

## Evaluation of Association between Dietary Habits and Temporomandibular Joint Disorders

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### ABSTRACT

Temporomandibular joint disorders (TMD) are often characterized by impaired function of the Temporomandibular joint (TMJ) and the associated neuromuscular system, which often leads to TMD-related pain. It involves a group of clinical conditions affecting the masticatory muscles, TMJ and other associated structures such as capsule and articular discs. Chewing and dietary habits are often considered as the factors stimulating the onset of TMD with many TMD patients complaining of pain around the area of TMJ following the intake of hard foods. The aim of this study was to evaluate the association of dietary habits of patients with temporomandibular joint disorders (TMD) and its effects on the development of TMD. This retrospective study was conducted by reviewing the case records of 86,000 dental patients reported to Saveetha Dental College and Hospital, Chennai, India from June 2019 to March 2020. About 104 cases were included in the study by a simple random sampling method. These included 52 patients with temporomandibular disorder, and 52 patients without temporomandibular disorder. Patient's name, patient's identification number (PID), age, gender and dietary habits were collected from the patients' case records. Data collected were analyzed using the SPSS version 23.0 and results obtained. Descriptive analysis was done, and categorical variables were expressed in frequency and percentage. Chi square test was used to evaluate the association between dietary habits and TMD.  $P$  value  $< 0.05$  was considered statistically significant. Majority of the patients were on a mixed diet (65.38%) and the rest of them were vegetarian (34.62%). Prevalence of TMD was seen slightly higher in males (51.92%) compared to females (48.08%). Most of the TMD cases were observed in individuals within the 31-40 years age group (46.15%). A statistically significant association was present between dietary habits and TMD [ $p=0.039$  ( $<0.05$ )]. Within the limits of the present study, temporomandibular disorders (TMD) showed higher predilection in males, within 31-40 years of age and in mixed diet patients. The association between dietary habits and temporomandibular joint disorders were statistically significant.

**Keywords:** Diet, Food habits, Temporomandibular disorders, Temporomandibular joint

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### INTRODUCTION

The ability of temporomandibular joints (TMJ) to function properly highly depends on the balance and harmony of the different structures of TMJ such as condyles, glenoid fossa and ligaments [1]. Any distortion to the normal structure of TMJ by external factors such as psychological factors and habits may lead to the impairment of TMJ function. The ability of the human body to

recover helps to repair any damage to the TMJ and prevent its progression but if this condition persists beyond the ability for repair, the body will lose its ability to recover and eventually leads to the development of severe conditions such as temporomandibular joint disorders (TMD) with various signs and symptoms [2].

It has been reported previously that the prevalence of temporomandibular joint and muscle disorder varies between 5% and 12% with higher incidence of TMD observed in younger individuals which was considered unusual for chronic pain conditions [3]. In terms of gender, it is reported that the prevalence of

TMD in females is at least twice that of males with higher risk seen in females who consume supplemental estrogen or oral contraceptives. Similarly, a recent study also reported that TMD accounts for 25% of the population with up to 11% in chronic pain [4]. TMD is considered as the second most common chronic pain condition with a prevalence of 5% to 12% in the general population and only musculoskeletal lower back pain has a greater prevalence [5].

Temporomandibular joint disorders (TMD) are often characterized by impaired function of the TMJ and the associated neuromuscular system, which often leads to TMJ-related pain [2,6]. It involves a group of clinical conditions affecting the masticatory muscles, TMJ and other associated structures such as capsule and articular discs [6-8]. Various etiologies are described in the study of TMD such as trauma, systemic factor, iatrogenic factor, and mental health disorders [9-15]. Previous studies suggested morphologic malocclusions and parafunctional habits as part of the causes of TMD [16,17]. It has also been reported that psychosocial functioning, stress, depression, and multiple somatic symptoms may lead to the development of TMD [2,6,18].

Chewing and dietary habits are often considered as the factors stimulating the onset of TMD [19-23]. Various cases of TMD have reported on patient's complaints of pain around the area of TMJ following the intake of hard foods [24]. Others studies have mentioned that the texture and hardness of foods may affect the movement of TMJ and influence the level of masticatory muscle activity [19-21]. Prolonged mastication of hard foods may result in masseter muscle pain, impaired masticatory laterality, and displacement of the mandibular condyle over period [23,25-27].

TMD are often characterized by numerous signs and symptoms such as musculoskeletal orofacial pain, TMD pain or both, which can be observed in all populations [28,29]. Other studies also mentioned the presence of orofacial and preauricular pain, as well as restricted mouth opening, TMD bruit during function and displacement of articular disc as some of the signs and symptoms of TMD. Orofacial pain may affect the daily activities of an individual with TMD, particularly in terms of psychological condition which further leads to chronic pain

and improper eating disorder [30-32]. The presence of TMD along with impaired eating habits and psychological problems faced by an individual may increase the severity of the initial condition. It is important to evaluate the association between TMD signs and symptoms and the ability of a TMD patient to consume food to understand the level of impairment experienced by an individual with TMD [33].

One of the common concerns of individuals with TMD is a change in their diet, which affects the quality and quantity of the food that they consume in order to minimize the pain associated with TMD [34-38]. Many TMD patients have also reported on the intake of medication to reduce TMD symptoms such as pain and discomfort, along with the consumption of soft foods such as porridge and soup, which require less chewing in order to reduce the severity of TMD pain [39-41]. However, most of the TMD patients tend to focus solely on the food texture instead of the nutritional contents of the food that they consume, which eventually leads to other health problems such as improper digestion, weight gain or loss, lack of energy and mental health problems [34,37,42,43]. If these conditions persist over a period, an individual with TMD may experience bigger problems involving their overall health and quality of life [8,44,45]. This study was done to evaluate the association of dietary habits of individuals with TMD and its effects on the development of TMD.

## MATERIALS AND METHODS

### Study design and study setting

This retrospective cross-sectional study was conducted in Saveetha dental college and hospital, Saveetha university, Chennai, to evaluate the association between dietary habits and temporomandibular joint disorders among dental patients reporting to outpatient department of oral and maxillofacial surgery from June 2019 to March 2020. The study was initiated after approval from the institutional review board.

### Study population and sampling

Among 86000 dental patients reported to our institution from June 2019 to March 2020, about 104 cases were included in the study by a simple random sampling method to minimise sampling bias. These included 52 patients

with temporomandibular disorder, and 52 patients without temporomandibular disorder. All missing or incomplete data, nutritionally debilitated patients and patients with severe systemic illnesses were excluded from the study. Each patient's dental records, treatment reports and photographs were reviewed thoroughly. Cross verification of data for errors was done with the help of an external examiner.

**Data collection and tabulation**

A single calibrated examiner evaluated the digital case records of the patients collected from June 2019 to March 2020 who reported with and without TMJ disorders and reviewed their dietary habits. Information on the patients' name, age, gender, dietary habits and presence of TMD were collected from the patients' case records. Age of the patients were categorized for statistical convenience as 11-20, 21-30, 31-40, 41-50 and 51-60. Patients' dietary habits were classified into a mixed diet and vegetarian diet.

**Statistical analysis**

The collected data was validated, tabulated and analysed with Statistical Package for Social Sciences for Windows, version 23.0 (SPSS Inc., Chicago, IL, USA) and results were obtained. Descriptive analysis was done to assess the prevalence of TMD in different age groups and gender. Categorical variables were expressed in frequency and percentage, and continuous variables in mean and standard deviation. Chi-square test was used to test association between dietary habits and TMD. P value < 0.05 was considered statistically significant.

**RESULTS AND DISCUSSION**

In our study, among 104 patients, there were an equal number of patients with TMDs (n=52) and without TMDs (n=52). Our study showed that the prevalence of TMD was slightly higher in males (51.92%) compared to females (48.08%) (Figure 1). Most of the cases with TMD in our study are seen in individuals within the 31-40 years age group (46.15%) while those within the 51-60 years age group showed the least prevalence for TMD (7.69%) (Figure 2).

Majority of individuals in our study presented a mixed diet (65.38%) while the rest of them were vegetarians (34.62%) (Figure 3). In our study shows that there is no statistically significant

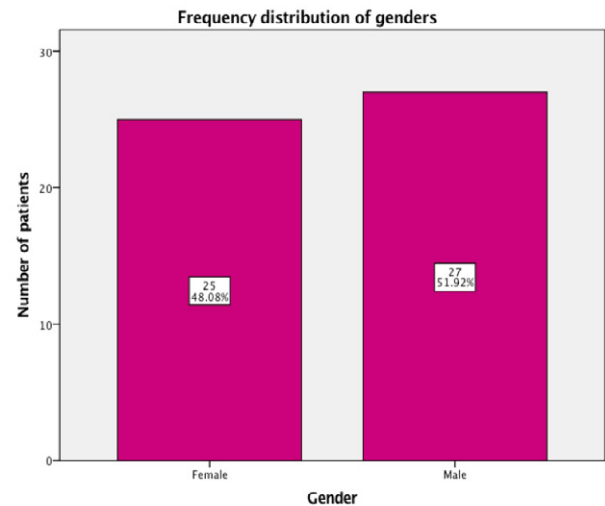


Figure 1: Bar graph showing gender wise distribution of temporomandibular joint disorders. X axis represents the different genders. Y axis represents the number of patients with TMD (Pink). Prevalence of TMD was slightly higher in males (51.92%) compared to females (48.08%).

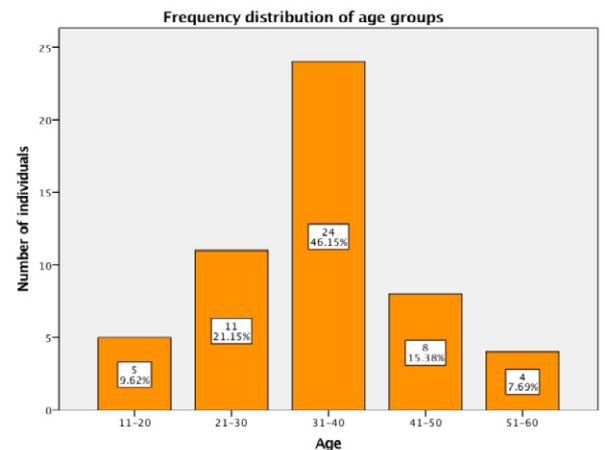


Figure 2: Bar graph showing age wise distribution of temporomandibular joint disorders. X axis represents the age category and Y axis represents the number of patients with TMD (Orange). Most of the TMD cases are observed in individuals within 31-40 years (46.15%), followed by 21-30 years (21.15%), 41-50 years (15.38%), 11-20 years (9.62%) and 51-60 years (7.69%).

association between diet and TMD (p>0.05). The association between dietary habits and TMD was evaluated. TMD was predominantly present in patients on mixed diet than on vegetarians and the results were statistically significant. [Pearson's chi square value - 4.248, df -1; p=0.039 (<0.05)] (Figure 4).

Our study showed that the prevalence of TMD was slightly higher in males (51.92%) compared to females (48.08%). Akhter et al. revealed a significant association between gender and TMD with TMJ pain being more common in males compared to females. However, another study concluded that no significant relationship is observed between males and females regarding

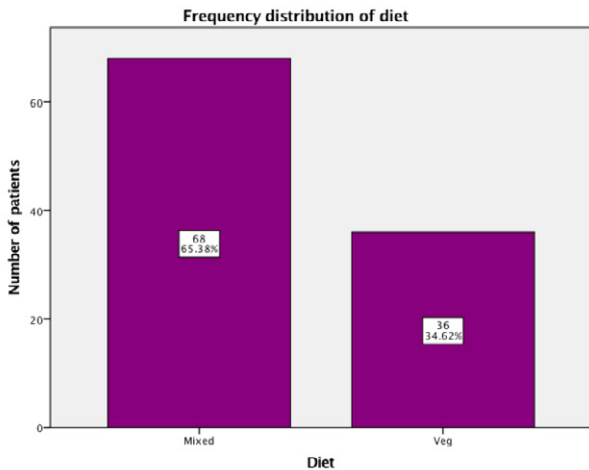


Figure 3: Bar graph showing distribution of dietary habits in our study population. X axis represents the type of diet (mixed or vegetarian) and Y axis represents the number of patients in our study (Purple). Most of the patients were on a mixed diet (65.38%), and the rest were vegetarians (34.62%).

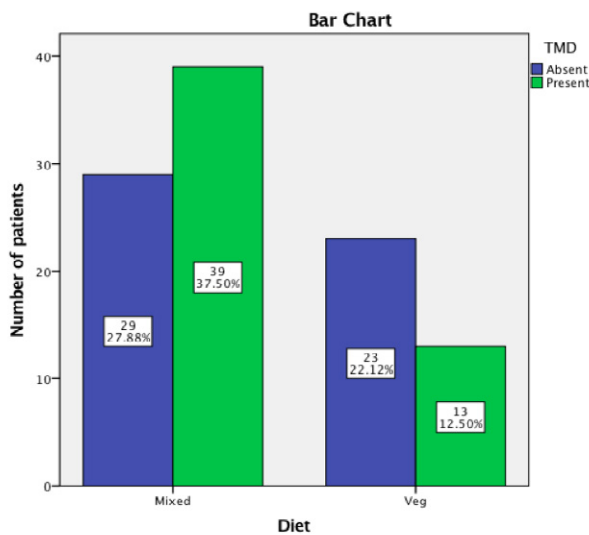


Figure 4: Bar graph showing the association between temporomandibular joint disorders and the different types of diet. X axis represents the types of diet (mixed or vegetarian). Y axis represents the number of patients with TMD (Green) and without TMD (Blue). Chi-square test was done and found to be statistically significant [Pearson's chi square value - 4.248, df -1; p=0.039 (<0.05)]. Therefore, TMD was predominantly present (Green) in patients on a mixed diet (37.5%) than on vegetarians (12.5%).

TMD disorders [27]. Another study by AlShaban et al. reported most of the TMD cases in their study are seen in males (65%) compared to females (35%), which is similar to the finding by Lee et al who reported the predominance of male with TMD [46,47]. Some studies have clearly shown the predominance of female with TMD which is associated with pubertal development, but the diagnosis remains unknown [48-51]. This is further supported by Shet et al. who reported that females (60.4%) have a significantly higher

prevalence of TMD signs than males (39.6%), which is associated with biological, psychosocial, and hormonal differences between the two groups [52].

Most of the cases with TMD in our study are seen in individuals within the 31-40 years age group (46.15%) while those within the 51-60 years age group showed the least prevalence for TMD (7.69%). A study by AlShaban et al. revealed a maximum percentage of TMD patients between the age ranges of 19-29 (58%) and the minimum is between the age ranges of 60-69 (1%) [46]. A study by Akhter et al reported on the significant relationship between age and TMJ pain, which is commonly observed in older individuals [27]. While Karibe et al. described that TMD symptoms are commonly reported in middle-aged individuals, rather than in children; with TMD symptoms being age-dependent among adults who are 20-70 years old [53].

Our study showed that there was a statistically significant association between dietary habits and TMD. TMD was predominantly present in patients on mixed diet than on vegetarians and the results were statistically significant. In contrary, a study by Akhter et al reported that there is no significant association between TMD clinical signs and dietary habits, although they agreed that dietary habits may contribute to the symptoms of TMD, especially TMJ pain which may be potential risk factors for TMD [27]. This is further supported by previous studies which mentioned the correlation of severity of masticatory muscle pains with biting hard foods as the activity of masticatory muscles and TMJ increases in relation to food hardness and texture [26,54,55].

According to AlShaban et al. the results in their study stated that most patients consume hard diet (56%) which could be a contributing factor in cause the disorders as shown in previous related studies [46]. It is believed that masticating hard foods induce displacement of TMJ causes pain by increasing the activity of masticatory muscles which leads to change in the dietary habits by taking softer foods that requires less chewing to minimize pain [34]. This explains the prevalence of TMD in patients with mixed diet compared to those with vegetarian diet in our study.

The present study had few limitations of study design. Since it is a retrospective study, follow up

of subjects was not possible to extrapolate the study results. This study also failed to assess the other confounding variables such as education and socioeconomic status of the patients. Further prospective study including all possible factors for TMD has to be investigated to prove the hypothesis.

One of the primary concerns of TMD patients is the change in the quality and quantity of food intake to minimize pain which is one of the main symptoms of TMD. Further advancement in diagnosis and newer preventative measures are believed to be helpful in reducing the risk of TMD development. Future studies should include clinical examination of these associations to help in better understanding of the condition.

### CONCLUSION

Within the limits of the present study, temporomandibular disorders (TMD) showed higher predilection in males, within 31-40 years of age and in mixed diet patients. The association between dietary habits and temporomandibular joint disorders were statistically significant.

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### CONFLICT OF INTEREST

There was no conflict of interest.

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