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Clinical profile in relation to age and gender of patients with temporomandibular disorders: a retrospective study

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Abstract

Background The present study is to evaluate the clinical characteristics of patients with temporomandibular disorders (TMD).

Methods A total of 3362 TMD patients were included. Each participant had complete medical records according to the diagnostic criteria for temporomandibular disorders (DC/TMD). The clinical characteristics including symptoms and signs in relation to age and gender were analyzed.

Results The mean age of the patients seeking care was 29.89 ± 13.73Y, and 68.6% of patients were aged 16–35 years. The female-to-male ratio of patients was 2.2: 1, and the average age of males was significantly lower than that of females. The prevalence of clicking symptoms decreased with age, while the prevalence of pain symptoms and limitations in jaw movement increased with age. Females were more likely to have limitations in jaw movement than males. Among the patients with pain, the average visual analogue scale (VAS) was 2.96 ± 1.23. The average VAS score of acute TMD patients (≤ 3 months) was significantly higher than that of chronic TMD patients (> 3 months).

Conclusions The majority of TMD patients seeking care were young people. The number and average age of female patients was higher than the males. Female patients were more likely to have limitations in jaw movement than males.

Keywords Temporomandibular disorders, Age, Gender, Pain, Limitation in jaw movement

Background

Temporomandibular disorders (TMD) involving the temporomandibular joint (TMJ), masticatory muscles and associated structures, is the second most common musculoskeletal condition after chronic lower backache [1]. It is mainly characterized by TMJ noises, joint and/or muscular pain, and mandibular movement limitation, which affect the quality of life of patients significantly [2].

In literature, the prevalence of TMD in the general population has varied widely, ranging from 7 to 84% [2]. This may be due to the lack of homogeneity of diagnostic protocols in relevant investigations. In history, two globally recognized diagnostic classification tools for

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TMD have been established. Research and diagnostic criteria for TMD (RDC/TMD) was issued by the National Institute of Dental Research (NIDR) of the United States in 1992, and diagnostic criteria for TMD (DC/TMD) published by the International Association for Dental Research (IADR) in 2014 based on symptom questionnaire and clinical examination [3, 4]. Since their publication, these two diagnostic tools have been widely used in TMD-related studies and proved to be reliable [5, 6], but large-scale studies are relatively few.

Most epidemiological studies showed that predilection of TMD in women is striking. The female-to-male ratio of patients seeking care has been reported as ranging from 3:1 to as high as 9:1 [7]. Unlike similar diseases of other joints that also have a greater female predilection but occur postmenopausally, a large proportion of women with TMD are between 18 and 45 years of age [8, 9]. TMD pain onset tends to occur after puberty, and peaks in the reproductive years, varies in intensity over the menstrual cycle [10], with the highest prevalence occurring in women aged 20–40 years, and the lowest among children, adolescents and the elderly [9]. However, the exact relationship between the clinical features and gender or age in recent years, especially in western China, remains unclear.

The aim of this study is to evaluate the relationship between the typical clinical features of TMD and gender or age by retrospective analysis, in order to provide reference for clinical diagnosis and treatment of TMD.

Methods

Participants

Patients admitted to the TMD clinic in School of Stomatology, the Fourth Military Medical University from January 1, 2021 to December 31, 2021, were included in the present study. The inclusion criteria were as follows: (1) diagnosed with TMD according to DC/TMD [4]; (2) complete medical records; (3) agree to participate in the study. The exclusion criteria were as follows: (1) TMJ ankylosis; (2) Inflammatory diseases of TMJ (rheumatoid arthritis, lupus, infections, etc.); (3) Maxillofacial trauma or TMJ surgery history. A total of 3362 patients with TMD were included in the present study. Informed consent to participate was obtained from all the participants and from legally authorized representatives of minors age below 18Y. The study was approved by the Medical Ethics Committee of the School of Stomatology, the Fourth Military Medical University (Approval number: KQ-YJ-2023–085) and conformed to the Declaration of Helsinki.

Data collection

Data collection for this study involved 1) Information collected by dentists through interviews according to DC/TMD, which including the information about chief complaint, medical history, and TMD-related oral habits and 2) a comprehensive clinical examination according to DC/TMD [4]. The included variables are shown in Figs. 1 and 2.

Statistical analyzes

All data were analyzed using IBM SPSS software, version 26.0. Descriptive (categorical) variables were compared using Chi-square and Fisher's exact analysis. The normality of the distribution was evaluated using the Kolmogorov–Smirnov test. Differences between groups in normally distributed variables were evaluated parametrically with the Independent Samples t-test and the One-Way Anova. Variables not normally distributed were evaluated using the non-parametric Mann–Whitney U test and the Kruskal–Wallis test. The correlations between the study variables were assessed using the Spearman correlation coefficient. The P values of < 0.05 were considered statistically significant.

Results

Demographic data

The age distribution of patients with different genders is shown in Table 1. Among 3362 TMD patients seeking care, the age varied from 7 to 85 years old, with an average age of 29.89 ± 13.73Y. Patients were divided into four age groups: ≤ 15Y, 16-35Y, 36-55Y, and ≥ 56Y. It was startling that the percentage of TMD patients aged 16-35Y was as high as 68.6% (2308 in all 3362 patients) ($\chi 2 = 12.381$, $P = 0.006$). In addition, the percentage of patients aged ≤ 15Y and ≥ 56Y was both only 7.5%. Among 3362 TMD patients, 2314 (68.8%) were female and 1048 (31.2%) were male, with a female-to-male ratio of 2.2: 1. Interestingly, the average age of male TMD patients (28.56 ± 13.26Y) was significantly lower than that of female (30.49 ± 13.90Y) ($Z = -4.395$, $P = 0.000$). When taken the age and gender distribution together, the percentage of different age group was similar in male and female, with 7.3% vs 7.5% in the ≤ 15Y age group, 72.5% vs 66.9% in the 16-35Y age group, 13.6% vs 17.6% in the 36-55Y age group, 6.5% vs 8.0% in the ≥ 56Y age group.

TMD duration before seeking care

Before seeking care, the duration of TMD patients ranged from 1 day to 30 years, with a median time of 4 months. As shown in Table 2, patients with TMD duration of > 3 months in the ≤ 15Y age group and 16-35Y age group, were more than that of ≤ 3 months. However, in the 36-55Y age group and ≥ 56Y age group, patients with TMD duration of > 3 months were less than that of ≤ 3 months. It is indicated that the older TMD patients were, the earlier they sought care. Among 1048 male TMD

Variables		Categories
Gender		Male
		Female
Age in group		≤15Y
		16-35Y
		36-55Y
		≥56Y
TMD duration		≤3 months
		>3 months
Chief complaint	Clicking	Yes
		No
	Self-reported pain	Yes
		No
	Limitations in jaw movement	Yes
		No
Clinical examination findings	Clicking	Yes
		No
	Pain	Yes
		No
	Restricted mouth opening	<40mm
		≥40mm
	VAS	0-10

Fig. 1 Variables in data collection

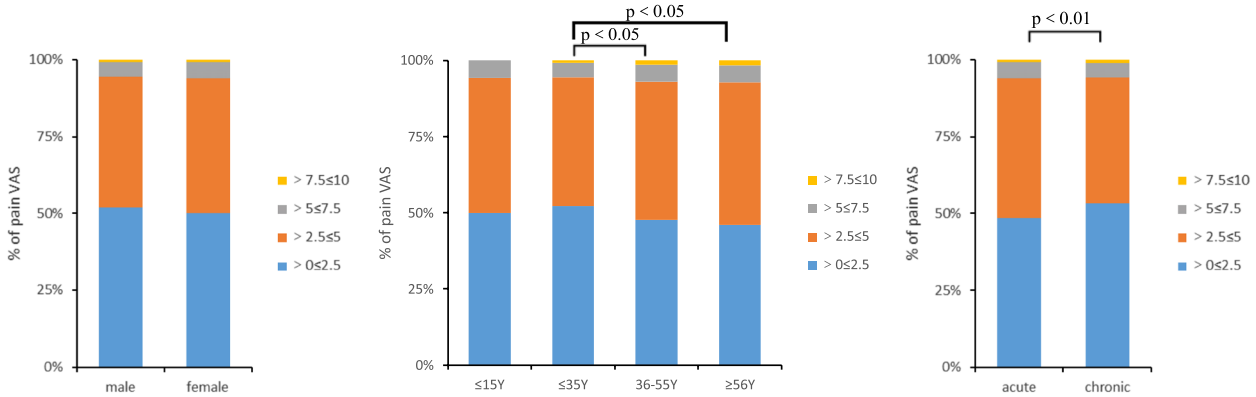

Fig. 2 Illustration of the frequency distributions of pain VAS

Table 1 Age distribution of the patients with different genders (%)

Age in group	All ($n=3362$)	Male ($n=1048$)	Female ($n=2314$)	χ^2	*P*
≤15Y	251 (7.5)	77 (7.3)	174 (7.5)	12.381	0.006
16-35Y	2308 (68.6)	760 (72.5)	1548 (66.9)		
36-55Y	550 (16.4)	143 (13.6)	407 (17.6)		
≥56Y	253 (7.5)	68 (6.5)	185 (8.0)		

Table 2 Clinical characteristics of the patients in different age groups (%)

Parameter	≤15 (*n* = 251)	16–35 (*n* = 2308)	36–55 (*n* = 550)	≥56 (*n* = 253)	χ^2	*P*
TMD duration						
≤3 months	114 (45.4)	1003 (43.5)	307 (55.8)	150 (59.3)	44.361	0.000
>3 months	137 (54.6)	1305 (56.5)	243 (44.2)	103 (40.7)		
Chief complaint						
Clicking	143 (57.0)	1186 (51.4)	199 (36.2)	72 (28.5)	88.021	0.000
Self-reported pain	123 (49.0)	1278 (55.4)	379 (68.9)	204 (80.6)	94.199	0.000
Limitations in jaw movement	44 (17.5)	416 (18.0)	120 (21.8)	63 (24.9)	10.257	0.017
Clinical examination findings						
Clicking	165 (65.7)	1424 (61.7)	269 (48.9)	121 (47.8)	47.794	0.000
Pain	151 (60.2)	1456 (63.1)	406 (73.8)	220 (87.0)	77.257	0.000
Restricted mouth opening (<40 mm)	64 (25.5)	637 (27.6)	255 (46.4)	128 (50.6)	117.197	0.000

Table 3 Clinical characteristics of the patients with different genders (%)

Parameter	All (*n* = 3362)	Male (*n* = 1048)	Female (*n* = 2314)	χ^2	*P*
TMD duration					
≤3 months	1574 (46.8)	530 (50.6)	1044 (45.1)	8.623	0.003
>3 months	1788 (53.2)	518 (49.4)	1270 (54.9)		
Chief complaint					
Clicking	1600 (47.6)	506 (48.3)	1094 (47.3)	0.292	0.589
Self-reported pain	1984 (59.0)	620 (59.2)	1364 (58.9)	0.014	0.907
Limitations in jaw movement	643 (19.1)	162 (15.5)	481 (20.8)	13.241	0.000
Clinical examination findings					
Clicking	1979 (58.9)	614 (58.6)	1365 (59.0)	0.048	0.827
Pain	2233 (66.4)	676 (64.5)	1557 (67.3)	2.503	0.114
Restricted mouth opening (<40 mm)	1054 (31.4)	227 (21.7)	827 (35.7)	66.431	0.000

patients, the duration ranged from 1 day to 30 years, with a median time of 3 months. Among 2314 female TMD patients, the duration also ranged from 1 day to 30 years, but with a median time of 6 months. Compared with males, female TMD patients had a longer duration of disease (Z = -3.094, $P = 0.002$), with similar trend shown in Table 3 ($\chi^2 = 8.623$, $P = 0.003$).

Symptoms and signs of TMD

As shown in Table 2, in terms of chief complaint, the prevalence rate of self-reported TMJ clicking symptoms was highest in the ≤15Y age group (57%), and gradually decreased with age ($\chi^2 = 88.021$, $P = 0.000$). The sign of TMJ clicking in clinical examination showed similar trend ($\chi^2 = 47.794$, $P = 0.000$). As shown in Table 3, there was no significant difference in the symptom ($\chi^2 = 0.292$, $P = 0.589$) and sign ($\chi^2 = 0.048$, $P = 0.827$) of TMJ clicking between male and female patients.

Among all the TMD patients, the prevalence of limited jaw movement ranged from 17.5% to 24.9% in different age groups. As shown in Table 2, patients in the ≤15Y age group had the lowest prevalence of the symptoms of limited jaw movement, which increased with age ($\chi^2 = 10.257$, $P = 0.017$). Similar trend also appeared in clinical examination ($\chi^2 = 117.197$, $P = 0.000$). As shown in Table 3, compared with males, the prevalence of both symptoms ($\chi^2 = 13.241$, $P = 0.000$) and signs ($\chi^2 = 66.431$, $P = 0.000$) of limited jaw movement was higher in female TMD patients.

Pain was the main symptom and sign of TMD, with prevalence from 49% to 80.6% in pain symptom, and 60.2% to 87% in pain sign in different age groups. As shown in Table 2, the prevalence of both pain symptom ($\chi^2 = 94.199$, $P = 0.000$) and sign ($\chi^2 = 77.257$, $P = 0.000$) increased with age. As shown in Table 3, there was no significant difference in pain symptom ($\chi^2 = 0.014$, $P = 0.907$) and sign ($\chi^2 = 2.503$, $P = 0.114$) between male and female patients.

Among 2233 patients with pain during clinical examination, 1776 (79.5%) had unilateral pain and 457 (20.5%)

had bilateral pain. Pain intensity data quantified by the visual analogue scale (VAS) were recorded in 2044 patients, with an average value of 2.96 ± 1.23, and frequency distribution was shown in Fig. 1. There was no significant difference in the average pain VAS score between males (2.93 ± 1.20) and females (2.97 ± 1.25). The average VAS values of different age groups were as follows: ≤ 15Y were 2.96 ± 1.09, 16-35Y were 2.90 ± 1.22, 36-55Y was 3.09 ± 1.29, ≥ 56Y was 3.11 ± 1.28. The difference in age distribution was statistically significant (H = 10.684, $P = 0.014$), suggesting that the self-reported pain degree of TMD patients aged 16–35 years was the lowest, followed by ≤ 15Y, and the pain intensity of patients > 36Y increased with age. The average VAS score of acute TMD patients (≤ 3 months) was significantly higher than that of chronic TMD patients (> 3 months) (Z = -3.261, $P = 0.001$).

Discussion

TMD is a group of disorders affecting the temporomandibular joint, masticatory muscles and associated structures. TMD affects an individual's eating and speech function, which can affect their nutrient intake and ability to communicate. Patients with TMD may also suffer from pain and discomfort, sleep disorders, increased muscular tension, which can affect their mood and overall ability to carry out daily activities [11, 12]. In literature, large-scale studies on the clinical profile of TMD among TMD patients seeking care are rare, especially after the publication of DC/TMD. The present study with 3362 TMD patients in 2021 may help to understand the real clinical profile of TMD currently.

As one kind of common maxillofacial diseases, TMD are most commonly reported in young to middle-aged adults (20 to 50 years of age), with a peak of occurrence between 20 and 40 years of age [13, 14]. A recent meta-analysis of studies using RDC/TMD and DC/TMD estimated that 31% of adults and 11% of children had TMD [15]. In the present study, among 3362 TMD patients seeking care, the age varied from 7 to 85 years old, with an average age of 29.89 ± 13.73Y. It was startling that the percent of TMD patients aged 16-35Y was as high as 68.6%, and the percent of TMD patients aged below 35Y was 76.1%. In addition, in TMD patients seeking care, the percent of patients aged ≤ 15Y and ≥ 56Y was both only 7.5%. In 2018, Marpaung C et al. reported that the prevalence of pain-related TMD was 21.6% in a large group of Dutch adolescents, aged between 12 and 18 years [16]. In 2023, Rentsch M et al. reported that the self-reported prevalence of TMD was 18.8% in Swiss children and adolescents aged 7–14 years [17]. It seems that with the increasing social pressure TMD is becoming a common disease in children and adolescents. However, due to low awareness of TMD or other reasons, the percent of TMD patients aged ≤ 15Y seeking care was relatively low.

In literature, most epidemiological studies showed that predilection of TMD in females is striking. Population-based studies show the prevalence of TMD to be 2 to 5 times higher in women than in men in community samples [18]. In a review from the New England Journal of Medicine, it has been reported the female-to-male ratio of patients seeking care ranged from 3:1 to as high as 9:1 [13]. In 2018, a meta-analysis showed that the odds for presenting TMD were 2.2 times higher in women as compared to men [17]. In the present study, the female-to-male ratio of TMD patients seeking care was also 2.2:1, which is identical to the previous meta-analysis [15]. Unlike similar diseases of other joints that also have a greater female predilection but occur postmenopausally [18], a large proportion of women with TMD are adolescents and young adults. The reasons for this marked sexual dimorphism and age distribution remain unclear. It is estimated that the differences might be related to hormonal factors (particularly estrogen), more stimuli to women (home, children, work stress, etc.), differences in pain sensitivity, as well as health-seeking behaviors [19]. Additionally, in an OPPERA cohort study of community populations in the United States published in 2013, women were more likely to develop chronic TMD [20, 21]. Several studies have shown that women are approximately three times more likely to have chronic TMD than men [9, 15, 22]. Anyway, this sexual dimorphism topic is worthy to be studied further.

It is well known that females tend to seek treatment more frequently and show more signs and symptoms of TMD than males [18, 23]. In most reports, the prevalence of jaw movement limitation symptoms was significantly different between men and women, but the prevalence of TMJ clicking and pain symptoms varied between studies [24, 25]. In a 2010–2017 longitudinal study in Sweden, based on 37,647 individuals surveyed in 2010, the incidence of self-reported jaw catching/locking was higher in women than in men (3.2% vs. 1.5%), and this relationship and magnitude remained similar throughout the study period [26]. In a study on 502 TMD patients during 2000–2002 in Vienna, females (mean age 40 ± 16 years) showed higher pain intensity, severer muscle tenderness on palpation, and lower degree of mouth opening than males (mean age 41 ± 16 years) [27]. In a 2012 comparative study of TMD symptoms in adolescents aged 6–18 years, there was no significant gender difference in symptoms except for more headache and neck pain in late adolescents aged 16–18 years [28]. A Finnish study reported in 2023 showed that headache was more common among 32-year-old adult subjects in women (odds ratio, 2.4), with no gender differences in

prevalence of TMD pain symptoms and TMJ sounds [29]. In the present study, females (mean age 30.49 ± 13.90 years) were more likely to have limitations in jaw movement than males (mean age 28.56 ± 13.26 years), which is consistent with previous reports. However, no significant difference in self-reported pain intensity and muscle tenderness on palpation was found between male and female TMD patients in the present study. Additionally, in the study in Vienna, females showed peaks of prevalence of TMD in the age group below 25 years and in the group 55–60 years, whereas males had a more even age distribution [26]. However, in the present study, the percent of TMD patients in different age group was similar in males and females, with highest percent in the 16-35Y age group. The difference may be due to the different era background and different TMD suffering population. Although it is reported that women show more pronounced pain responses to experimentally induced stimuli and also increased pain and reflex responses to glutamate application to jaw muscles than men [30–32], the real pain in natural TMD process may be different from experimental pain.

In literature, males were usually reported to have higher pain threshold and tolerance than females [33]. Interestingly, in the present study, the average age of female TMD patients was significantly higher than that of male TMD patients, and female TMD patients had a longer duration of disease before seeking care than males. This might be due to more pain experience in females than males, especially during menstrual period and child birth. Thus, females may do better at coping with pain experience. In addition, East Asian women are relatively under greater social pressure, more involved in family affairs, and less concerned about themselves, so they might come to the clinic later. The longer duration of TMD in women may also contribute to a higher prevalence group in the cross-sectional analysis.

The present study has several limitations. Firstly, the study's data reliance on single-center may lead to regional biases, impacting the generalizability of the findings. Secondly, due to economic constraints, only a small subset of patients underwent MRI assessment, and their results were not included in the statistical analysis, which may limit the full understanding of TMJ pathology. Thirdly, the retrospective nature of the study, spanning only one year, does not permit the evaluation of long-term trends or the progression of TMD over an extended period. Future research should strive to overcome these limitations by incorporating multi-center data, adding MRI assessments, and extending the study duration to investigate longer-term patterns and trends.

Conclusion

The majority of TMD patients seeking care were aged 16–35 years old, and the number of female TMD patients seeking care was about twice that of males. Female TMD patients had a longer duration of disease before seeking care and higher average age than males. Females were more likely to have limitations in jaw movement than males.

Abbreviations

TMD Temporomandibular disorders
TMJ Temporomandibular joint
MRI Magnetic resonance imaging

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Authors' contributions

QH, JZ and YS designed the main study, analysed the data and edited the manuscript. QH, GS, CX, LY, LL and ZM contributed to the data acquisition, collection and assembly. QH, ZH and ZJ wrote the manuscript. All authurs agreed to be accountable for all aspects of the work in ensuring that questions related to the accurcay or intrgrity of any part of the work are appropriately investigated and resolved.

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Availability of data and materials

The data sets from the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee of the School of Stomatology, Fourth Military Medical University (Protocol No. KQ-YJ-2023–085). The data were collected from the medical records of previous patients. Therefore, all the participants were only asked to give an oral consent (without written informed consent) before the study, which was also approved by the Ethics Committee of our school.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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