Age-Related Differences in Temporomandibular Disorder Diagnoses

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ABSTRACT: The purpose of the current study was to evaluate the pattern of age distribution of temporomandibular disorders (TMD) and to identify prevalence peaks for the different diagnoses. The study sample (N = 383; F:M ratio = 3.9; mean age range 41.7±17 years) consisted of patients seeking treatment for TMD and who were assessed in accordance with the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) version 1.0 guidelines.[1] The sample was divided into four age groups on the basis of percentile-derived intervals to compare prevalence of different diagnoses in relation to age. The pattern of clinical diagnoses changed with increasing age. The peculiar distribution of RDC/TMD axis I diagnoses, with relation to age, mainly affected the disorders trend of groups II and III, with the former decreasing with age from about 62% to 40% and the latter increasing from 75% to almost 95%. Two distinct age peaks were identified for the prevalence of the main clinical marker of group III diagnosis of arthrosis/arthritis, viz., joint crepitus sounds (N=104, mean age range 51.9±14.5), and for the prevalence of all other diagnoses in patients without joint crepitus (N=279, mean age range 37.9±16.4). The hypothesis that TMD patient populations may be composed of at least two diagnostic subgroups in relation to age, and that the presence of clinically diagnosed degenerative joint disorders may be a key discriminating factor, was supported. The external validity of the results from this investigation needs to be confirmed by multicenter and cross-cultural studies.

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Temporomandibular Disorders (TMD) represent a heterogeneous group of pathologies affecting the temporomandibular joints, the jaw muscles, or both,[2] and are characterized by a classically described triad of clinical signs: muscle and/or temporomandibular joint (TMJ) pain; TMJ sounds; and restriction, deviation, or deflection of the mouth opening path.[3] TMD are the most common orofacial pain conditions of non-dental origin, even though their actual prevalence is a matter of debate, due to the lack of homogeneity in the diagnostic criteria adopted by differing research groups.[4]

Early reviews suggest that the prevalence of TMD at the community level ranges from 1% to 75% for objective signs and from 5% to 33% for subjective symptoms.[5-7] Patient populations are mainly composed of females and, when diagnoses are standardized using the currently available reference guidelines,[1] are variably affected by muscle, joint, and combined disorders.[8] Also, it is a common statement that the age distribution of TMD patients is characterized by a Gaussian curve, with a peak between the age of 35 and 45 years and a lower preva-

lence in younger and older people.[9] Nonetheless, it has been recently suggested that the age peak is not the same for all temporomandibular disorders, with significantly different prevalence peaks for disc displacements and inflammatory-degenerative disorders.[10]

In consideration of that, the aim of the present study was to evaluate the pattern of age distribution of TMD diagnoses and to discuss data in light of the available literature on this issue.

Materials and Methods

Data of the present study was collected from 449 consecutive patients seeking treatment for TMD at the TMD Clinic, Department of Maxillofacial Surgery, University of Padova, during the period from July 1st, 2008 to June 30th, 2009. Anamnestic data gathering and clinical examinations were conducted according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) version 1.0 guidelines,[1] and by the adoption of the standard, internationally accepted Italian version of the RDC/TMD instrument available since 2002 on the RDC/TMD consortium website.[11] According to the RDC/TMD guidelines, criteria for exclusion from the study were the following: age under 18 (due to the characteristics of the RDC/TMD, the reliability of which has been tested on adult populations) and presence of polyarthritis and other rheumatic diseases. Diagnostic deepening through imaging techniques (orthopantomography, magnetic resonance, plain tomography, cone beam computerized tomography) was available to all patients.

The current study reports prevalence data of RDC/TMD axis I diagnoses, without considering the assessment of the psychological status of TMD patients, as provided by the RDC/TMD axis II. In the present investigation, all RDC/TMD examinations were conducted by one of two expert investigators. Patients were given one or more of the following diagnoses: muscle disorders (group I), disc displacement (group II) and arthralgia, osteoarthritis, and osteoarthrosis (group III) (**Table 1**).

The RDC/TMD classification system allows multiple diagnoses. Different diagnoses within each group are mutually exclusive, but it is possible to have a minimum of zero, viz., absence of any positive group I, II and III diagnoses, to a maximum of five diagnoses, viz., a group I diagnoses of muscle disorders, plus a group II and a group III diagnoses for each joint.

The mean age of different RDC/TMD axis I diagnostic groups was calculated, and the sample was divided into four groups on the basis of percentile-derived intervals within the variable *age*. A chi-square test was performed to assess for significant differences in the diagnostic patterns in relation to age. All statistical procedures were performed with statistical software SPSS 15.0 for Windows (SPSS Inc., Chicago, IL, USA).

Results

Criteria for inclusion in the study were satisfied by 383 patients, 78 of whom were men (20.4%) and 305 (79.6%) women (F:M ratio= 3.9). Mean age of the patients was 41.7±17 years (range 18-81). The percentile-derived intervals within the variable *age* were the following: 25th percentile was 28 years, 50th percentile was 39, and 75th percentile was 56.

Group A was represented by 97 patients with an age ≤28 years (mean 20.9±4.5). The distribution of the main RDC/TMD axis I diagnoses was as follows: 49 patients (50.5%) received a muscle disorders diagnosis (group I), 60 patients (61.8%) a disc displacement diagnosis (group II), and 70 (75.2%) a diagnosis of inflammatory-degenerative disorders (group III).

Group B was comprised of 97 patients with an age between 28 and 39 years (mean 34.3±3.2). Group I diagnoses were made in 55 patients (56.7%), group II in 51 patients (52.2%), and group III in 78 patients (80.4%).

Group C included 102 patients aged between 39 and 56 (mean 47.9±4.8). Group I disorders were diagnosed in 56 patients (54%), group II in 36 patients (35.3%), and group III in 92 patients (90.2%).

Group D consisted of 87 patients whose age was over 56 years (mean 65.9±6.6). Group I diagnoses were made in 52 patients (59.8%), group II in 35 patients (40.2%), and group III in 82 patients (94.2%).

Table 2 shows the distribution of each single and combined diagnoses for each different age group (chi-square, $p<0.001$).

The peculiar distribution of RDC/TMD axis I diagnoses in relation to age affects mainly the trend of groups II and III disorders, with the former decreasing with age from about 62% to 40% and the latter increasing from 75% to almost 95% (**Figure 1**). Two distinct age peaks were identified for the prevalence of the main clinical marker of group III diagnosis of arthrosis/arthritis, viz., joint crepitus sounds (N=104, mean age 51.9±14.5), and for the prevalence of all other diagnoses in patients without joint crepitus (N=279, mean age 37.9±16.4) (**Figure 2**). The mean age of the latter *no crepitus* group was not significantly different from that of the patients showing the main clinical marker for group II diagnosis of disc displacement, viz., joint click sounds (N=172, mean age 36.5±16.4). The mean age of patients with pain (N=344, mean age 42.6±16.9) was not significantly different from that of the overall sample (**Table 3**).

Table 1
RDC/TMD Criteria for Axis I Diagnoses

Group I: Muscle disorders

Ia. Myofascial pain:
- report of pain or ache in the jaw, temples, face, preauricular area, or inside the ear at rest or during function;
- pain reported by the subject in response to palpation of 3 or more of the following muscle sites (right side and left side count as separate sites for each muscle): posterior temporalis, middle temporalis, anterior temporalis, origin of masseter, insertion of masseter, posterior mandibular region, submandibular region, lateral pterygoid area, and tendon of the temporalis;
- at least one of the painful sites must be on the same side as the pain complaint

Ib. Myofascial pain with limited opening:
- myofascial pain as defined in Ia;
- pain-free unassisted mandibular opening of less than 40 mm;
- maximum assisted opening (passive stretch) of 5 or more mm greater than painfree unassisted opening.

Group II: Disc displacement

IIa. Disc displacement with reduction:
- reciprocal TMJ clicking (click on both vertical opening and closing that occurs at a point at least 5 mm greater interincisal distance on opening than closing and is eliminated on protrusive opening), reproducible in 2 of 3 consecutive trials; or
- TMJ clicking on both vertical range of motion (either opening or closing), reproducible in 2 of 3 consecutive trials, and click during lateral excursion or protrusion, reproducible in 2 of 3 consecutive trials.

IIb. Disc displacement without reduction with limited opening:
- history of significant limitation in opening;
- maximum unassisted opening ≤35 mm;
- passive stretch increases opening by 4 mm or less over maximum unassisted opening;
- contralateral excursion <7 mm and/or uncorrected deviation to ipsilateral side on opening;
- absence of joint sound or presence of joint sounds not meeting criteria for disc displacement with reduction.

IIc. Disc displacement without reduction, without limited opening:
- history of significant limitation of mandibular opening;
- maximum unassisted opening >35mm;
- passive stretch increases opening by 5 mm or more over maximum unassisted opening;
- contralateral excursion ≥7 mm;
- presence of joint sounds not meeting criteria for disc displacement with reduction;
- in those studies allowing images, imaging conducted by either arthrography or magnetic resonance reveals displacement of the disc without reduction.

Group III: Arthralgia, osteoarthritis, osteoarthrosis

IIIa. Arthralgia;
- pain in one or both joint sites (lateral pole and/or posterior attachment) during palpation;
- one or more of the following self-reports of pain: pain in the region of the joint, pain in the joint during maximum unassisted opening, pain in the joint during assisted opening, pain in the joint during lateral excursion;
- for a diagnosis of simple arthralgia, coarse crepitus must be absent.

IIIb. Osteoarthrosis of the TMJ:
- arthralgia as defined in IIIa;
- either coarse crepitus in the joint or radiological signs of arthrosis.

IIIc. Osteoarthrosis of the TMJ:
- absence of all signs of arthralgia;
- either coarse crepitus in the joint or radiological signs of arthrosis.

Discussion

The field of temporomandibular disorder practice has, for years, been one of the most controversial subjects in the dental literature, due to the peculiar and multifactorial nature of the diseases.[2] Using a nonsurgical approach to the disease is usually favorable in the majority of indivdual cases, by treating the symptoms at the muscular or articular origin.[12,13] This has led to many evidence-based claims in favor of the adoption of conservative and non-

Table 2
Prevalence of Each Single and Combined RDC/TMD Axis I Diagnoses in the Different Age Groups

Age groups	0	I	II	III	I+II	I+III	II+III	I+II+III
Group A	1	5	14	16	4	12	17	28
age≤28	1.0%	5.2%	14.4%	16.5%	4.1%	12.4%	17.5%	28.9%
Group B	4	4	8	14	3	20	16	28
age >28 ≤39	4.1%	4.1%	8.2%	14.4%	3.1%	20.6%	16.5%	28.9%
Group C	1	5	3	28	1	32	14	18
age >39 ≤56	1.0%	4.9%	2.9%	27.5%	1.0%	31.4%	13.7%	17.6%
Group D	X	2	2	20	1	30	13	19
age >56		2.3%	2.3%	23.0%	1.1%	34.5%	14.9%	21.8%

Table 3
Mean Age of the Different Clusters of Patients with Respect to the Overall Sample

Cluster of patients	Number of subjects	Mean age
Overall sample	383	41.7±17.0
Crepitus sounds	104	51.9±14.5
No crepitus sounds	279	37.9±16.4
Clicking sounds (no crepitus)	172	36.5±16.4
Pain (TMJ and/or muscles)	344	42.6±16.9

invasive therapeutic approaches.[14-16] Notwithstanding, several features characterizing the epidemiology of TMD are worthy of further investigation, particularly with regard to age-related differences in the prevalence of the different TMD diagnostic groups.

A recent paper hypothesized that two distinct age-related clusters of patients could be identified: one represented by subjects seeking TMD advice and receiving a diagnosis of disc displacement, with or without pain in the temporomandibular joint area, viz., arthralgia, and the other identified by those patients who received a diagnosis of osteoarthritis/osteoarthrosis. The two groups accounted for up to 80% of the total study sample and were characterized by a significantly different mean age (32.7 vs. 54.2).[10]

The present study, performed on a larger sample, confirmed the finding that two age peaks could be identified within a TMD patient population and suggesting that the main clinical marker for clustering patients into the twofold age-related peaks is the presence of joint crepitus sounds. The presence of signs of disc displacement, viz., joint click sounds, was not important to identify a specific age pattern in this larger sample, since patients with any RDC/TMD group II diagnoses seem to represent a subgroup of the sample constituted by all patients not showing joint crepitus sounds, with regard to the mean age. Thus, the presence of clinically diagnosed degenerative joint diseases identifies a specific age-related peak, which is significantly different from the mean age of the overall TMD sample—also suggested by the shift from a predominance of group I/II diagnoses to a strong representation of group III disorders with increased age.

The identification of such age-related patterns in a population of TMD patients, despite the fact that it may appear obvious when one considers critically the demographic features of the patients attending TMD clinics, has never been the focus of study so far, and it is worthy to be discussed in the light of common literature statements that TMD have a peak within the 35-45 years age range.[9] Such claims can only refer to TMD samples as a whole, as also confirmed by the present study, which reported a mean age around the age of 41 years for the overall sample.

Notwithstanding this, it should be remembered that TMD are different clinical entities grouped under a common umbrella term, and that achieving a deeper knowledge of the epidemiology of the different clusters

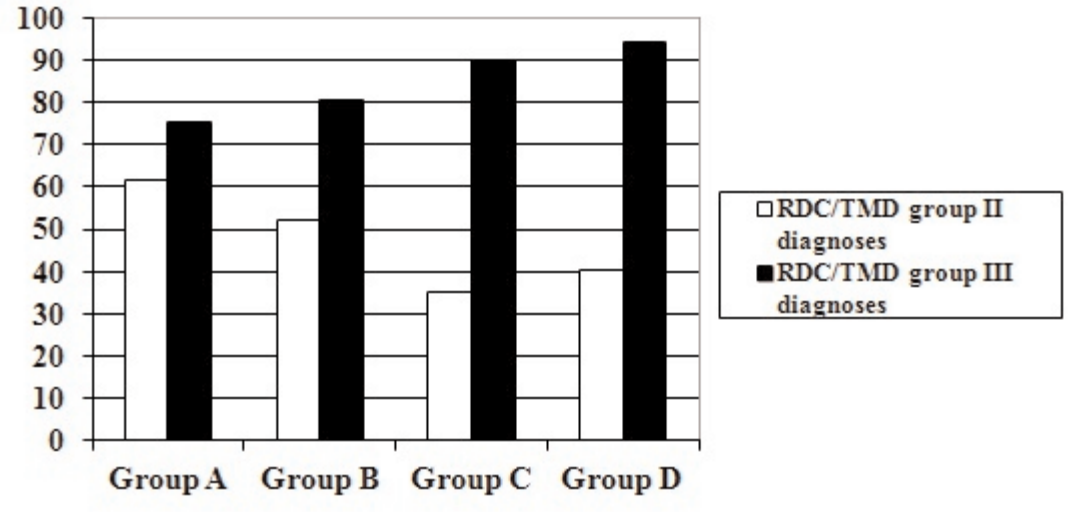

Figure 1
Bar graph showing the prevalence of RDC/TMD Axis I, Groups II and III diagnoses in the different age groups.

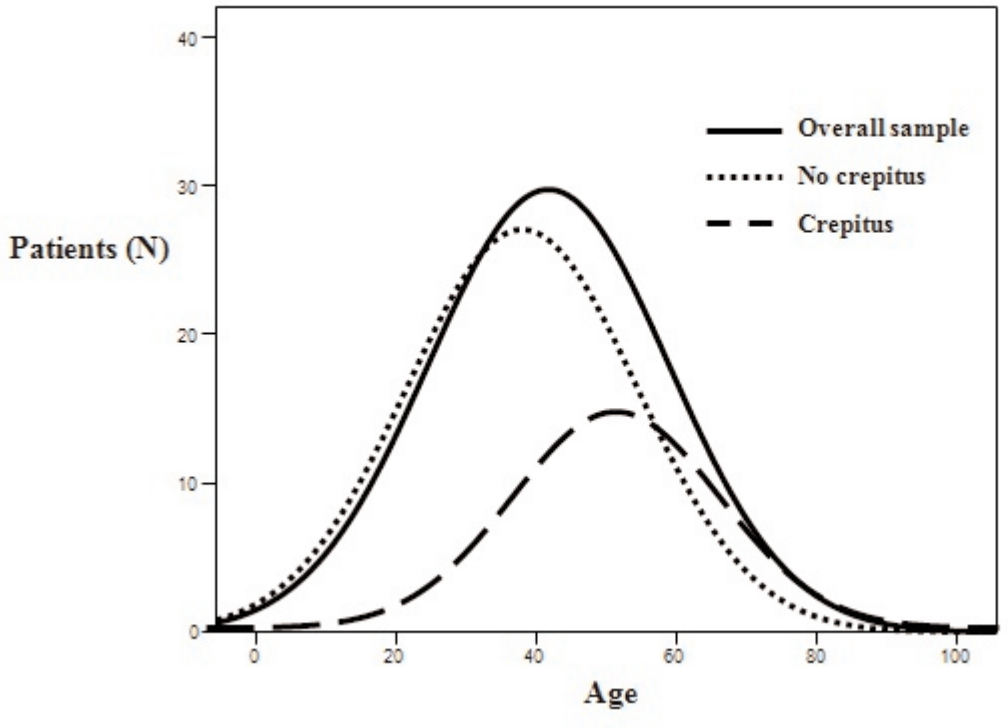

Figure 2
Graph showing the mean age of patiets with or without crepitus sounds, with respect to the mean age of the overall sample.

of symptoms may be very useful for future researchers into these disorders. Unfortunately, the literature is not conclusive on these aspects, since very few papers have addressed the issue of the prevalence of the different TMD diagnoses in relation with age.

Some early studies did not support the existence of age-related differences in either the presence of specific joint sounds nor in the prevalence of TMD as a whole.[17,18] Later studies placed such findings into discussion by research conducted on autopsy specimen, which concluded that arthrosis is more frequent in older than in younger subjects.[19] Clinically, investigations conducted at a community level showed that older subjects have a much higher prevalence of objective clinical signs, such as joint sounds, with respect to younger populations, which reported more frequently the presence of subjective symptoms, viz., pain. For instance, crepitus TMJ sounds have been reported to have a prevalence of up to 21% in geriatric populations, while they are absent in younger population subjects.[20-23] Nonetheless, no definitive reports have been published on the age-related pattern of TMD by the adoption of standardized diagnostic guidelines, and the need for acquiring a deeper knowledge on this issue should be considered in the design of future studies.

Findings from the present investigation suggest that at least two major age-clustered groups of patients may be identified in a sample of subjects asking for TMD advice. As expected, the mean age of subjects showing clinical signs of inflammatory-degenerative disorders is about 14 years higher than that of the other subjects. The presence of pain, which is the main reason for patients to seek TMD treatment, is not an important discriminant, as suggested by the absence of significant differences between the mean age of patients with pain and that of the overall sample. Thus, muscle and TMJ pain appeared to be equally distributed in relation to the age of patients and were of poor significance in detecting specific patterns of age-related TMD.

The limitations of the current study are mainly related to the single-setting recruitment and assessment of patients, which prevents generalization of findings to other cultural, social, and racial contexts. The two examiners involved in the patient assessments did not receive RDC/TMD calibration training by a gold standard examiner, but they are both examiners with years of experience in the field of TMD management and had also taken part in previous studies adopting the RDC/TMD. So the absence of examiners' calibration, as well as the use of a systematically translated version of the RDC/TMD, which is not validated yet, are unlikely to represent a diagnostic bias tempering the validity of findings.

In the current study, all patients underwent a diagnostic deepening via radiological and/or imaging techniques, but their adoption and pattern of prescription was not standardized. The strong majority of patients came to the TMD clinic at the suggestion of some other dental or non-dental specialists, and almost all of them had a baseline orthopantomography or a plain tomography prescribed by their primary care providers. Magnetic resonance imaging and computerized tomography were mostly reserved to the specialist phase. When available, and as allowed by the RDC/TMD version 1.0 for the assessment of degenerative joint disorders, radiological and imaging techniques were used to implement information gathered with the clinical assessment. Such an approach may explain the high rate of group III disorders diagnosed in this study sample, which is in line with other previous findings from our same research group[10] and also with results from studies adopting imaging diagnosis for epidemiological purposes.[24,25] Thus, the role of imaging techniques in the diagnostic process of TMJ disorders should be better standardized in order to ease comparison of data among different studies. Considering this, the age-related patterns of diagnoses distribution in this study sample were based on clinical assessment alone in order to try and minimize bias related to a possible radiological over-diagnosis of joint disorders. In the near future, analysis of data from ongoing multicenter investigations,[26] and from studies adopting the revised version of the RDC/TMD guidelines,[25,27] is a compelling need to confirm or refute hypotheses drawn from the present study. However, it seems logical to suggest that the literature in the TMD field may benefit from a more specific indication of each single clinical entity and from the avoidance of the generic term TMD to identify such heterogeneous patient populations.

Conclusions

The present investigation provided support to the hypothesis that TMD patient populations may be composed of at least two diagnostic subgroups in relation to age, and that the presence of clinically diagnosed degenerative joint disorders could be a key discriminating factor. Two age peaks in the prevalence of TMD, one around the age of 52 for patients with joint crepitus and one around the age of 38 for those without joint crepitus were identified. Such findings suggested that a better specification of the TMD diagnoses and the avoidance of generic statements in relation to the demographic features of TMD populations are of much importance to gain a better insight into the epidemiology of such disorders. The external validity of the results from this investigation

need to be supported by multicenter and cross-cultural investigations.

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