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ORIGINAL ARTICLE

# The prevalence of myofascial pain and its association with occlusal factors in a threshold country non-patient population

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**Abstract** The objective of the study is to assess the prevalence of myofascial pain in a threshold country and to isolate occlusal risk factors. One hundred and seventy-one randomized selected women were examined by a trained examiner in accordance with the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) examination procedure. Subscales of the SCL 90-R, graded chronic pain status, and anamnestic questionnaires were also used. Logistic regression was performed to compute the odds ratios for six common occlusal features with regard to the presence of myofascial pain, in accordance with the RDC/TMD criteria. Fifteen subjects (15/151 = 9.93%) suffered from myofascial pain. Results from logistic regression analysis showed that non-occlusion (posterior teeth, at least one side) and open bite increased the risk of myofascial pain. The prevalence of myofascial pain in this study is comparable with that in another study, in a highly industrialized environment, in which the RDC/TMD was used. The role of occlusion in a non-patient population seems to be restricted to serious alterations of normality. This article presents the prevalence of myofascial pain and its association with occlusal factors. This issue will help the clinicians to assess the influence of occlusion in myofascial pain patients and to send the patient to the appropriate specialist.

**Keywords** Myofascial pain · Epidemiology · Clinical examination

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## Introduction

The prevalence of symptoms of temporomandibular disorders in a non-patient population has been assessed in some environments, especially in highly industrialized countries [4, 5, 7, 9, 10]. Beside other factors [8, 25], socioeconomic status, and other cultural aspects must be taken into consideration, however, and in highly industrialized countries, these are inhomogeneous and quite different from those in less industrialized countries. In contrast, in threshold countries, this bias might be avoided because the inhabitants live under the same cultural, religious, and socioeconomic conditions.

The role of occlusion as an etiological factor within the acknowledged multifactorial origin of temporomandibular disorders (TMD) has been a controversial topic in recent decades [1, 12, 15, 23]. For some years, the presence of "malocclusion" has been regarded a major factor in the etiology. In recent years, occlusal factors have been eclipsed by other factors, e.g., psychosocial aspects [24].

Several factors which might affect the results of studies dealing with the etiology of TMD have been identified, however. These factors lead to bias in most studies:

- it is necessary to distinguish between sufficient cause and causal factor [1]
- representative samples might be necessary for some studies [1] and the results of studies based on representative samples and preselected samples might be different
- successful therapy is proof neither for nor against etiological theory [1]
- most studies seem to focus on TMD as a whole without distinguishing between different subtypes [15]
- use of neither standardized nor validated examination procedures [6]

- multifactorial analysis was not used [15]
- consideration of socioeconomic factors in pain perception [16]
- examination of subjects presenting with mild occlusal findings only
- use of symptoms instead of disease [15]

It would, therefore, be desirable to assess the effect of occlusal factors on the etiology of TMD for a representative sample which overcomes these shortcomings. Some are hard to eliminate, however; consideration of socioeconomic factors and integration of pronounced occlusal findings in patients and subjects are especially hard to realize. Because of the absence of cultural and religious differences, in combination with ethnic equality and severe changes in occlusion, in less industrialized countries, the conditions for assessing the effect of occlusion on myofascial pain seem to be excellent. In addition, assessment of the prevalence of myofascial pain in these countries on the basis of representative data has not yet been attempted.

The objective of this study was to assess the prevalence of myofascial pain in female non-patients in a threshold country on the basis of representative data and to analyze associations between occlusal factors and the presence of myofascial pain on the basis of a standardized clinical examination procedure.

## Materials and methods

This study was approved by the local review board, and all subjects signed an informed consent form.

### Randomization

Medical care in the city of Mashhad (Iran, 2.1 million inhabitants) and adjacent suburbs is provided by numerous health care bases which are headed by three medical centers. These centers are controlled and financed by the Government and are responsible for basic health services, vaccination, epidemic control, sex education, etc. These centers and their bases are manned permanently by a medic, and occasionally, a dentist. Their services are usually provided free of charge.

In this context, it is important to mention that visiting these health care bases is regulated by law for all inhabitants, so they are visited by all inhabitants and not only ill persons.

Six health care bases in Mashhad were randomly selected, and 15 females visiting each were examined. A suburb health care center was also selected randomly (Zoshk village, 180 inhabitants) and all female adult (≥18 years) inhabitants were recruited ($n$=90). Persons suffering from acute dental problems, ear, nose, and/or throat diseases, and/or acute traumata were excluded from recruitment.

Nine subjects who were eligible to participate did not agree to be examined, however.

### Questionnaires

Subscales of the SCL 90-R (somatization and depression), the graded chronic pain status, and anamnestic questionnaires (according to axis II of the Research Diagnostic Criteria for Temporomandibular Disorders, RDC/TMD) were translated into Farsi. These translations were then retranslated into English and compared with the originals. Differences were evaluated and the Farsi translation was modified to improve it. Finally, a second translator rechecked the translations. In this process, special attention was paid to adapting cultural aspects (e.g. income—per capita income approximately 1,500 USD). The detailed translation process is described elsewhere [11]. Because some subjects were illiterate, it was necessary to read the questions to them.

### Clinical examination

All patients were examined by a trained examiner strictly in accordance with the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) examination procedure. This procedure includes assessment of the presence or absence of joint sounds and pain, the palpation of intraoral and extraoral masticatory muscles using defined pressure, and the measurement of the range of mandibular motion. The procedure provides defined cut-off limits for muscle and joint-related diagnoses. The RDC/TMD examination procedure has been described in detail elsewhere [6].

The status of the teeth was also recorded and the location of pain was described by the subject.

The analysis of occlusion included: overjet (<4 and ≥4 mm), open bite (open bite and no open bite), overbite (<5 and ≥5 mm), missing posterior teeth, dental attrition, and RCP-ICP slide length (≤2, >2 mm).

### Statistical assessment

The data obtained were recorded on a standardized data-entry sheet.

Descriptive statistics were used to characterize the population. Logistic regression was performed to compute the odds ratios for six common occlusal features with regard to the presence of myofascial pain according to the RDC/TMD criteria. Backward elimination was used. Results for which $p<0.05$ were regarded as statistically

**Table 1** Logistic regression model for myofascial pain and occlusal factors

| Steps | Variable | *p* Value | Odds ratio | 95% Confidence interval | |
|---|---|---|---|---|---|
| | | | | Lower | Upper |
| First step | RCP-ICP slide | 0.936 | 0.906 | 0.080 | 10.313 |
| | Non-occlusion, at least one side | 0.030 | 4.075 | 1.142 | 14.546 |
| | Excessive attrition | 0.723 | 0.766 | 0.176 | 3.338 |
| | Deep bite (≥5 mm or <5 mm) | 0.999 | 0.000 | 0.000 | 0.899 |
| | Open bite | 0.097 | 2.966 | 0.820 | 10.729 |
| | Overjet | 0.777 | 0.938 | 0.601 | 1.463 |
| | Constant | 0.163 | 0.159 | | |
| Second step | Non-occlusion, at least one side | 0.030 | 4.075 | 1.142 | 14.545 |
| | Excessive attrition | 0.714 | 0.761 | 0.177 | 3.281 |
| | Deep bite (≥5 mm or <5 mm) | 0.999 | 0.000 | 0.000 | |
| | Overjet | 0.765 | 0.935 | 0.602 | 1.452 |
| | Open bite | 0.092 | 2.986 | 0.835 | 10.673 |
| | Constant | 0.027 | 0.260 | | |
| Third step | Non-occlusion, at least one side | 0.031 | 4.051 | 1.140 | 14.396 |
| | Deep bite (≥5 mm or <5 mm) | 0.999 | 0.000 | 0.000 | |
| | Excessive attrition | 0.747 | 0.789 | 0.187 | 3.331 |
| | Open bite | 0.061 | 3.176 | 0.950 | 10.618 |
| | Constant | 0.000 | 0.124 | | |
| Fourth step | Non-occlusion, at least one side | 0.032 | 3.917 | 1.126 | 13.630 |
| | Deep bite (≥5 mm or <5 mm) | 0.999 | 0.000 | 0.000 | |
| | Open bite | 0.048 | 3.306 | 1.011 | 10.811 |
| | Constant | 0.000 | 0.118 | | |
| Fifth step | Non-occlusion, at least one side | 0.024 | 4.203 | 1.210 | 14.600 |
| | Open bite | 0.034 | 3.602 | 1.101 | 11.782 |
| | Constant | 0.000 | 0.110 | | |

significant. All analyses were performed using SPSS software, package 14.0.1 (SPSS, Chicago, IL, USA).

## Results

One hundred and seventy-one women (18–65 years, mean 31.05 years, SD±18.84 years) agreed to participate in the study (response rate 95%). For 20 subjects, however, the data were incomplete (illiterate subjects, refusal to answer questions). Fifteen subjects (15/151=9.93%) suffered from myofascial pain. Results from logistic regression analysis are given in Table 1. In the last step of the logistic regression model, non-occlusion (posterior teeth, at least one side) and open bite remained in the model. Because the odds ratios for non-occlusion and for open bite were 14.6 and 11.8, respectively, both factors increase the risk of myofascial pain.

## Discussion

The role of occlusion as an etiological factor within the acknowledged multifactorial origin of TMD has been a controversial topic in recent decades. There are no representative data, based on a standardized clinical examination procedure, about the prevalence of myofascial pain in a threshold country.

In this study, a representative sample was examined, rather than patients of a specific department of dental school. Generalization of the results might thus be possible [20]. A standardized examination procedure was also used [6] and distinction was made between different TMD subtypes [15]. Many studies have assessed the effect on joint-related findings [17, 22], and some have analyzed the effect of occlusion on myofascial pain [12, 18, 23].

Landi et al. [12] assessed the relative risk of occlusal variables for muscle disorders, using the RDC/TMD criteria. They found that a RCP-ICP slide of ≥2 mm and mediotrusive interferences increased the risk of myofascial pain. The present study could not confirm those results. The recruitment procedure used in the aforementioned study is not described, however. It might, therefore, be a preselected population and not a representative sample. This might explain the differences between the results.

In another study [18], the effect of occlusion on myalgia was assessed and $p$-values $\leq 0.05$ were obtained for an anterior open bite, unilateral crossbite, overjet, and RCP-

ICP slide length. Although the participants in this study were not a representative sample, the finding that an anterior open bite increases the risk for myofascial pain was confirmed by the present study; the present study did not, however, confirm the results of that study with regard to overjet and RCP-ICP slide length. One reason for this discrepancy might be the different study populations. Le Bell et al. [13] reported in their review that subjects without a TMD history (which are more likely to be found in a representative sample) might be tougher with regard to occlusal factors initiating TMD symptoms. Thus, occlusal risk factors for myofascial pain could be different in representative and clinical samples.

Sarita et al. [21] assessed signs and symptoms which might be associated with TMD in adults with shortened dental arches. They found that when all posterior support is unilaterally or bilaterally absent, the risk of signs and symptoms of TMD seems to increase. This result is confirmed by the present study-only serious changes in occlusion (e.g., loss of posterior support) might increase the risk of TMD in a representative sample. Casanova-Rosado [3] assessed the prevalence of TMD and its associated factors in a Mexican population using the RDC/TMD. However, that study included a university sample, and consequently, no representative data were obtained. The results showed that tooth loss increased the risk for TMD. The present study could confirm this result for the loss of posterior occlusal support in the representative sample.

The prevalence of signs and symptoms of TMD has been assessed in several studies. In some studies, however, questionnaires only were used [14]. Others did not use standardized examination procedures [9] or were performed in a preselected population [2]. In addition, most studies were performed in highly industrialized countries, and so, comparison with the results from the present study might not be valid.

The prevalence of myofascial pain in female participants in this study was approximately 10%. This is lower than the findings of Gesch at al. [9], who found a prevalence of 15% in their randomized population study in Germany. Their study population was, however, different from that in the present study in respect of socioeconomic and cultural aspects. Men and women were, furthermore, not examined by means of calibrated examiners and a standardized, international examination procedure. Rantala et al. [19] assessed the prevalence of myofascial pain in Finnish non-patients by using the RDC/TMD and found 7% suffered from myofascial pain. This seems to be comparable with the results from the present study. The slight difference might be because Rantala et al. included male and female subjects; the cultural and socioeconomic environment was also different from that in the present study.

## Conclusion

The prevalence of myofascial pain in this study is comparable with that in another study using the RDC/TMD in a highly industrialized environment. The role of occlusion in a non-patient population seems to be restricted to serious alterations of normality.

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