

FREQUENCY AND SEVERITY OF RISK FACTORS FOR TEMPOROMANDIBULAR DISORDERS IN YOUNG ADULTS

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ABSTRACT

Objective: To document the frequency and severity levels of risk factors for temporo-mandibular disorders (TMD) in young adults.

Methodology: This cross-sectional study was conducted at the Department of Prosthodontics Khyber College of Dentistry (KCD), Peshawar. A structured proforma and the method of interview and clinical examination, was used to collect data from 100 young adults for the presence and severity level of TMD risk factors including socio-economic and psychological, dental and neuro-musculo-skeletal. Each of these broad categories of TMD risk factors were further elaborated into five sub-areas and their severity level ranked on a 5-point Likert scale with 0 (No Effect) to 4 (Extreme Worst Effect). The total score of each category was determined from the sum of the scores of severity level of the individual risk factors. The grand total was calculated by adding the total scores of all categories. Risk for TMD was determined as nil if the score = 0, low if range was 1-20, moderate when 21-40 and high when it was 41-60.

Results: Subjects having moderate severity risk level for TMD were 52/100 with 18 (47.4 %) males and 34 (54.8 %) females. Maximum score was noted for the socio-economic and psychological factors (19/20) with a mean of 7.3 ± 4.2 . Low score was noted for dental factors (8/20) with a mean of 1.8 ± 1.9 . The scores for any of the two main category factors came out higher for the socio-economic and neuro-musculo-skeletal categories risk factors and lower for the dental and neuro-musculo-skeletal factors. The order of decreasing importance of the three main category TMD risk factors appeared as socio-economic and psychological > neuro-musculo-skeletal > dental (t-value = 0.5, p-value = 0.000, df. = 99).

Conclusion: Addressing the psycho-socio-economic problems of young adults might help minimizing the risk for development of TMD.

Key Words: *Temporomandibular disorders (TMD), Risk Factors, Chronic Orofacial Pain.*

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INTRODUCTION

Temporo-mandibular disorders (TMD) with chronic pain in the oro-facial region result because of an inter-play between several risk factors. Among these, the role of occlusal factors as risk indicators for the development of TMD has dominated in some studies.

¹⁻⁵ Notwithstanding, this and the resultant bio-medical model of TMD treatment, the multi-factorial etiology of TMD considering the role of physical, emotional, and behavioral factors in the disease were also emphasized and thus supporting the bio-psychosocial model for chronic TMD.⁶ Some studies have shown that depression and somatization have been heavily implicated in chronic pain conditions, including TMD.⁷⁻⁹ Indeed, in one longitudinal treatment outcome study, sleep disorders and

depression were implicated as perpetuating factors in non-responding TMD patients.¹⁰ Another study determined psychological characteristics both as a cause and consequence of TMD.¹¹

Some studies have challenged and discredited the etiologic role of occlusion.^{12, 13} This disagreement highlighted the need for studies evaluating occlusal factors as part of the multi-factorial etiology of TMD.¹⁴ Presence of occlusal interferences was considered important risk indicators for the development of TMD in an investigation, even when some socio-demographic factors (employment, age and gender) were considered as effect modifiers.¹⁵

Neuro-musculo-skeletal factors are in addition to occlusal, psychological and economical factors that

are considered as risk factors for TMD. However, their strong role in the etiology of TMD is not indicated in most studies. But, still there are studies that favour the strong impact of such factors in TMD. In a study done by Pakkala and Quarnstrom, it was found that jaw deviation on opening and closing had some impact on the estimations of risk for TMD¹⁶.

It is depicted from previous studies that young adults are at higher risk for developing TMD.¹⁷ Another study suggested females and puberty as a group requiring most treatment for TMD.¹⁸⁻²¹ It has thus been noted that an early diagnosis and management of those at risk would be a rational approach.^{17, 22-26} Such an approach to the recognition of TMD risk factors will surely be beneficial to both prospective patients and oral health-care funding authorities with financial and functional advantages by avoiding costly and time consuming treatment of TMD cases that could have already been established.²⁷⁻³¹ With this in mind, there is now a focus on prevention by screening young and adolescents to look at the presence of conditions and risk factors considered as initiators and predisposers of TMD. Knowing about the frequency and severity of risk factors that may later lead to TMD will modify the need for necessary preventive and therapeutic approaches including counseling and education to those vulnerable. This will also eliminate suffering later because of TMD development and cost of therapy for the individual, health care providers and third party payers. A local research exercise of the kind is also considered important as no such investigations have so far been done.

METHODOLOGY

This cross-sectional (Descriptive) study was designed at Khyber College of Dentistry (KCD), Peshawar involving 100 young adults. Subjects informed consent as well as institutional approval for conduction of the study was sought. A convenience (non-probability sampling) technique was used. Both males and females with ages ranging between 13 – 22 years and who reported to the general dental out patients department of KCD for consultation of dental problems other than acute or chronic pain conditions in the oro-facial or stomatognathic system were included. Excluded were those who had mixed dentition, congenital or acquired defects, abnormalities in the oro-facial region, for example hypodontia, cleft palate and other facial

/developmental defects and defects due to dento-alveolar and facial surgeries and trauma. Those already diagnosed, or treated for an established TMD and those having pain and trismus associated with impacted third molar teeth were also not included.

Using a structured proforma, from each subject, with the direct interview method and clinical examination, data were collected for the severity level of each of the three categories of risk factors for TMD. The first category of socio-economic and psychological factors included financial problem, feeling of loneliness, worrying about things, avoidance of social contacts and abnormal habits like (sleeping on one side, leaning on palm, lip / cheek / tongue biting, habit of biting on objects including nail, pencil, pen etc), The second category of dental factors including abnormal bite feeling, bruxing and clenching of teeth, tooth wear and deep bite. The third category of neuro-musculo-skeletal factors included joint sounds, headache, neck stiffness, abnormal mouth opening patterns and midline deviations.

The total score for responses in each category and the total of all these determined the extent of the probability of TMD in each participant and hence in the sample population when the individual scores were collectively considered. Data collection continued till complete data sets were obtained from 100 subjects. The severity of an individual risk factor was determined using a 5-point Likert Scale with no effect ranked as 0, to some extent as 1, mild as 2, moderate as 3 and its extreme worse effect as 4. The total score for each category was determined from the sum of the severity level of the individual risk factors. The grand total was calculated by adding the total scores of all the three categories. Risk for TMD was calculated as No if the collective score coming out as 0, Low if between 1- 20, Moderate when ranging between 21-40 and High when it was 41 or more.

For the purpose of this study, operational definitions for the level and impact of financial problem were considered. The level / impact of financial problem was considered nil or zero, if family annual income was more than Rs.300,000, 1 for those with annual income of Rs.200,000- 300,000, 2 for those who had annual income ranging between Rs.100,000 – 200,000, 3 for those with annual income of Rs.50000-100,000 and 4 for those having annual income less than 50,000. For deep bite the severity level was

considered as 0, when there was no trauma to palatal soft tissues and no attrition of the labial aspect of mandibular anterior teeth or palatal aspect of maxillary anterior teeth, 1 when there was only some attrition of the above surfaces of anterior teeth, 2 when there was evidence of trauma to both soft tissues and dental tissues, 3 when the damage occurred required restorations in anterior teeth and 4 when extractions were needed because of the prolonged untreated/corrected deep bite.

The data were statistically analyzed using SPSS (Statistical Package for Social Sciences) version 13. Descriptive statistics was used to calculate mean and standard deviation for quantitative variables (age). Frequencies, percentages were computed for qualitative variables (gender) and for the level of severity for each of the individual risk factors. Chi-Square (χ^2) test and Probability (P) values were calculated to verify the significance level for gender differences regarding risk severity for TMD development. The One Sample t-test was also applied for the significance of order of decreasing importance of the three main categories (socio-economic and psychological, dental, and neuro-musculo-skeletal) as risk factors for TMD.

RESULTS

A convenience but purposive study sample in terms of two age groups 13 – 17 years 18-22 was chosen. Most subjects were teen-aged with a mean age of 16.9 ± 2.7 (SD) years. Females were 62 as compared to 38 males with a male to female ratio of 1:1.6. The distribution of subjects in the age group of 13 – 17 was 59 as compared to 41 in the second age group of 18-22. The apparent variation of scores of the risk factors for TMD in the two genders were statistically insignificant (χ^2 -value = 0.5, P-value = 0.2). The proportion of subjects having low TMD risk was 47 % as compared to 52% who had moderate level of risk for TMD. These figures left only 1 % subjects who had higher risk.

Table 1 gives scores for each of the individual three factors as well as their total score for both genders. According to the results the category of socio-economic and psychological factors contributed more to the total score as compared with other two category risk factors. The differences observed for the data of the three categories were significant (t-value = 0.5, P-value = 0.000).

Table 1: Range & mean values for scores of the individual risk factors for TMD in adults (n = 100).

Factors Scores	Score Range	Mean Score (Males)	Mean Score (Females)	Mean Score (All subjects)
<i>Socioeconomic and Psychological</i>	0 – 19	7.1 ± 4.56	7.4 ± 4.1	7.3 ± 4.2
<i>Dental</i>	0 – 8	1.7 ± 1.8	1.9 ± 2.0	1.8 ± 1.9
<i>Neuro-musculoskeletal</i>	0 – 11	2.3 ± 2.0	3.3 ± 2.3	2.9 ± 2.2
<i>Grand total score of all above</i>	1 – 34	11.1 ± 5.9	12.5 ± 6.0	12.0 ± 6.0

$\pm$ Standard Deviation

The combined effect of the different risk factors for TMD is presented in Table-2. It is clear that in combination, the socio-economics and psychological and neuro-musculo-skeletal category exerted a maximum effect on the total score. The data of socio-economic and psychological factors alone as given in Table 3, for both genders reveal that more males exhibited the severe level of risk as compared to females. However, the number of females were more in the moderate level as compared to males in the same context. As a whole nearly 99/100 subjects were seen as those at risk (some to severe) for TMD because of the socio-economic and psychological category risk factors.

Table 2: Combined range & mean values for the scores for the various TMD risk factors groups.

Factors Scores	Score Range	Mean Score (Males)	Mean Score (Females)	Score (All Subjects)
<i>Socioeconomic & Psychological + Dental</i>	0.0 -23.0	8.7 ± 5.4	9.2 ± 4.7	9.0 ± 4.9
<i>Socioeconomic & Psychological + Neuromusculoskeletal</i>	1 – 30.0	9.3 ± 4.9	10.6 ± 5.2	10.1 ± 5.1
<i>Dental + Neuromusculoskeletal</i>	0.0 - 17	4.0 ± 2.9	5.1 ± 3.5	4.7 ± 3.3
<i>Grand Total Score of All</i>	1.0 – 34.0	0.1 ± 5.1	4.7 ± 3.3	12.0 ± 6.0

$\pm$ Standard Deviation,

The data for the individual items of the dental factor are shown in Table 4. It can be seen that irrespective of the gender of the subject, 63 subjects were found as having some risk for developing TMD in the future because of the presence of dental factors (Table 4). The data for the risk category factor comprising the neuro-musculo-skeletal problems is given in Table 5. It can be seen that the pattern of the distribution is similar to that seen for the dental factors.

Table 3: Distribution of subjects (%) in various score levels for socioeconomic &**psychological risk factors.**

Gender	No of Subjects (%) with TMD Risk Severity Level / Effect					Total
	Not at all	To some extent	Mild	Moderate	Severe	
Male	1 (2.6)	17 (44.7)	11 (29.0)	5 (13.1)	4 (10.5)	38
Female	0 (0.0)	22 (35.4)	26 (42.0)	12 (19.3)	2 (3.2)	62
Total	1	39	37	17	6	100

*Data in parentheses show percentages***Table 4: Distribution of subjects (%) in the various score levels for dental risk factors.**

Gender	No of Subjects (%) with TMD Risk Severity Level / Effect					Total
	Not at all	To some extent	Mild	Moderate	Severe	
Male	15 (39.5)	22 (57.8)	1 (2.6)	0 (0.0)	0 (0.0)	38
Female	22 (35.5)	37 (59.7)	3 (4.8)	0 (0.0)	0 (0.0)	62
Total	37	59	4	0	0	100

*Data in parentheses show percentages***Table 5: Distribution of subjects (%) in various score levels for neuro-musculoskeletal risk factors.**

Gender	No of Subjects (%) with Severity Level / Effect					Total
	Not at all	To some extent	Mild	Moderate	Severe	
Male	6 (15.7)	29 (76.3)	3 (7.8)	0 (0)	0 (0)	38
Female	4 (6.4)	51 (82.2)	6 (9.7)	1 (1.6)	0 (0)	62
Total	10	80	9	1	0	100

Data in parentheses show percentages

DISCUSSION

This study is the first of its kind local study exploring the frequency and severity levels of some risk factors for TMD in young adults. However, it has some limitations including few subjects as well as a study done at one center thus not reflecting real situation in the population. Of the score relating to the socio-economic and psychological, dental and neuro-musculoskeletal, those relating to the socio-economic and psychological risk factors were maximum (19 / 20) in most subjects (Table 1), indicating this as the most important risk factor for the development of TMD. This finding is in support of those of the previous studies that emphasized on the major role of

socio-economic and psychological factors in TMD development.⁶⁻⁹ In a clinical and case-control study it has been found, that many TMD patients were in a "poor social situation", socially disintegrated and had increased levels of stress, anxiety and depression.³³ The relationship between adverse economic factors and poor health status had been seen. Generally, people with lower socio-economic status are at higher risks for diseases.³³ furthermore, in consideration of the psychological impact that the TMD-condition have in terms of decreased quality of life of patients and socio-economic costs, an improvement in the standardization of diagnostic process for these disorders is strongly suggested to avoid unnecessary delays in the pathways to diagnosis and ultimately, management of TMD.³⁴⁻³⁵

When the combined effect of two main category factors were considered, it was observed that the combined effect of the socio-economic and psychological factors with any of the other two factors would result in enhancement of severity level of the risk. When the individual scores of socio-economic and psychological risk factors were added to that of the neuro-musculoskeletal risk factor, the score raised to 15 and 11 when it was added to the category of dental risk factors (Table 1). This is also the finding of other studies done by Grossi et al¹⁰ and Slade et al.¹¹ However, contrasting findings were reported by Kleinknecht³⁶ when effect of a single factor or group of factors putting the individual at risk for developing TMD was not seen.

Contrary to the socio-economic and psychological factors, the other category factors of dental and neuro-musculo-skeletal had smaller scores and low severity risk level of TMD i.e. 8/20 and 11/20 respectively (Table 1) which show their less likelihood of causing TMD in future. A similar insignificant role of the dental factors in the TMD causation has also been suggested by previous studies.³⁷⁻³⁹

Despite the above, the controversial relationship of occlusion to TMD remains unresolved. TMD experts on one side de-emphasize the importance of occlusion as an etiological factor, while majority of practitioners are still adhering to a concept that focuses on occlusal factors when diagnosing and treating TMD.³⁷ Occlusal therapy and occlusal adjustment as the only treatment modality was in fact taken as steps to be rarely defended. However, in combination with other forms of therapy (counseling,

splints, and physiotherapy) it could contribute to a positive treatment outcome in selected cases. Some recent results have indicated that occlusal adjustment in children and adolescents might reduce the later occurrence of TMD signs and the need and demand for TMD treatment. However, a need for continuing research on the relationship of the occlusion with TMD using evidence based study methods has been highlighted.¹⁻⁵

The finding of this study of lower severity risk levels for TMD in most subjects is supported by others who have failed to see a stronger role of neuro-musculoskeletal factors in the etiology of TMD.^{17, 18} But, still there are some studies that favour the strong impact of such factors in TMD.^{16, 40, 41} Among the 62 females, 27 (43.5 %) had low risk and 34 (54.8 %) had moderate risk for TMD. Among 38 males, 20 (52.6 %) had low and 18 (47.4 %) had moderate risk for TMD. The figures for the two genders were not found statistically significant ($\chi^2 = 0.5$ and $P\text{-value} = 0.2$). The reason for this could be that majority of the subjects were belonging to middle and lower class families who were having the same problem of low financial status. A larger population sample from different places might clarify the reality. Previous studies favored the high preponderance of females to develop the TMD.^{18, 42, 43} But contrary to the findings of the said studies, men and women were shown equally at risk for TMD development in future that support the results of our study.⁴⁴⁻⁴⁵

Regarding association of gender with socioeconomic and psychological factors (Table 3), there were 4% males and 2% females which were severely affected by this factor while none of the males and females respondents were having so severe levels for the dental factors (Table 4) as well as for the neuro-musculoskeletal factors (Table 5).

Pakistan is a developing country which is confronting with various social issues including poverty, health and education etc. The same situation was observed during this study survey showing mostly i.e. 76 out of 100 patients/respondents who were interviewed belonged to the low middle class families with their annual income ranging between less than Rs. 50000 to Rs. 100000. Owing to dearth of financial resources most of the patients neglect the treatment of dental problems. So in such scenario the socio economic factors could dominate the other two factors.

The results of this study show that the effect of lower

socio-economic status as risk factor would be dominant on individual basis for the development of TMD as compared to the other two factors (dental and neuro-musculo-skeletal factors). However, as the overall severity risk level was found low, therefore, it could be concluded that dental and neuro-musculoskeletal factors when considered could have diluted the dominant effect of the socio-economic and psychological factors.

There are many potential reasons for the failure of researchers to identify risk factors associated with TMD. The methods used in many of the studies have left many areas in need of improvement. With very few exceptions, the sample sizes were probably not reflective of the population. In addition, there were very few longitudinal studies that evaluated risk factors. The consistent failure to find occlusal, psychosocial, demographic, occupational and economical factors placing the individual at risk certainly indicates the need for continued research. It also suggests that the development of disorders may be multi-factorial and indicates that there is a need to look at combinations of factors that place the individual at risk for the development of TMDs. Only long term, large scale epidemiologic studies, investigating many potential factors, will be able to accomplish this important goal.⁴⁶

Not-with-standing the varying levels of the presence of the various category risk factors for TMD, this study has indicated the benefit and usefulness of the early screening of young adults for the possibility of having TMD in future. This approach will also aid in earlier diagnosis and management of the risky young individuals.³⁹

CONCLUSION

A significant effect of the presence of the risk factors for TMD in young adults was that of the socio-economic and psychological risk factors. In contrast, the dental factors had the lowest contribution. The role of the socio-economic and psychological factor was dominant in female respondents as compared to the other two factors i.e. dental and neuro-musculoskeletal factors. The clinical implication of this work is to consider identification of young adults through screening for the presence of socio-economic and psychological problems as TMD risk factors. Necessary counseling and social re-integration of such young adults will reduce the risks for the development of TMD.

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