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Oral Health-Related Quality of Life in Temporomandibular Disorder Patients Treated with Stabilization Splint

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ABSTRACT

Introduction: The study aims to evaluate the oral health index related to the quality of life in patients with temporomandibular disorder (TMD) referred to the Mashhad School of Dentistry between 2018 and 2019 before and three months after treatment.

Materials and Methods: This observational prospective study was conducted by interviewing patients with temporomandibular joint (TMJ) pain and clicking who referred to the Department of Prosthodontics, Mashhad Dental School, Iran, between 2018 and 2019. The demographic information of 63 patients was recorded separately. Then, using the Persian version of the OHIP-14 and GHQ-28 questionnaire, the quality of life in patients with TMD was compared before and three months after stabilization splint treatment. To evaluate the quality of life, the OHIP-sum index was used, and finally, the obtained data were analyzed by SPSS software using the Mann-Whitney test, paired-sample t-test, and Wilcoxon test.

Results: OHIP sum was 24.31±8.82 and 13.15±9.52, before and after the intervention respectively. The GHQ sum was 33.32±12.9 and 20.71±11.07 before and after the intervention respectively, showing a significant decrease. The most problems of the stabilization splint users were related to psychological discomfort and the least common problems were related to functional limitations.

Conclusion: The treatment of TMD using stabilization splints can significantly increase the oral health-related quality of life (OHRQoL) in these patients.

Keywords: Oral health-related quality of life (OHRQoL); Temporomandibular disorders (TMD); Stabilization splint (SS).

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Introduction

The term temporomandibular disorder (TMD) refers to a set of disorders characterized by joint and masticatory muscle pain. Also, it is associated with joint sounds (clicking and crepitation), and deviation or limitation of mandibular movement [1]. Other symptoms are locking and otologic problems, including ear fullness, tinnitus, vertigo, and hearing loss [2]. As well as headache that is limited to the temporal region [3]. TMD is a major public health problem that affects up to 11% of the general population and is more common in women. The prevalence of TMD is 16 to 68% among children and adolescents and the patients are typically between 20 to 40 years old [2].

There can be several causes for TMD, including parafunctional habits (bruxism and clenching), trauma (microtrauma or macro-trauma), stress (the body's physical response to stress is also related to the oral parafunctional movements, that causes TMJ pain and other injuries over a long period) [4,5], developmental anomalies of the temporomandibular joint, systemic diseases, and most importantly occlusal trauma [6]. Pain greatly affects the quality of life and it is the paramount factor that forces patients to seek treatment [7,8]. Treatment could include a combination of counseling, pharmacotherapy, manual therapy, stabilization splint (SS) therapy, laser therapy and, acupuncture. It has been demonstrated short-term, conservative therapies such as counseling, occlusal splints, physical therapy, and occlusal splints along with counseling are the most helpful in improving the overall quality of life, and disease symptoms. however, no treatment has been proven to be superior to the other [9].

Occlusal treatments include occlusal adjustment, occlusal splints, and other appliances, using a fixed prosthesis to replace missing teeth and physical therapy [10]. A stabilization splint is an intraoral device that is one of the most common non-invasive treatments for TMD. Some short-term randomized controlled trials have proven SS to have a appreciable effect in alleviating TMD pain (either with joint or muscle origin) compared to other therapies or no treatment for TMD pain [11,12]. On the other hand, some studies have shown that splint therapy has very little or no additional benefit for TMD pain relief compared to placebo or control group, or other treatments such as acupuncture, counseling, or muscle exercises [13–15]. OHRQoL reduction has been reported in TMD patients in systematic studies [7]. A recent systematic review has shown that some psychological and physical conditions that occur following TMD that reduce the quality of life and also functional limitations associated with pain can lead to psychological and physical disabilities in addition to social disabilities [16]. Health is a factor when evaluating the quality of life, and the actual impact of health and diseases on quality of life is referred to as Oral Health-Related Quality of life (OHRQoL) [17]. According to Locker (the founder of the OHRQoL), OHIP-14 is an appropriate tool in terms of involving different aspects of OHRQoL compared to other similar questionnaires [18]. Patients with disabilities have reported an average OHIP score of 20 points higher than those who did not have severe disability or pain. Depression and jaw limitation can also be associated with reduced OHRQOL [19]. Functional, physical, psychological, and social disabilities can significantly affect OHRQOL more than other oral complications [7]. Therapeutic interventions can also have a significant effect on OHRQoL [20]. Quality of life in TMD patients is a multidimensional phenomenon that is affected by factors such as previous orthodontic treatment, associated symptoms, pain, functional limitations, and muscle tenderness [20]. This study aims to assess the oral health-related quality of life in patients with temporomandibular disorders before and during the post three-months follow of treatment by stabilization splints.

Materials and Methods

Sixty-three patients (41 women and 22 men) with inclusion/exclusion criteria, who referred to the Department of Prosthodontics, Mashhad Dental School, Iran, between 2018 and 2019, were entered into the study. The inclusion criteria were as follows: Patients with arthralgia and/or myalgia based on the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD axis I and II), who signed the informed consent, and were over 18 years of age. Exclusion criteria were uncontrolled systemic disease and neurological disorders, head and neck cancer, edentulism, idiopathic clinical symptoms, severe anxiety, history of TMJ surgery or trauma during treatment or to the joint, face, and neck during the last three months. These patients underwent treatment with stabilization splints under the supervision of a specialist. OHIP-14 and GHQ-28 questionnaires were given to patients before and three months after the treatment, then their quality of life was determined and compared accordingly. Data were collected over a period of 10 months.

Sample size calculation

The sample size was determined with power analysis based on the previous study [21] using the formula for two-means comparison, according to the mean and standard deviation of OHIP severity, it was 17.57±10.89 and 12.05±8.84 before and three months after the intervention respectively. The sample size was calculated to be 51 and with an attrition rate of 20%, with 63 patients eventually entering the study.

Ethics approval and Informed consent

All participants were only recruited into the study after being informed about the purpose and method of the study and then giving their consent. The study protocol was reviewed and approved by the Clinical Research Ethics Board of Mashhad University of Medical Sciences.

Assessment and questionnaires

The reliability and validity of two Persian versions of the questionnaires (OHIP-14 and GHQ-28 questionnaires) have been verified according to the conditions of Iran [19,20]. The questionnaires were given to the patients before and three months after the intervention. A member of the research team was always available to explain ambiguous questions to the patients (to elucidate any unclear items if necessary). Subsequently, the quality-of-life scores were determined and compared. The General Health Questionnaire (GHQ-28) is a 28-item multiple-choice, self-administered test that does not aim to achieve a specific diagnosis in a range of mental illnesses but to differentiate between mental illness and mental health. It is intended only for the psychological examination of the individual during the last month. The GHQ-28 consists of physical questions, followed by psychological questions, with four subscales: somatization, anxiety, social dysfunction, and depression. The questions are 4-choice and the severity scores, which represents the effect of the independent variable at all levels of frequency, is calculated using the two scoring methods. In the first method, the individual's score is from 0-28 and the Likert [22] method is calculated from 0-56. The lower the score, the better one's mental health is [22]. The oral health impact profile (OHIP) questionnaire, originally developed by Slade and Spencer [22], has been translated into various languages and verified according to Iran's validity and reliability conditions [22]. The OHIP questionnaire is highly reliable and valid in assessing an individual's OHRQoL [23]. OHIP-14 which is a summarized form, investigates seven subscales: functional limitations, physical pain, psychological discomfort, physical disability, social disability, and handicap. The answers are graded from 0-4 and the severity of total response is calculated from 0-56 and the higher score indicates lower oral health [24].

Statistical Analysis

Data were presented as mean ± standard deviation (SD) for numerical variables and frequency and percentage for qualitative variables. Independent sample t-tests were applied to compare the mean of numerical variables between baseline and after the intervention. To analyze the main findings, first, the normality of variables was examined by the Kolmogorov-Smirnov test, and then for non-normal variables, Man-Whitney and Wilcoxon tests were used. For normal variables, the independent sample t-test, and paired sample t-test were used. To analyze the data, the software SPSS 25 was used and all statistical tests were two-sided, and P values less than 0.05 were considered as statistically significant.

Results

The mean age of the patients was 30.89±10.68 and the majority of them were female participants (65.1%). All variables except social dysfunction had an abnormal distribution before or after the treatment ($p<0.05$). The mean of the OHIP-14 sum was 24.31±8.82 and 13.15±9.52 before and after the intervention respectively ($p<0.001$). The mean of the GHQ-28 sum was 33.32±12.9 and 20.71±11.07 before and after the intervention respectively ($p<0.001$). The mean of the OHIP-14 sum and GHQ-28 sum indices decreased significantly in all subscales after the intervention compared to before (Tables 1 and 3). The OHIP scores decreased significantly in both males and females. The obtained results indicate a significantly less change in the OHIP scores among females, such that the OHIP scores showed the least improvement in women than men (Table 2). All seven aspects related to the quality of life (functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap), had statistically significantly decreased three months after the intervention. The highest scores, followed by the most problems with OHRQoL, were regarding psychological discomfort. The lowest score after the intervention was related to functional limitations. All subscales received a lower mean score three months after the intervention than before, which signifies improved oral health. This difference in the mean score on all OHIP subscales was statistically significant ($p<0.001$) (Table 1).

Table 1. The mean and standard deviation of OHIP-14 subscales before and three months after the interventio.

Test result	After three months	Baseline	Subscales
Z= -4.54 p-value<0.001	0.53±1.03	1.32±1.72	Functional limitation
Z= -6.33 p-value<0.001	2.51±2.04	4.63±1.91	Physical pain
Z= -5.83 p-value<0.001	3.62±1.87	5.08±1.76	Psychological discomfort
Z= -6.18 p-value<0.001	1.78±1.76	3.66±1.94	Physical disability
Z= -6.26 p-value<0.001	1.9±1.93	3.6±2.1	Psychological discomfort
Z= -6.07 p-value<0.001	1.21±1.62	2.75±1.84	Social disability
Z= -6.02 p-value<0.001	1.44±1.52	3.22±1.86	Handicap

Table 2. Means and standard deviations of the OHIP-14 before and after the intervention according to sex.

Wilcoxon test result	Difference	After three months	Baseline	Variable levels	Variable
Z= -3.92 p-value<0.001	-12.73±5.72	13.53±11.52	26.26±9.82	Male	Sex
Z= -5.3 p-value<0.001	-9.51±4.8	13.82±8.98	23.33±8.42	Female	
	t= -2.95 p-value=0.005	Z= -0.74 p-value=0.45	Z= -0.88 p-value=0.37	Mann-Whitney	

Table 3. Mean and standard deviations of the GHQ-28 subscales before and after the intervention.

Wilcoxon test result	After three months	Baseline	Subscales
Z=-6.21 p-value<0.001	4.65±3.64	8.13±4.11	Somatization
Z=-6.11 p-value<0.001	4.25±3.19	8.03±4.31	Anxiety
t=-10.78 p-value<0.001	9.41±3.43	12.61±3.33	Social dysfunction
Z=-5.11 p-value<0.001	2.33±2.93	4.4±4.14	depression

Discussion

Oral health plays a vital role in an individual's quality of life because it affects a variety of aspects including comfort, function, and esthetics. Temporomandibular disorders also impact quality of life and TMD patients have been shown to suffer from impaired OHRQoL [7,8,25]. Data related to the effect of stabilization splint therapy as a treatment for TMD on OHRQoL have been reported using the OHIP-14 questionnaire in some studies [9,21,26,27]. The present study also used a GHQ-28 questionnaire to measure psychological symptoms, including anxiety, depression, and social functioning. In the present study, quality of life, measured by the indicators of the OHIP-14 sum and GHQ-28 sum, increased overall after receiving stabilization splint therapy compared to baseline (by decreasing the scores of the OHIP-14 sum and GHQ-28 sum indexes) [13,28]. Study results are in agreement with the present study, showing users of stabilization splints had a lower score after the follow-up period and inevitably signifying a higher quality of life than before receiving treatment [9,21,29].

Silvola et al. [30] have shown that as a consequence of TMD treatment, pain reduction was associated with an improved OHIP-14. Concerning the present study, it was acknowledged that the treatment of malocclusion led to the improvement of the OHRQoL score by reducing facial pain and it affects the dimensions of pain, and physical, and social disability. Also, there was no clear difference between sex and different treatment groups. List et al. [13] have acknowledged in a systematic review that there is evidence that occlusal appliances increase quality of life by pain reduction. The present study corroborates these findings. In a systematic review study published by Song, It has been reported that occlusal appliance therapy improves OHRQoL among TMD patients [28]. It has been mentioned that the best treatment for TMD may vary depending on the patients, but the quality of life had increased in cases where the patient required appliance therapy. The results of that valid study are in line with the findings of the present study.

In another study in which patients were allocated into three treatment groups was shown that SS is considered to be one of the best treatments, but no single treatment has been shown to be superior to the others [26]. The reason for the agreement in the findings of the mentioned studies may be attributable to the skills and overall ability of the expert in the study who treated the patients and fabricated occlusal splints and consequently, was able to reduce the discomfort of TMD patients [31]. However, it should be noted that treating TMD may involve combination therapies, and it should be noted that the effect of each treatment may affect other treatments.

According to the Pain study, no single treatment is holistically suitable to control TMD [28]. SS therapy did not show any beneficial effects on OHRQoL among TMD patients after the one-year follow-up, compared to mere counseling or masticatory muscle exercises. It can be said that every single method could, to a certain extent, be effective and a possible is safe to say that each method alone can be effective to some extent. A possible explanation for the reported findings could be the placebo effect or the longer follow up period and the return of the previous symptoms [21]. Also, in the present study, after using hard occlusal splints (in 3-month follow-up), the highest scores and consequently the most common problems related to OHRQoL, were regarding psychological discomfort. This is also explained as "overt emphasis on somatic idioms of distress" and "unacceptability and stigma" related to mental illness in Asian culture [2]. High severity scores related to physical pain were explained as one of the main signs of TMD is orofacial pain, regarding this finding, it offers additional support for previous studies on TMDs and OHRQoL using the OHIP-14. Also, the least affected subscales after the intervention were observed to be functional limitations, which were slightly different from other studies [2,7]. Another rationale for differences in results may be related to the patients' dissatisfaction with occlusal splints due to the nature of occlusal splint treatment. Stabilization splint therapy requires greater clinical time, and patients need to use their splint frequently, which can lead to dissatisfaction and loss of motivation, resulting in reduced quality of life [32]. Psychological status can affect the short-term effects of the treatments, and a meta-analysis has revealed that there was no difference between the treatments [33].

In contrast to the present study, previous studies have shown that there are no gender or therapeutic group differences [8,30]. In one study, OHRQoL remained unchanged in men; but increased in women [34]. In this study, anxiety had a great impact on the quality of life of the study subjects [8]. This study also reported a significant change in the OHIP scores among women, which was less than the changes observed in men; indicating that lower scores of satisfaction were obtained after the intervention. It has been pointed out that in some studies conducted on patients with malocclusion and TMD, women had poorer OHRQoL scores than men, which may be attributed to different reasons, such as biological, hormonal, social, and psychological factors [19,35]. As De Resende reported, the prevalence rate of TMD was 80.9% in women, and the discrepancy could be due to women's endocrine system and hormonal fluctuations that may cause them to perceive pain more severely and have a greater temporal summation of painful stimuli than men [9]. The Sipilä et al study corroborated the conclusion that the OHRQoL scores in women were associated with depression, and women generally reported higher rates of depression, followed by more complaints [36]. It has also been shown that women are more exposed to complex neurophysiological mechanisms between pain and depression than men. Therefore it has been recommended to use auxiliary methods such as counseling and muscle exercises [36]. The results of this study proved the extent to which the use of stabilization splints for TMD patients affects their quality of life and found, that even though stabilization splints are accepted as an ideal treatment, but concentrating on other factors such as psychological factors could

improve the quality of life in a wide range of patients. The results of this study can provide a good insight into the treatment of choice for each patient. Also, auxiliary treatments for females, such as counseling and muscle exercises could be beneficial. One of the limitations of this study was the lack of a control group to identify changes in the questionnaire in healthy individuals.

Conclusion

Due to the limitations of this study, the results show that the treatment of temporomandibular disorders using stabilization splints has improved the health of the individual's dental system and therefore can increase OHRQoL significantly. Also, the effects of stabilization splints and temporomandibular joint problems on a person's anxiety and stress status and vice versa, as well as their relationship with TMD problems, have been well determined in this study.

Conflict of Interest

There is no conflict of interest to declare.

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