

Assessment of Impacts Attributed to Malocclusion and Psychosocial Stress on Oral Health Related Quality of Life: A Cross- Sectional Study

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ABSTRACT

Background: Over the past few decades, 'health' has emerged as not only a state of physical well-being, but now it also encompasses social and psychological wellness. Issues related to oral health and their contribution to general health has now taken centre stage, and even the minor activities like eating or smiling can also affect the quality of life. Identifying factors which disturb the harmony of this biopsychosocial model has now become mandatory so as to understand and henceforth improve the future aspects of wellness at community levels.

Materials and Method: This cross-sectional study was carried out in 300 systemically healthy subjects with malocclusion in the age group of 25-40 years. Malocclusion was assessed by using Index of orthodontic treatment needs (IOTN) followed by a periodontal examination by recording community periodontal index (CPI). The impacts of malocclusion on oral activities (Condition-specific oral impacts on daily performances) were noted along with an assessment of psychological stress levels by using Perceived stress scale (PAS). Statistical analysis was done by using the Chi-square test, and Pearson's correlation analysis was done to find an association between variables.

Results: Statistically significant ($p \leq 0.05$) association was found between malocclusion and periodontitis, periodontitis and stress and malocclusion and stress.

Conclusion: A plausible association may exist between malocclusion and psychological stress which may lead to worsening of periodontal health.

Keywords: Malocclusion, Periodontitis, Psychological stress, Quality of life.

INTRODUCTION

Malocclusion or placement of teeth outside the ideal range of dental arches is amongst the most common dental problems encountered all across the globe. Untreated malocclusion has been found to affect the physical and psychosocial health of the individual with the overall deterioration of their well-being^[1]. Impaired periodontal health, disturbances in oral functions and facial esthetics are few of the consequences seen with malocclusion. Last few

decades have seen a great increase in awareness about dentofacial and personal esthetics with a greater impact on the psychological aspects of the patients along with oral health.

Since many years with the evolution of the dental field, the relationship of malocclusion with the masticatory system has been reviewed. These dentofacial anomalies can have an influence on

Received: June. 21, 2020; Accepted: Aug. 16, 2020

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other determinants of dental health as well. The effect of deviated dentition on periodontal health has long been an area of research as it is assumed that this morphological variation may favour plaque accumulation and hinder the normal cleaning activity thus aggravating periodontal inflammation^[2].

Health is now no longer considered only a state of physical well-being, and it now follows the biopsychosocial model of illness which encompasses the physical, psychological and social aspects of well-being of an individual^[3]. Oral health is also found to be affected by similar determinants. So, another factor which has been found to add to the grievances of malocclusion is the psychosocial damage which happens because of this unpleasant appearance which triggers behavioural changes in terms of abstinence of oral hygiene measures which may further complicate the ongoing periodontal inflammation.

All these factors with their cumulative action add a dimension to the general health, which is directly related to the quality of life. The concept that summative action of factors affecting oral health can also affect the general well-being has given rise to an idea known as "Oral health-related Quality of life (OHRQoL)" ^[4]. It is said to be an interaction between and among oral health conditions, social and contextual factors and the rest of the body. Also, it is said that assessing OHRQoL allows a shift from traditional assessments to a more precise and definite treatment-oriented approach. It helps in better healthcare decision making and aids in improvement in clinical practice with proper health outcomes monitoring^[5].

Assuming an association between dental conditions and psychological science, a model was also hypothesized to understand the interaction.

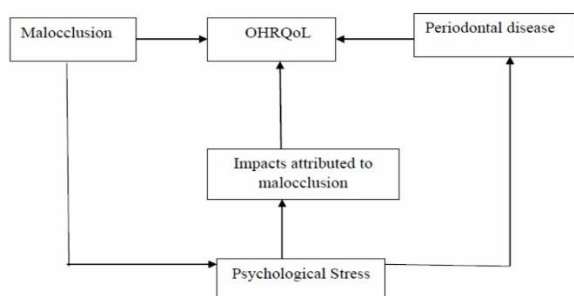


Fig 1: Theoretical model for OHRQoL

Table-1: Orthodontic treatment need according to IOTN scores.

IOTN Score	Treatment Need	Frequency (n)
1	No need	31
2	Slight treatment	97
3	Borderline treatment	98
4	Great need	47
5	Very great need	28

Table 2: Condition specific oral impacts on daily performances (CS-OIDP) attributed to malocclusion

(a) Prevalence of impacts attributed to malocclusion.

Attributes	Prevalence (n %)
Eating	104 (34.6%)
Speaking	97 (32.3%)
Cleaning mouth	152 (50.6%)
Relaxing	46 (15.3%)
Emotion	53 (17.6%)
Smiling	92 (30.6%)
Studying	19 (6.3%)
Social Contact	38 (12.6%)

(b) : Intensity of Impacts attributed to malocclusion.

Intensity	Frequency (n %)
Very Little	9.5%
Little	16.2%
Moderate	32.8%
Severe	26.4%
Very Severe	15.1%

Table 3: Prevalence of Periodontal disease (Community Periodontal Index with treatment needs)

Scores (Code)	Prevalence	Treatment need (n%)
Code 1	31	TN-1 10.2% (Self-care)
Code 2	122	TN-2 73.4% (Professional cleaning with self care)
Code 3	98	
Code 4	49	TN-3 16.4% (Complex treatment)

Table 4: Perceived stress scale scores.

Scores	Frequency (n %)
Low stress	48.3%
Moderate Stress	32.6%
High stress	19%

Table 5: Association between Index of Treatment Needs, Community Periodontal Index of Treatment Needs, Perceived Stress Scale.

Index IOTN	CPITN	PSS
r	r	r p
p	p	
IOTN	0.23 0.01	0.92 0.05
CPITN 0.23 0.01		0.18 0.05
PSS 0.92 0.05	0.18 0.05	

With an increased focus on health promotion alongside disease prevention, healthcare now strongly recognizes the influence of psychosocial health as an asset for enhancement of well-being. Thus, the aim of this study was to analyze the impacts of malocclusion on psychological aspects and periodontal status of selected subjects and how do these attributes correlate with each other affecting the cumulative oral health-related quality of life.

MATERIALS AND METHODS

The study population consisted of 300 adults having malocclusion in the age group of 25-40 years irrespective of gender. The patients were selected by convenience sampling method from the OPD of the Department of Periodontology, Narsinhbhai Patel Dental College and Hospital, Visnagar. Only consenting subjects were selected for the study, and ethical approval was taken from the institutional ethical review committee. None of the patients selected had a history of any orthodontic or periodontal intervention. Patients who were immuno-compromised, pregnant or lactating females, patients with a history of tobacco consumption in any form and patients on corticosteroid therapy were excluded from the study. Ethical approval was taken from the Research Committee of the institute. No dental casts or radiographs were used in the study.

Before being clinically examined, demographic data of the patients were obtained. Patients were then assessed for severity of malocclusion with Index of Treatment Needs (IOTN index)^[6] which assesses both, the dental health as well as an aesthetic component of malocclusion. This index was taken as the dental health component records malocclusions in terms of the significance of tooth irregularities for personal dental health which has an eventual effect on periodontal parameters of the subjects. The aesthetic component of this index records the aesthetics impairment, which justifies the effect malocclusion has on socio-psychological health.

The periodontal status of the patient was then assessed using the Community Periodontal Index of treatment needs (CPITN index)^[7]. This index provides a basis for estimating overall population needs in terms of treatment categories and act as a simple screening method for determining the level of intervention required and also a tool for the longitudinal monitoring of disease changes. A mouth mirror, an explorer and CPITN probe were used to check gingival bleeding and periodontal pockets at six index teeth.

Since psychological stress has now emerged as a major determinant of health, it was recorded by means of a self-reporting questionnaire. Patients were administered Perceived Stress Scale questionnaire^[8] to record their stress levels followed by a recording of condition-specific oral impacts on daily performances (CS-OIDP)^[9] so as to

determine the possible impact of malocclusion on total oral health-related quality of life.

The data was compiled and subjected to statistical analysis (SPSS software version 23). Chi-square test was carried out to study the scores of all indices, and Pearson's rank correlation coefficient was done to find the association between IOTN, CPITN, Perceived Stress Scale and CS-OIDP.

RESULTS

This cross-sectional study was carried out to find an association between malocclusion, periodontitis and psychological stress. Three hundred subjects, 166 males (55.3%) and 134 females (44.66%) with a mean age of 28.6 ± 0.5 years who had not undergone any orthodontic treatment previously participated in the study. Out of all the participants (Table-1), 42.5% needed no or slight treatment (IOTN 1 and 2), 32.6% showed moderate need (IOTN 3), 24.9% showed a definite need for orthodontic treatment (IOTN 4 and 5).

On the evaluation of impacts of malocclusion, CS-OIDP scores (Table -2 (a and b) showed very little impact in 9.5%, little impact in 16.2%, moderate impact in 32.8%, severe impact in 26.4% and very severe impact in 15.1% of the patients.

CPITN scores (Table -3) showed that 51.3% showed either gingival bleeding and/or had calculus or plaque retentive factors (Code 1 and 2), 32.6% showed pathological pockets with 4-5 mm of depth (Code 3) and 16.1% showed pathological pockets of 6 mm or more (Code 4). All the subjects were then segregated on the basis of treatment needs as described by WHO. 10.1% of subjects required no professional intervention with improvement in personal oral hygiene (TN-1), 74.7% required professional scaling (TN- 2) and 15.2% were in need of complex therapy by trained personnel (TN-3).

Perceived stress scale scores (Table-4) for stress level measurement demonstrated low stress in 48.4% subjects, 32.9% showed moderate stress and 18.7% subjects presented with high-stress levels. On assessing the interrelationship (Table-5) between malocclusion (IOTN) scores and (CPITN) scores, a statistically significant relation was found between the two ($p \leq 0.01$). Stress levels (PSS) and periodontal conditions (CPITN) were also found to

be significantly correlated ($p \leq 0.05$). Malocclusion (IOTN) and stress levels (PSS) were also found to be significantly associated ($p \leq 0.05$).

DISCUSSION

Quality of life has nowadays become one of the most important aspects of public health policy, and oral health has also become an integral part of this concept. Monitoring trends about dental health have become significant as the implications are widespread. There is now a paradigm shift from traditional criteria of assessment of health which is now focused on an individual's social, emotional oral and physical well-being. This patient-centric bio-psychosocial approach to oral health care has not only affected the health care decision-making process but will also change the dynamics of clinical practice along with medical and dental research.

In the present study, oral health-related quality of life was assessed by evaluating the relationship between the two most prevalent dental conditions, i.e. malocclusion and periodontal disease. It is believed that malocclusion gives rise to anxiety-like behaviour through a putative lateral habenula-mesencephalic trigeminal nucleus pathway. This malocclusion has an effect on soft tissues through periodontal proprioceptors, trigeminal mesencephalic nucleus (Vme) and trigeminal motor nucleus (Vmo). The lateral habenula is involved in emotional modulation, which gets projected to Vme^[10]. Thus, the malocclusion has an effect on both periodontal as well as psychological health. Periodontitis and stress have also been found to be linked with each other through hypothalamo-pituitary axis^[11]. Interrelationship of all three factors has been assumed to be clinically significant, which may affect the general health-related quality of life (HRQoL)^[5].

In this study, this relationship of orthodontic treatment needs with other variables was evaluated. IOTN index was chosen as this index is a valid and reliable indicator that defines specific distinct categories of treatment needs with a measure of function. Also, it allows improved focusing of services with the potential of inducing greater uniformity in the standardization of assessment of orthodontic treatment needs. The study showed 65% of people exhibited little to

moderate severity of malocclusion, while 25% of the study population had severe malocclusion.

Impacts attributed to malocclusion (CS-OIDP) were observed, which showed 41.5% of people showed severe to very severe impacts on routine activities due to malocclusion. The results were in accordance to study by Bernabe E et al. [9] and Ekuni D et al. [12] where the effect of malocclusion was found to range from severe to very severe in almost 52.1% of the study population.

Positive association of malocclusion with the periodontal condition was also observed ($p \leq 0.01$). Malocclusion is considered as a predisposing factor to periodontal disease as plaque retention is increased. Also, neuronal activity and periodontal proprioceptive pathways are affected, leading to worsened periodontal conditions^[10]. The results were found to be similar to studies by Bernhardt O et al. [2] ($p=0.01$) and Gabris et al. [13] ($p \leq 0.05$). However, there are studies like Nalcaci R^[1] ($p=0.25$) and Goel S^[14] et al. ($p=0.09$) which did not found any significant association between these two conditions.

The study also noted positive association ($p \leq 0.05$) between malocclusion and psychological stress levels which were manifested in different behavioural changes in terms of altered performance of routine activities. This can be attributed to emotional modulation and dysfunctional neuronal activities [9],[10],[12]. Periodontal conditions were also significantly found to be deteriorating with an increase in the severity of stress levels. These results were in accordance with studies by Penmetsa S et al. [15] and Shende AS et al. [16].

This study, within its limitations, showed a significant association between malocclusion and stress, malocclusion and periodontitis and periodontitis with stress. Larger sample size with more precise selection criteria can establish this association more accurately. In this era of evidence-based care, integrating patient's needs and clinician's perspective with the eventual improvement of Quality of Life while maintaining interrelationships between psychological, oral and systemic health is the need of the hour. This study reinforces the crucial importance of dental awareness and traces its interrelationship with the

psychological health thus emphasizing their action on health-related quality of life.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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