The Prevalence of Temporomandibular Disorders in a Non-Patient Population

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Summary

The purpose of the study was to determine the prevalence of clinical signs and symptoms of temporomandibular disorders (TMD) in a young adult non-patient population and to investigate the possibility of an association between TMD and occlusal factors. A questionnaire including data from history and clinical functional examination was used in the study. All subjects (a total of 230) were male (army recruits), from 19 to 28 years of age (mean 21.3 ± 2.1). The study indicated that 38% of subjects had at least one symptom (subjects with slight, moderate and severe discomfort), while 45% of subjects had at least one sign of TMD. Spearman's rank correlation test showed weak but statistically significant correlation ($p < 0.05$ and $p < 0.01$) between occlusal factors and TMD in a young adult non-patient population. Clinical signs and symptoms of TMD were weakly correlated with some occlusal factors (malocclusion traits (Angle classes II/1, II/2, III, and crossbite), slide between RCP and ICP ≥ 1 mm, midline discrepancy ≥ 2 mm, nonworking side interferences, horizontal overlap ≥ 5 mm) and parafunctional habits (teeth clenching and teeth grinding). However, the importance of association between TMD, occlusal factors and parafunctional habits should not be overstated (weak correlation), since this may lead to neglect of the many other causes of orofacial pain and dysfunction in a biologically multifactorial system.

Key words: *prevalence, temporomandibular disorders (TMD), occlusion, parafunctional habits.*

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Introduction

There is permanent clinical interest in the controversial role of occlusion (morphological factors of malocclusion, occlusal disharmony, and malposition of the mandible) as a factor that contributes to the development of disorders of the masticatory muscles, temporomandibular joints (TMJs) and periodontium (1).

Controversy exists because of the limited knowledge regarding the etiology and natural history or course of temporomandibular disorders (TMD).

Some contributing etiologic factors are only risk factors, others are causal in nature, and others result from, or are purely coincidental to, the problem (2, 3). Even though clinically there are beliefs and many testimonials claiming that occlusion is a predisposing etiologic factor, scientifically a direct correlation between malocclusion and TMD is still largely unproved (4-6). However, it has been reported that an anterior open bite, overjet greater than 6 to 7 mm, discrepancy between the retruded contact position and the intercuspal position greater than 2 mm, five or more missing posterior teeth, and unilateral crossbite may be associated with TMD. It should be pointed out, however, that the first three occlusal findings may be the effect of TMD, not the cause (7-9).

Parafunctional habits such as teeth clenching, teeth grinding, lip biting, and abnormal posturing of the jaw are common and usually do not result in TMD symptoms (10, 11). Although parafunctional habits are still regarded as important causative factors in TMD by most clinicians, there is no strong evidence of a close relationship between bruxism and TMD (12, 13). However, parafunctional habits have been suggested as initiating or perpetuating factors in certain subgroups of TMD patients (14-16).

The purpose of this study was to determine the prevalence of clinical signs and symptoms of TMD in a young adult non-patient population and to investigate the possibility of an association between TMD and occlusal factors.

Subjects and methods

The study comprised 230 subjects of a specific group (army recruits) requiring conservative-endodontic and surgical (extraction) treatment or check-up within a prevention programme. All subjects were men aged from 19 to 28 years (mean 21.3 ± 2.1).

Initially, subjects were examined by means of a questionnaire on TMD symptoms, headaches, and oral parafunction, and by a clinical assessment of signs of TMD and occlusion (13, 17-20). The questionnaire included questions on the presence of symptoms (TMJ sounds, tension headaches, difficulties in mouth, TMJ pain at wide opening, muscular pain at wide opening) in the masticatory system, the subjective assessment of subjects on severity symptoms of TMD (1 - no or minimal discomfort; 2 - slight discomfort; 3 - moderate discomfort; and 4 - severe discomfort), as well as questions about general health (good/bad), taking medication (due to headache and pain in the orofacial area - especially analgetics and musle relaxants), awareness of oral parafunctions (teeth clenching and teeth grinding) and need for treatment of TMD (13, 19).

Examination of morphologic occlusion consisted of: sagittal jaw relationship (Angle's class I; Angle's class II/1; Angle's class II/2, Angle's class III), and transverse jaw relationship (crossbite), tooth loss in both jaws (in relation to the total number of 28 teeth), vertical and horizontal overlap, midline discrepancy of the dental arches greater than 2 mm, crowding or spacing of dental arches, and number of occluding tooth pairs (17, 19).

Examination of functional occlusion consisted of measurement of mandibular movements (range of maximum mouth opening, right and left lateral movements, protrusive movement of the mandible in millimetres, mandibular deviation on opening and closing movements greater than 2 mm) and detection of occlusal interferences (slide between the retruded contact position (RCP) and intercuspal contact position (ICP) exceeding 1 mm, occlusal interferences on the working and non-working side during lateroprotrusive movements of the mandible) (18).

The TMJs were examined for signs (clicking, crepitation, and pain) by digital palpation and functional manipulation. A masticatory muscle examination was included, determining muscle tenderness and pain also by digital palpation and functional manipulation (17, 18).

Clinical signs of TMD comprised TMJ clicking, TMJ crepitation, TMJ pain at palpation, TMJ pain at functional manipulation, masticatory muscle pain at palpation, masticatory muscle pain at functional manipulation, and mandibular deviation on opening and closing movements greater than 2 mm were reported in the study.

To test interobserver reliability, two trained observers examined 10 randomly selected adult patients at the Department of Prosthodontics, School of Dental Medicine, University of Zagreb, three

times. All nominal variables in the interobserver examination indicated substantial to almost perfect agreement between them, as assessed by Kappa coefficient (0.75 to 0.92) (21).

Correlations between variables (comparisons of occlusal factors and parafunctional habits with clinical signs and symptoms of TMD) were calculated by means of Spearman's rank correlation test. The following levels of significance were used: $p < 0.01$ and $p < 0.05$.

Results

The distribution of subjects according to the categories of sagittal and transverse jaw relationship showed that 47% of the subjects had Angle's class I, 20% of the subjects Angle's class II/1, 16% of the subjects Angle's class II/2, 6% of the subjects Angle's class III and according to the transverse jaw relationship 11% of the subjects had crossbite.

By examining the number of teeth in both jaws we established that 28% of the subjects had all teeth (28 teeth), whereas the remaining 72% of the subjects had lost one to nine teeth.

The distribution of some occlusal morphologic characteristics (vertical and horizontal overlap, crowding, midline discrepancy and number of occluding tooth pairs) is shown in Table 1, Table 2 shows measurement of mandibular movements in milimetres.

With regard to the prevalence of occlusal interferences in 230 young adults 65% had no occlusal interferences during examination of the functional state of occlusion, while 14% subjects had slide between RCP and ICP, 5% subjects had working side interferences and 16% subjects had non-working side interferences during lateral and protrusive movements of mandible.

Subjective assessment on the severity of symptoms of TMD showed that 63% of the subjects had no or minimal discomfort, 14% mild discomfort, 9% moderate discomfort, and 14% of the subjects had severe discomfort which required treatment. The question of general health observation included possible serious systemic diseases with special reference to general joint and muscle diseases, which was determined in 9% of the subjects. Fourteen percent of the subjects took medication (most often analgetics and muscle relaxants) due to tension-type headache and pain in the orofacial area. Fifteen percent of the subjects were aware of parafunctional habits (teeth clenching and teeth grinding), 12% among them were aware of their teeth clenching, and 10% teeth grinding.

From the total number of subjects, 55% were asymptomatic, while 45% had at least one sign of disorder of the TMJs and/or masticatory muscles. Table 3 shows the prevalence of clinical signs and symptoms of TMD in a young, adult non-patient population. Table 4 shows the distribution of the sagittal and transverse jaw relationship with respect to the asymptomatic subjects and subjects with TMD signs and symptoms. The subjects with TMD signs and symptoms with Angle's classes II/1, II/2, III, and crossbite differed significantly ($p < 0.001$) from the group of subjects with Angle's class I.

The occlusal variables which showed the correlations for different signs and symptoms of TMD and tension type of headache were: 1) slide between RCP and ICP ≥ 1 mm, 2) midline discrepancy ≥ 2 mm, 3) nonworking side interferences, and 4) horizontal overlap ≥ 5 mm. Also, awareness of parafunctional habits (teeth grinding and teeth clencing) were the variables that had the largest influence on the clinical signs and symptoms of TMD with a statistically significant level of $p < 0.05$ and $p < 0.01$ (Table 5). By calculation Spearman's rank correlation coefficients, most of the coefficients were generally weak. Correlation implies only an association, which is not the same as cause.

Discussion

Epidemiologic studies have on average revealed a high prevalence of signs and symptoms of TMD, such as pain and tenderness in TMJs and masticatory muscles, sounds in the TMJs, and limitation or other disturbances of mandibular movements. One of the problems with interpretations of the results of such studies is the extremely great variation in the presented prevalence rates. A more recent meta-analysis of 51 prevalence studies registered even more extreme variations of prevalences: 6% to 93% based on subjects' reports and 0% to 93% according to clinical assessment (22, 23).

Cross-sectional epidemiologic studies of specific non-patient populations show that in approximately 60% of those populations subjects have at least one sign of joint dysfunction (movement abnormalities, joint noise, tenderness on palpation, etc.), and approximately 40% have at least one symptom (facial pain, joint pain, etc.), which probably presumes that the same percentage exists also in the general population (3, 5, 18, 22, 24). In a non-patient group of 222 students (the mean age was 23.9) it was found that 39% of students had one symptom, and in 48% of students there was one sign of TMD (5). The study indicated that 38% of subjects had at least one symptom of TMD (subjects with slight, moderate and severe discomfort), whereas 45% of subjects had at least one sign of TMD.

Although, TMD are acknowledged to be of multifactorial origin (3), occlusion continues to be cited as one of the major influences in dental literature, and the question remains open (25). Two extensive reviews of literature (8, 9), indicate that, contrary to popular belief, the majority of existing dental research literature does not support a relationship between occlusion and TMD. The results from epidemiologic studies vary considerably from study to study because of differences in descriptive terminology, in data collection, in analytic approaches (eg, single-factor versus multiple factor analysis) and in the individual factors selected for study. However, occlusal features such as malocclusion (Angle classification), crossbites, open bites, occlusal interferences, extensive overbite and overjet, crowding, midline discrepancy, missing teeth have been commonly pointed out as contributing etiologic factors (4-6, 19, 26-30). The results of this study indicated that there were correlations between signs and symptoms of TMD in subjects with certain occlusal characteristics (malocclusion (Angle classes II/1; II/2; III, crossbite), slide between RCP and ICP ≥ 1 mm, midline discrepancy ≥ 2 mm, nonworking side interferences, and horizontal overlap ≥ 5 mm). However, it is important not to equate (even when statistically significant) correlation with cause, even if the correlation coefficient is high. In addition, the limitation of the study is absence of control group. Notwithstanding, a total lack of relationship between morphology and function or dysfunction would seem to be biologically improbable. Studies to date suggest that occlusion is likely to be of secondary importance as a factor, exacerbating symptoms once TMD has become established for other reasons. Therefore, future scientifically controlled longitudinal epidemiologic studies are required to validate a relationship between occlusion and TMD (3, 31).

Parafunctional habits have been most frequently assessed by indirect means such as self-report, questionnaire, reports by a sleeping partner, or tooth wear. These indirect measures of parafunctional habits have provided conflicting reports as to the relationship between TMD and the presence of parafunctional habits (10, 13). In this study the most influential registered varibles for TMD signs and symptoms, and tension type headache were the reported awareness of parafunctional habits (teeth grinding and teeth clenching). Whether this is the result of a causal relationship between the parafunctional habits and TMD, or a consequences of the TMD signs and symptoms, and tension type headache having increased the subjects' awareness of the presence of such habits, was impossible to determine from this study. However, there are numerous studies in which parafunctional habits are considered an important causative factor in TMD and in certain types of headache (10, 13, 16, 19, 32-34). Continued research with more direct measurements of parafunction, ie, portable electromyography, sleep laboratory, and direct observation, will be necessary to clarify the specific role of parafunction.

Conclusion

The study indicated that 38% of subjects had at least one symptom (subjects with slight, moderate and severe discomfort), while 45% of subjects had at least one sign of TMD. TMD signs and symptoms were weakly correlated with some occlusal factors (malocclusion traits (Angle classes II/1; II/2; III, crossbite), slide between RCP and ICP ≥ 1 mm, midline discrepancy ≥ 2 mm, nonworking side interferences, and horizontal overlap ≥ 5 mm) and parafunctional habits (teeth clenching and teeth grinding). Some association between occlusal variables and TMD was found, however, it cannot be considered unique or dominant in defining subjects with TMD in a non-patient population.