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## **TMJ & its role in prosthodontia: A systematic review**

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**Abstract**---Aim The aim of this systematic review was to evaluate importance of TMJ and assessing the prevalence of temporomandibular joint disorders (TMJD) among the general population. Methodology Five main electronic databases and three grey literature were searched to identify observational studies in which TMJD was diagnosed using the research diagnostic criteria (RDC/TMD) or diagnostic criteria (DC/TMD). The studies were blindly selected by two reviewers based on eligibility criteria. Risk of bias

(RoB) was assessed using the Joanna Briggs Institute Critical Appraisal Checklist, and the “R” Statistics software was used to perform meta-analyses. Results From 2741 articles, 21 were included. Ten studies were judged at low RoB, seven at moderate, and four at high. The TMJD investigated were as follows: arthralgia, disk displacement (DDs) with reduction (DDwR), DDwR with intermittent locking, DDs without reduction (DDwoR) with limited opening, DDwoR without limited opening, degenerative joint disease (DJD), osteoarthritis, osteoarthrosis, and subluxation. The main results from prevalence overall meta-analyses for adults/elderly are as follows: TMJD (31.1%), DDs (19.1%), and DJD (9.8%). Furthermore, for children/adolescents are as follows: TMJD (11.3%), DDs (8.3%), and DJD (0.4%). Considering the individual diagnosis meta-analyses, the most prevalent TMJD is DDwR for adults/elderly (25.9%) and children/adolescents (7.4%). Conclusion The overall prevalence of TMJD was approximately 31% for adults/elderly and 11% for children/adolescents, and the most prevalent TMJD was DDwR.

**Keywords**---Temporomandibular disorder. Temporomandibular joint. Prevalence. Evidence-based dentistry.

## Introduction

Temporomandibular joint (**TMJ**) is a complex joint anatomically and functionally. It is a bilateral, feely movable hinge type of joint, joint is formed by temporal fossa and condyle of mandible, it exhibits two types of movements, rotatory and translatory, there is corelation between occlusion and **TMJ**. Temporomandibular disorders (TMDs) are a heterogeneous group of conditions affecting the TMJs, the jaw muscles, and related structures.<sup>1-6</sup> They have a multifactorial cause, with an interaction of systemic, psychosocial<sup>7</sup>, genetic<sup>8,9</sup>, trauma-related<sup>10</sup>, hormonal<sup>11</sup>, neurological<sup>12-14</sup>, and anatomic or facial morphology factors.<sup>15-18</sup> The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) are employed to diagnose patients. The DC/TMD protocol comprises two domains: a physical domain in Axis I (clinical condition) and a psychosocial domain in Axis II (psychosocial distress).<sup>19</sup> The clinical examination for Axis I diagnostics requires pain history, assessed by a questionnaire, and a well-defined and structured clinical examination. The criteria for DC/TMD Axis I comprise TMJ arthralgia, masticatory muscle myalgia, headache attributed to TMD, degenerative joint disease, and TMJ disc displacements. DC/TMD Axis II assesses the patient's psychosocial function and distress as well as pain-related disability. Axis II is based on validated instruments (questionnaires) and interpretation guidelines. It includes instruments for assessing pain behavior, jaw function, and psychosocial functioning and distress. Several papers suggested that the relationship between TMDs and dental occlusion is weak.<sup>20,21</sup> Nevertheless, patients with TMD symptoms often need a prosthetic treatment, including partial edentulism, esthetic deficiencies, or functional problems.<sup>21,22</sup> Those patients should be managed carefully after a detailed evaluation.<sup>21-23</sup> Different studies introducing iatrogenic changes to dental occlusion reported some interesting considerations.<sup>20,21</sup> Furthermore, as far as bruxism is concerned, several

systematic reviews analyzing implant-supported restorations suggest that bruxism may be associated more with mechanical than biological causes.<sup>24-27</sup>

### **Aim Of The Present Study**

The aim of this systematic review was to evaluate importance of TMJ and assessing the prevalence of temporomandibular joint disorders (TMJD) among the general population.

### **Materials And Methodology**

#### **Search strategy**

This systematic review was elaborated according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis checklist (PRISMA). Inclusion criteria consisted of cross-sectional studies that evaluated the prevalence of TMJD among general population. Also, TMJD should be assessed through RDC/TMD or DC/TMD. No restrictions regarding participant's age, sex, and language of publication were applied. Painful and non-painful TMD were accepted. The types of TMJD considered in this study were arthralgia, disk displacements (DD), and degenerative joint disease (DJD). All primary studies should start with patients in the general population, who had no signs or symptoms of orofacial pain or who already had a diagnosis of TMD. The exclusion criteria encompassed the following: (1) studies that did not use RDC/TMD (studies published before 1992) or DC/TMD, or studies that modified the tool; (2) studies with duplicated data from another included study; (3) studies focused on the following patients: with full prosthesis, orthodontic treatment, athletes, pregnant, obese, musician, postmenopausal women, and full or partial edentulous; (4) studies focused on samples of patients with comorbidities. An electronic search strategy was developed for PubMed and adapted for each of the following bibliographic databases: EMBASE, Latin American and Caribbean Health Sciences (LILACS), Scopus, and Web of Science. A partial grey literature search was also performed on Google Scholar, Open Grey, and ProQuest. The Google Scholar search was limited to the first 100 most relevant articles published in the last 10 years. The prevalence of TMJD was expressed by means of relative or absolute frequencies and its 95% confidence intervals (95% CI). A meta-analysis was performed to assess the overall pooled prevalence of TMJD. Furthermore, additional meta-analyses were conducted to assess the pooled prevalence of TMJD considering individually diagnosis. The confidence interval of individual studies was estimated using the Clopper-Pearson interval. For analysis of statistical heterogeneity, the following parameters were calculated: Cochran Q ( $\chi^2$ ), I-squared ( $I^2$ ), Tau-squared ( $\tau^2$ ), and the prediction interval. Moreover, the  $\tau^2$  was calculated through the restricted maximum likelihood method.

### **Results**

Following a systematic literature search, a total of 3769 articles were found in main electronic databases and 452 studies were selected from grey literature and reference list. After duplicates had been removed, 2741 records remained for title and abstracts screening (phase 1). Subsequently, 145 studies were considered

eligible to be fully assessed. After full-text reading (phase 2), 124 studies were excluded and 21 were finally included for qualitative and quantitative synthesis. (Table 1) The 21 studies on general populations accounted for a total of 11,535 subjects (10,743 to RDC/TMD and 792 to DC/TMD) (6099 women; 4078 men, 1358 unspecified gender; female to- male ratio 1.5) with a mean age ranging between 7 and 75 years. The studies were divided between RDC/TMD (17 studies) and DC/TMD (4 studies) and also between children/adolescents (aged 7 to 19 years) and adults/elderlies (aged 20 to 75). Most studies were judged at low risk, seven studies at moderate risk, and four at high risk of bias. There was a high heterogeneity between the studies in the meta-analyses because of the variability between the characteristics of the sample, methodological heterogeneity and risk of bias, therefore, a random effect was considered. The overall prevalence of TMJD for adults/elderlies was 29.3% for RDC/TMD, 38.8% for DC/TMD, and 31.1% for the grouped criteria (RDC + DC). While for children/ adolescents was obtained 11% for the RDC/TMD and only one study used DC/TMD in children/adolescents, so it was not possible to do a meta-analysis with this group. The overall prevalence for the DD group, in adults/elderlies, was 12.9% for RDC/TMD, 37.1% for DC/TMD, and 19.1% for the grouped criteria (RDC + DC). For children/ adolescents, a prevalence of 8.3% was obtained for the RDC/TMD. Finally, the overall prevalence for the DJD group, in adults/ elderlies, was 17.4% for RDC/TMD, 5.2% for DC/TMD, and 9.8% for the grouped criteria (RDC + DC). For children/ adolescents was obtained 0.4% for RDC/TMD. The most prevalent individual diagnosis was DDwR, for adult/elderly, both in the RDC/TMD (19.8%) and in the DC/TMD (33.2%). Likewise, DDwR was also the most prevalent diagnosis in children/adolescents assessed by the RDC/ TMD (7.4%). (Table 2)

## Discussion

Patients with TMD symptoms are present over a large age range, appearing to be quite common among children and adolescents. Yet, a higher prevalence is seen in young and middle-aged adults, with a peak of occurrence between 20 and 40 years of age, corroborating our findings that adults/elderlies have a higher prevalence of TMJD (31.1%) than children/adolescents (11.3%). The results for overall arthralgia in this systematic review were 7%, a higher prevalence when compared to the 2.6% prevalence found in a previous systematic review. This prevalence increased, possibly, due to the fact that more studies were included evaluating this condition; moreover, this increase in prevalence was already expected and suggested in previous systematic reviews<sup>28</sup>, due to the creation of new diagnostic criteria. New instruments have been added to the DC/TMD, such as the diagnostic algorithms for arthralgia, which include criteria for modification of pain by function, movement, or parafunction. Additionally, the clinical examination for arthralgia includes provocation tests of pain with any jaw movement and new sites for TMJ palpation.<sup>29</sup> According to the included studies, the prevalence of TMJD in adults/elderly shows that DDwR is the most prevalent (25.9%) individual diagnosis, regardless of the diagnostic criteria, in agreement with results of previous studies. Nevertheless, in a previous systematic review<sup>28</sup>, which was used only RDC/TMD, a lower prevalence was found (11.4%) due to the smaller number of articles and patients affected by the condition. Regarding to prevalence of TMJD, considering individual diagnoses, it was observed the lowest rates for DDwoR, regardless diagnostic criteria. In addition, in the RDC/TMD for

children/adolescents, there were more categories with low prevalence, such as osteoarthritis and osteoarthrosis. The distribution pattern of these diagnoses seems to suggest that these disorders are more unusual than other conditions in the general population. Furthermore, the DD is commonly false negative diagnosis, since this clinical sign many times has to be confirmed by imaging tests. Therefore, dental surgeons must be aware of the relatively high rates of some specific types of TMJD that can affect the general population, especially in adults. When discussing this with the patients, appropriate strategies for early and correct diagnosis and, if need be, accurate management should be considered.

### **Conclusion**

The overall prevalence of TMJD was approximately 31% on adults/elderly and 11% for children/adolescents. Furthermore, the most prevalent TMJD is DDwR, approximately 26% in adults/elderly and 7.5% in children/adolescents.

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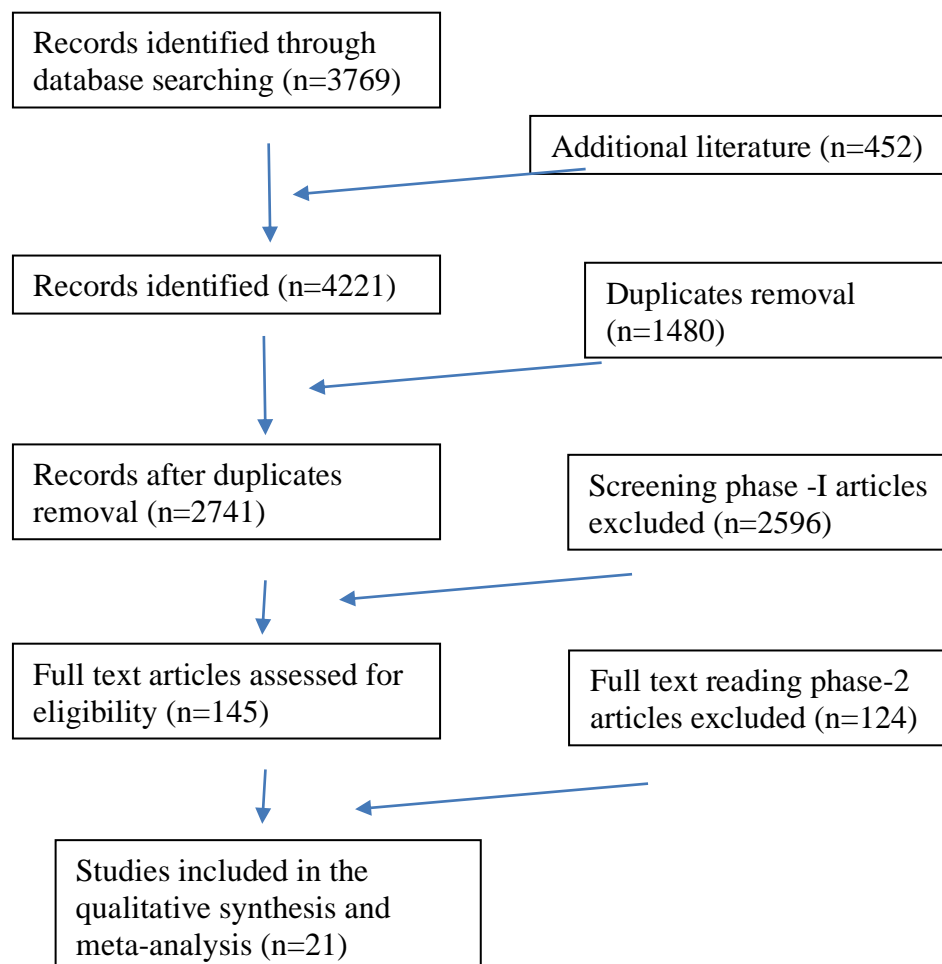
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## TABLES

**Table 1- Flowchart of the process of literature search and selection**





**Table 2-**  
**Summary of prevalence of temporomandibular joint disorders from meta-analyses**

<b>Meta-analyses</b>	<b>RDC/TMD Prevalence (%) (95% CI) (I2) (<math>\tau^2</math>) (p.i.) (n)</b>	<b>DC/TMD Prevalence (%) (95% CI) (I2) (<math>\tau^2</math>) (p.i.) (n)</b>	<b>RDC/TMD and DC/TMD Prevalence (%) (95% CI) (I2) (<math>\tau^2</math>) (p.i.) (n)</b>
Adults and elderlies Overall - any joint diagnosis	29.3% (6.1–72.3) (99) (5.1) (0.0–99.7) (6)	38.8% (21.9–58.9) (93) (0.3) (NE) (2)	31.1% (10.6–63.3) (99) (3.6) (0.3– 98.4) (8)
Overall - disk displacements	12.9% (5.0–29.5) (97) (1.6) (0.3–87.1) (6)	37.1%(25.5–50.4) (89) (0.2) (0.0– 99.8) (3)	19.1%(9.4–34.9) (98) (1.5) (1.0–83.8) (9)
Overall - degenerative joint disease (osteoarthritis and osteoarthrosis)	17.4% (2.0–68.1) (97) (4.0) (0.0–100) (3)	5.2% (0.5–35.8) (97) (3.9) (0.0–100) (3)	9.8% (2.2–34.3) (96) (3.6) (0.0–97.1) (6)
Children and adolescents Overall - any joint diagnosis	11.3% (7.6–16.4) (96) (0.4) (2.3–40.4) (11)	-	-
Overall - disk displacements	8.3% (5.2–13.0) (97) (0.5) (1.3–37.1) (10)	-	-
Overall - degenerative joint disease (osteoarthritis and osteoarthrosis)	0.4% (0.2–0.9) (0) (0) (0.0–2.5) (4)	-	-

\* RDC/TMD, research diagnostic criteria for temporomandibular disorders; DC/TMD, diagnostic criteria for temporomandibular disorders; CI, confidence interval;  $I^2$ , I-squared;  $\tau^2$ , tau-squared; p.i., prediction interval; n, number of articles; NE, not estimable (a minimum of 3 studies per meta-analysis is required); not reported or without enough studies to group into a meta-analysis