	.006	4	0.86	0.27–2.71	.789
No	191	137				39				39			
Gender													
Women	149	116	1.97	1.03–3.76	.039	39	2.27	1.00–5.15	.038	30	1.06	0.51–2.22	.879
Men	64	41				9				13			

OR = odds ratio; CI = confidence interval. $P < .05$.

[a]In univariate analyses, only subjects with or without certain migraine and tension-type headache (TTH) diagnoses (excluding diagnoses of probable migraine or TTH) were included.

Table 5 Associations of Headache Reports and Diagnoses with TMJ Disorders According to Univariate Analysis

		Headache reports (last 12 mo)				Migraine[a]				TTH[a]			
Variables	Total no.	No.	OR	95% CI	$P(\chi^2)$	No.	OR	95% CI	$P(\chi^2)$	No.	OR	95% CI	$P(\chi^2)$
Any TMJ disorder													
Yes: Right side	81	62	1.27	0.67–2.42	.459[b]	21	1.38	0.70–2.73	.350[b]	11	0.52	0.25–1.12	.084[b]
Yes: Left side	69	52	1.14	0.59–2.21	.703[c]	18	1.54	0.76–3.13	.230[c]	14	1.02	0.49–2.13	.952[c]
Yes: At least one side	104	82	1.69	0.90–3.16	.096[d]	28	1.78	0.90–3.51	.091[d]	21	1.04	0.53–2.06	.904[d]
Disc displacement with reduction													
Yes: Right side	79	60	1.20	0.63–2.29	.567[b]	20	1.27	0.64–2.52	.492[b]	11	0.55	0.26–1.18	.113[b]
Yes: Left side	67	51	1.20	0.61–2.36	.586[c]	17	1.47	0.72–3.00	.294[c]	14	1.08	0.52–2.24	.827[c]
Yes: At least one side	102	81	1.78	0.95–3.33	.069[d]	27	1.69	0.86–3.32	.124[d]	21	1.10	0.56–2.16	.789[d]
Disc displacement with reduction, with intermittent locking													
Yes: Right side	0	0	N/A			0	N/A			0	N/A		
Yes: Left side	0	0				0				0			
Disc displacement without reduction, with limited opening													
Yes: Right side	0	0	N/A			0	N/A			0	N/A		
Yes: Left side	0	0				0				0			
Disc displacement without reduction, without limited opening													
Yes: Right side	0	0	N/A			0	N/A			0	N/A		
Yes: Left side	1	0				0				0			
Degenerative joint disease													
Yes: Right side	2	2	N/A			1	N/A			0	N/A		
Yes: Left side	1	1				1				0			
Dislocation													
Yes: Right side	0	0	N/A			0	N/A			0	N/A		
Yes: Left side	0	0				0				0			

OR = odds ratio; CI = confidence interval; N/A = not applicable.

[a]In univariate analyses only, subjects with or without certain migraine or tension-type headache (TTH) diagnoses (excluding probable migraine or TTH) were included. Results were significant at $P < .05$.

[b]Compared to "No: Right side."

[c]Compared to "No: Left side."

[d]Compared to "No: At least one side."

Discussion

Similar to other reports, this paper suggests that nonpainful intraarticular TMD is not associated with HA occurrence.[3,7,8] In the present study, the prevalence of any form of pain-related TMD and HA in the studied Polish urban population was high. In more than half of the participants, at least one type of pain-related TMD was found. About three-fourths of the participants reported experiencing headaches in the previous 12 months. Similar to other studies, it was found that muscle disorders were the most frequent TMD.[20–26]

Similar to Ciancaglini and Radaelli[8] and Franco et al,[6] in this study, individuals suffering from painful TMD were 5-fold more likely to report headaches. In accordance with others in the Polish population, the occurrence of any form of pain-related TMD, especially myalgia, was associated with migraine and TTH.[5–7] In the present sample, diagnosis of myofascial pain increased the risk of migraine, but had no effect on TTH. In general, the literature indicates a strong relationship between myofascial pain and TTH.[5,6,27] Differences in obtained outcomes may arise from the different diagnostic criteria used after 2013. The previous version of the DC/TMD, the Research Diagnostic Criteria for TMD, included only myofascial pain diagnosis and did not include myalgia as a separate disease entity.[10,28] On the other hand, Gonçalves et al concluded that, in the multiple logistic regression model, the occurrence of any TMD subtype was strongly associated with migraine, but not with episodic TTH.[7] The author explained this finding with a theory of central facilitation of nociceptive inputs.[7] In the present study, women were about 2-fold more likely to report headaches than men, consistent with the results of other works.[8] A significant peak in the prevalence of headaches was observed between 20 and 30 years of age. Also, two-thirds of headache sufferers were in their reproductive age, consistent with the literature.[27] The present research demonstrates that TMJ pain, similar to degenerative joint disease and disc displacement, might not be associated with migraine and TTH.

The authors of the present work focused on TTH and migraine due to scientific evidence showing their comorbidity with TMD. The questionnaires and information obtained through examination were not suitable for diagnosing other primary and secondary headaches. The only example of secondary headache that could be reasonably diagnosed was headache attributed to TMD. Headache attributed to TMD is one of the secondary headaches described in the ICHD-3.[9] It is characterized as a pain usually in the temporal region, preauricular area of the face, and/or the masseter muscle, developed in temporal relation with the onset of TMD or leading to its discovery. It may be unilateral or bilateral and is aggravated by jaw motion, function (eg, chewing), and/or jaw parafunction (eg, bruxism) and provoked on physical examination by temporalis muscle palpation and/or passive movement of the jaw.[9] A total of 157 individuals reported HA; however, only 22 who reported HA were finally diagnosed with HA attributed to TMD, which is proof of the different pain origins in both groups, although overlapping of pain pathways is possible.[29] Moreover, HA due to TMD was associated with migraine, but had no effect on the risk of TTH.

Although some previous articles have raised the problem of TMD in the Polish population, the evidence from epidemiologic studies concerning the prevalence and overlaps of TMD and HA is limited. The epidemiologic data demonstrated in this study are in line with the results presented by other authors. Muscle disorders and disc displacements seem to be most frequently diagnosed in the Polish population.[20,30,31] Osiewicz et al showed that muscle disorders were diagnosed in 56.9% of patients, disc displacements in 48.9%, and one or more of arthralgia, osteoarthritis, and osteoarthrosis were observed in 31% of Polish patients.[20] Interestingly, the percentages presented by Osiewicz et al are very similar to the present results, although the studied population was comprised of patients seeking TMD treatment at the university dental clinic in Krakow. The percentage distribution of particular types of TMD in individuals who sought medical help was very close to that of shopping mall visitors. Perhaps the DC/TMD and RDC/TMD examination forms are appropriate screening tools, but do not provide information about real treatment needs. The issue seems to be very promising for future investigations.

This study is valuable because it was conducted among random individuals in shopping malls, not among patients seeking assistance in clinics; thus, the study is more representative of the general population. Every willing person could take part in the study. On the other hand, the choice of shopping mall as a place of study could cause selection bias, as the selected population might not be representative of a city or region. This could be a limitation of the present study. The use of validated research standards such as the DC/TMD and ICHD-3 has reinforced the accuracy of the test results; however, the main limitation of this study is that the diagnosis of HA was based on a questionnaire and not on the basis of a clinical examination. This limitation is quite common in the literature, where many studies have successfully used questionnaires for headache assessment.[6,8] Another limitation of the study was that, due to the lack of anamnesis, it was impossible to distinguish primary from secondary headaches, head from neck

surgery, exclude neurologic disorders, widespread pain, and drug administration. In addition, due to it being a cross-sectional study, no cause-and-effect relationships could be identified. Although several studies have explored the association between TMD and headaches among adults, the precise relationship between both these disorders remains unknown.[3–8] The role of psychologic factors cannot be excluded[7] in the study of TMD and HA. It is also unknown whether these multidirectional factors are causally related or have a common genesis leading to their appearance. In spite of all these dilemmas, it is important for health care providers to note that these disorders may coexist in a single patient; thus, they must be aware of such disorders and must make appropriate clinical decisions.

Conclusions

Based on the collected data, it can be concluded that headache and pain-related TMD are major problems among the studied urban population. In addition, headache is a more frequent problem among Polish inhabitants suffering from painful TMD. This issue requires further research and identification of cause-and-effect relationships. Considering the entire studied population, the relationship found between TMJ disorders and headache is negligible.

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