

ORIGINAL RESEARCH



Association between Tooth Loss and Degree of Temporomandibular Disorders: A Comparative Study

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ABSTRACT

Objective: The aim of this study was to evaluate the association between tooth loss and the signs and symptoms of temporomandibular disorders (TMDs).

Materials and methods: One hundred fifty patients with an average age of 49.2 (± 14.06) years were divided into three groups ($n=50/\text{group}$) according to the degree of tooth loss: GI (dentate – control), GII (edentulous), GIII (partially dentate). After performing anamnesis and clinical examination, a questionnaire was used, so that the patients could fill in information on signs and symptoms of TMD. After analyzing this information, it was possible to classify the degree of severity of TMD. As age is a confounding variable to the level of TMD, an analysis of covariance (ANCOVA) was used to check for differences in the degree of TMD between groups (covariate = age). A *post hoc* test (Bonferroni) was performed to compare the groups two by two (5% significance level).

Results: The mean level of TMD according to the groups was GI – 1.95; GII – 2.15; GIII – 2.55. There were significant differences between the study groups ($p > 0.05$). A *post hoc* test (Bonferroni) confirmed the difference between edentulous patients and the other groups.

Conclusion: The tooth loss is directly related to the signs and symptoms of TMD. The degree of TMD was significantly higher in edentulous patients.

Keywords: Edentulism, Signs and symptoms of TMD, Temporomandibular disorders.

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INTRODUCTION

Temporomandibular disorders (TMDs) comprise a number of clinical disorders involving the masticatory muscles, temporomandibular joints (TMJ), and associated structures; they cause a series of changes that may compromise the adequate functioning of the various components of the stomatognathic system.¹

Temporomandibular disorders manifest themselves in various ways, and have different signs and symptoms causing a great impact on the individuals' quality of life²⁻⁴ and may imply a negative effect on their social and even emotional function. They are basically characterized by certain signs and symptoms, such as pain or sensitivity in the region of the chewing muscles or TMJ, abnormal noise during movements of the jaw, headache, and neck pain, limitation or incoordination of movements, and incorrect relationship between jaw positions.¹ Psychosocial factors and chronic pain has been associated with the severity of symptoms of TMDs, and also multiple psychological factors have been implicated as risk factors for the development of TMDs.⁵

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Among the musculoskeletal and rheumatic disorders that manifest with pain symptoms, TMD appear with high prevalence.⁶ It is the leading cause of nondental pain in the maxillofacial region, which may occur at any age, being more frequent in individuals of 13 to 35 years of age, with a higher prevalence in women than in men.^{2,7}

The literature shows that in the case of absence of the posterior teeth, and patients who have lost all of their teeth using complete dentures, the possibility of degenerative changes and the development of temporomandibular dysfunctions^{3,8,9} increases. When one loses the support of natural teeth, especially the molars, an overload of forces is created, where the same shall overcome the resistance of interarticular soft tissues. This imbalance of occlusal and masticatory forces, which was previously supported by the teeth, results in a decrease of tissue homeostasis, resulting in an increased possibility of developing TMD.^{10,11}

The importance of the association between totally and partially edentulous patients and TMDs lies in the fact that this type of patients lose the occlusal stability and the vertical dimension of occlusion and it is followed by the appearance of changes in TMJs.¹⁰⁻¹² The study of the association between occlusal disharmony caused by TMDs and dental losses increasingly gains more importance, as these analyses are able to contribute to better diagnosis and treatment. Thus, the aim of this study was to evaluate the severity of signs and symptoms of TMDs in totally edentulous patients and bilateral posterior edentulous (Kennedy Class I).

MATERIALS AND METHODS

A sample of 150 patients was selected regardless of gender and age of ≥30 years, considering the following inclusion criteria: patients who agreed to participate in the study, signing an informed consent form, and had not been diagnosed or were being treated for TMD. These patients have shown no systemic disease such as rheumatoid arthritis and not having undergone a TMJ or facial surgery.

The sample was divided into three groups of 50 patients each, GI: dentate patients; GII: edentulous patients; GIII: partially edentulous patients (Kennedy class I).

All patients were submitted to anamnesis and thorough clinical examination. A history questionnaire (proposed by Fonseca¹³ and adapted by Mollo Jr et al¹⁴) was applied without interference from the examiner, with 10 questions about signs and symptoms related to TMD (Box 1):

Among the possible answers, there were three alternatives: “yes,” “sometimes,” or “no” that correspond

Box 1: Questionnaire used to evaluate the degree of TMD

1. Do you have difficulty opening the mouth?
2. Do you have difficulty moving your jaw sideways?
3. Do you feel discomfort or muscle pain when chewing?
4. Do you feel headaches often?
5. Do you feel pain in the neck and/or shoulders?
6. Do you feel pain in the ear or close to it?
7. Do you notice any noise in the TMJ?
8. Do you use only one side of your mouth to chew?
9. Do you feel pain in the face when you wake up?
10. Do you consider yourself an anxious person?

to the values 2, 1, 0 respectively. For questions 6 and 7, if the symptoms were bilateral, an extra “1” point should be added to the total value; in question 4, “1” point was added when pain, besides frequent, was intense.

From these values, a classification of the severity of TMD was presented by patients in accordance with the rates summarized in Table 1.

A descriptive analysis of TMD severity and frequency of the most frequent parafunctions was first performed. An analysis of covariance (ANCOVA) was applied to check for differences in TMD severity degree between groups if the patients presented the same average age. A *post hoc* test (Bonferroni test) was performed to confirm the differences between the groups.

The statistical software used was Statistical Package for the Social Sciences (SPSS) version 19.0 (IBM, Armonk, NY). In all tests, the level of significance was 5%.

RESULTS

Regarding the degree of severity of TMD, it was verified that 18.7% had no TMD; 46.7% of patients experienced mild TMD; 28.7% had moderate TMD; and 6.0% had severe TMD (Graph 1). Table 2 summarizes the frequency of TMD degrees of severity according to the group of patients studied.

The results showed that among the symptoms of TMD found, the most common were patients who considered themselves anxious people (54%), patients who reported to use only one side for chewing (68%), and patients who reported using only one side to chew and perceived noise in TMA (54%), respectively for respondents from the

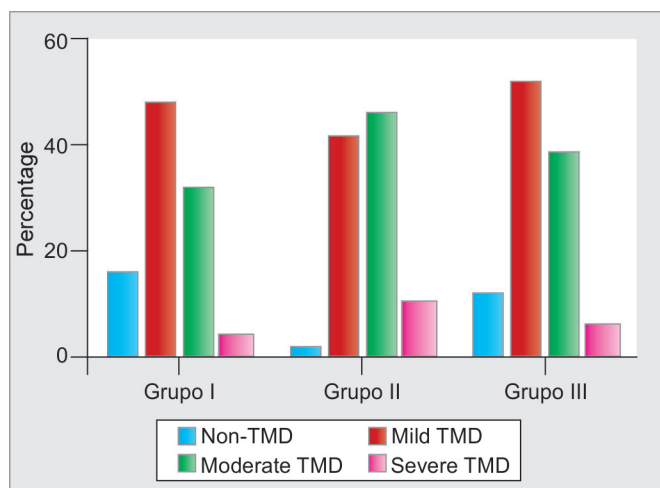
Table 1: Classification of temporomandibular disorders according to the history questionnaire

| Clinical index | TMD severity | Degree |
|----------------|----------------------|--------|
| 0–3 | Non-TMD patient | 1 |
| 4–8 | Mild TMD patient | 2 |
| 9–14 | Moderate TMD patient | 3 |
| 15–23 | Severe TMD patient | 4 |

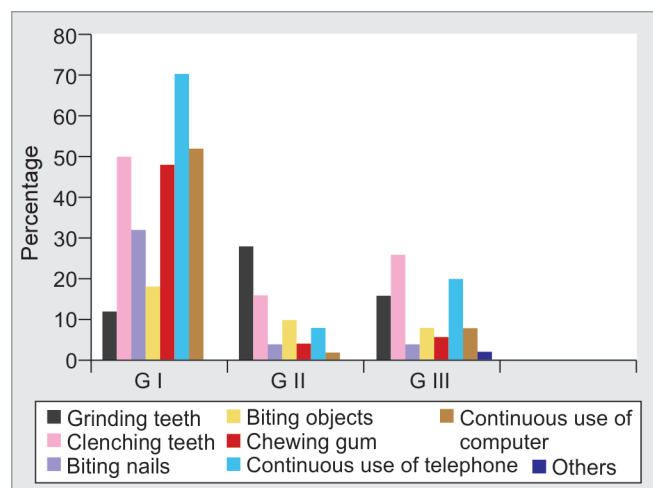


Table 2: Frequency of temporomandibular disorder severity degrees according to the patient groups

| | TMD severity degree | | | | Total |
|----------------------|---------------------|------------|------------|-----------|--------------|
| | Non-TMD | Mild | Moderate | Severe | |
| Dentate patients | 15 (30.0%) | 22 (44.0%) | 11 (22.0%) | 2 (4.0%) | 50 (100.0%) |
| Totally edentulous | 3 (6.0%) | 23 (46.0%) | 19 (38.0%) | 5 (10.0%) | 50 (100.0%) |
| Partially edentulous | 10 (20.0%) | 25 (50.0%) | 13 (26.0%) | 2 (4.0%) | 50 (100.0%) |
| Total | 28 (18.7%) | 70 (46.7%) | 43 (28.7%) | 9 (6.0%) | 150 (100.0%) |



Graph 1: Temporomandibular disorder severity among the studied groups



Graph 2: Most frequent parafunctional in the studied experimental groups

groups GI, GII, and GIII. Parafunctional habits found for patients of all groups are shown in Graph 2.

The mean (standard deviation) age according to groups: Dentate patients, 35.6 (3.32) years; totally edentulous, 59.8 (12.5) years; partially edentulous, 52.26 (11.0) years. As age is a confounding variable in the degree of TMD, an ANCOVA was performed to determine whether there was any difference between TMD severity score between groups if age was maintained constant, that is, if the average age of the groups was the same. Descriptive statistics (Table 3) shows that the adjusted average of TMD severity degree was higher in edentulous patients. The result of the ANCOVA showed significant differences between the study groups ($F=4.249$; $p=0.016$). A *post hoc* test (Bonferroni) confirmed the difference between the group of totally edentulous patients and the other groups (Table 4).

DISCUSSION

This study sought to establish the relationship between tooth loss and the severity of TMD from collecting the data obtained from the application of a history questionnaire. Dentate and partially edentulous patients had statistically similar TMD index, while the comparison of edentulous patients with the other groups showed a statistically significant difference.

The mild TMD was found in 44 and 52% in totally edentulous and partially edentulous patients respectively,

Table 3: Adjusted averages of temporomandibular disorders degree of groups with the respective standard errors and confidence interval of 95%

| Group | Mean | Std. error 95% confidence interval | |
|----------------------|-------|------------------------------------|-------------|
| | | Lower bound | Upper bound |
| Dentate patients | 1.951 | 0.145 | 1.666 2.237 |
| Partially edentulous | 2.151 | 0.114 | 1.925 2.377 |
| Totally edentulous | 2.558 | 0.133 | 2.295 2.820 |

Table 4: Comparison between groups using Bonferroni's test

| Group | Group | p-value |
|----------------------|-----------------------|---------|
| Dentate patients | Partially edentulous | 0.917 |
| | Totally edentulous* | 0.025 |
| Partially edentulous | Dentate patients | 0.917 |
| | Totally edentulous* | 0.048 |
| Totally edentulous | Dentate patients* | 0.025 |
| | Partially edentulous* | 0.048 |

while dentate patients presented a rate of 48%. In the moderate and severe TMD, there was a greater increase for patients GII (46 and 8%), when compared with GIII (30 and 6%), and GI (32 and 4%) groups. These results are similar to those found in the literature.^{12,15}

Shibayama et al¹⁶ in a study using 240 individuals, divided into three groups according to the edentulism, observed a higher prevalence of absence of TMD in the group of totally edentulous patients (62.2%) when compared with partially edentulous and dentate (32.5 and 5.2%). This was contrary to the results found in this

research, wherein the group of totally edentulous patients had a lower incidence of absence of TMD (2%), followed by partially edentulous and dentate (12%; 16%). In totally edentulous group, the presence of old dentures with occlusal changes and mismatches could mean a greater probability of TMDs, but the literature shows a weak association between the conditions of the dentures and the appearance of TMDs.¹⁰ Yet another study⁹ showed an increase of TMDs with the increase of the time of use of dentures. In the case of partially edentulous patients, literature shows that the lack of posterior teeth increases the prevalence of TMDs especially in female patients.^{8,17,18} These results were not found in this study. The literature also shows that in cases of partially edentulous patients with TMD, the prosthetic treatment should be performed only after the pain relief and control of TMD.¹⁹

It was observed that the partial edentulous patients had mostly mild TMD (52%), only 6% had severe TMD, and 30% had moderate TMD. It was found that patients with severe and moderate TMD usually had no prostheses that can be good to treat the TMD in part.²⁰

Other authors¹⁴ studied 100 edentulous individuals, where symptoms such as noise in the joint and the use of only one side to chew appeared more frequently, coinciding with the results of this study, which were similar between analyzed groups. The association between total and/or partial tooth loss and TMD has shown to be inconclusive when established the cause/effect relation, as TMD signs and symptoms occur in healthy people, increasing with age.

Some habits, such as clenching or grinding teeth, chewing gum, nail biting, biting objects, and continuous use of telephone and computer were reported by participants in the research. Another study reports that when bad habits are present, they can cause pain and decreased coordination of the affected muscles, so the parafunctional habits may be sufficient to cause the appearance and development of TMDs.^{20,21}

CONCLUSION

Symptoms, such as the use of only one side for chewing, TMJ noises, and considering oneself an anxious person were the most prevalent. Habits such as chewing gum, continuous use of the computer, phone, and symptoms, such as clenching teeth were the most mentioned ones.

It was possible observing a direct relation between the total tooth loss and degree of TMD.

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