

Assessment of Changes in the Oral Health-Related Quality of Life among Patients Wearing Fixed Orthodontic Appliances

Abstract

Objectives: The objective of this study was to assess changes in the oral health-related quality of life (OHRQoL) among patients wearing fixed orthodontic appliances 1 week after insertion. **Materials and Methods:** Forty patients aged between 14 and 28 years (17 males and 23 females; mean age, 21.6 years; SD 4.7 years) seeking orthodontic care at the Postgraduate orthodontic clinic, M.A.Rangoonwala dental college. The oral Health-Related quality of life (OHRQoL) was measured before treatment and 1 week after insertion of the orthodontic appliance. The instrument used to measure OHRQoL was a modified self-administered short version of Indian questionnaire. The higher the score, the poorer is the OHRQoL. **Results:** Overall score of OHRQoL increased significantly 1 week after insertion (mean 17.20 ± 10.06) as compared to before insertion (mean 9.10 ± 10.43) ($P < 0.001$). Significant changes were found for the following items: Difficulties in chewing, bad breath, difficulties in pronunciation, discomfort in eating, ulcer, pain, food stuck in between teeth, embarrassment, avoidances of eating certain foods, difficulties in cleaning, embarrassment, concentration affected, concentration affected, difficulty carrying out daily activities, and lack of self-confidence ($P < 0.05$). Significant changes were also found in female relating to OHRQoL ($P < 0.001$). **Conclusion:** OHRQoL was found to deteriorate after insertion of fixed orthodontic appliances. This information can be used as “informed consent,” which might increase patient’s compliance as they are aware of what to expect from initial orthodontic treatment.

Key Words

Changes; oral health; quality

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INTRODUCTION

In the preamble of its constitution, the World Health Organization (WHO) states “Health is a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity.”^[1] So now it is important to know that quality of life (QoL) measures are not a substitute of measuring outcomes associated with the disease, but are adjunct to them.^[2] Oral health related quality of life (OHRQoL) is a relatively new, but rapidly growing phenomenon, which has emerged over the past 2 decades. This shift happened in the second half of the 20th century and it was the result organization (WHO) as the key issue in the

conception of health related quality of life (HRQoL) and subsequently OHRQoL a “silent revolution” in the values of highly industrialized societies from materialistic values that concentrate on economic stability and security to values focused on self-determination and self actualization.^[3] Orthodontic treatment is different from most medical interventions in that it does not cure or treat a condition; but rather, it aims to correct variations from an arbitrary norm.^[4] Despite the fact that demand for orthodontic treatment is mostly related to personal concern about appearance and other psychosocial factors, measures of orthodontic need and outcomes of orthodontic treatment place

Table 1: The distribution of demographic characteristics of the subjects studied

Characteristics	Frequency n (%)	Mean (SD)
Gender		
Male	17 (42.5)	
Female	23 (57.5)	
Age (Years)		
Adolescents (14 – 18)	12 (30.0)	16.3 (1.7)
Young adults (19 – 35)	28 (70.0)	23.9 (3.6)
All combined	40 (100.0)	21.6 (4.7)

Table 2: The comparison of pre and post OHIP-16 score for each domain

Domain	Pre-OHIP-16	Post-OHIP-16	P-value
Functional limitation	0.40 ± 0.77	1.22 ± 0.86	0.001
Physical pain	0.20 ± 0.62	1.29 ± 0.77	0.001
Psychological discomfort	0.84 ± 0.71	1.35 ± 0.93	0.003
Physical disability	0.65 ± 0.99	1.36 ± 1.01	0.001
Psychological disability	0.49 ± 0.53	0.63 ± 0.86	0.315
Social disability	0.31 ± 0.82	0.49 ± 0.51	0.258
Handicap	1.26 ± 1.58	1.03 ± 1.00	0.320
OHIP-16 (Overall)	9.10 ± 10.43	17.20 ± 10.06	0.001
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Physical pain	0.20 ± 0.62	1.29 ± 0.77	0.001
Psychological discomfort	0.84 ± 0.71	1.35 ± 0.93	0.003
Physical disability	0.65 ± 0.99	1.36 ± 1.01	0.001
Psychological disability	0.49 ± 0.53	0.63 ± 0.86	0.315
Social disability	0.31 ± 0.82	0.49 ± 0.51	0.258
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relatively little emphasis on the patient's perceptions of need and the difference that orthodontic care would bring to their daily lives. Studies have also shown that malocclusion is associated with poor OHRQoL.^[5,6] Studies have also shown that, depending on the phase of the treatment, orthodontic treatment may either compromise or improve OHQoL.^[7,8] The relationship between the quality of life and malocclusion has not been established. However, evidence suggests that evaluations in relation to a need for correction of malocclusion should be patient oriented or subjective. In other words, the need for orthodontic treatment is related to OHQoL, but it is not necessarily related to objective (clinical) criteria.^[9] In the two decades since Cohen and Jago^[10] advocated the development of 'socio-dental' indicators, there has been considerable methodological research leading to the development of questionnaires to measure dimensions of quality of life that relate to oral health.^[11] Also, Patients as well as their parents expect orthodontic treatment to enhance their lives in many ways beyond just improving occlusion, mastication, and speech. They view this treatment as a means to achieve a better

QoL.^[12] The increasing emphasis on the need for evidence based health services requires that the evaluation of the effectiveness of orthodontic treatment employ outcome measures that are important to the patient and the clinician^[13]. Thus, studying OHQoL in orthodontic patients may provide information that will help clinicians and public health planners improves the quality of orthodontic care.^[14] Studies have shown that orthodontic therapy affects QoL.^[15-20] The intensity of the negative impact depends on the type of therapy received. For example, Bernabe *et al.*,^[15] found that adolescents wearing fixed appliances had a higher frequency of impact than those wearing removable or both types of appliances simultaneously. Another study done by Miller *et al.*,^[16] reported that patients wearing fixed appliance had more negative impact than those who were wearing the Invisalign aligners. However, this may have bias effect on the reaction and perception of the patients since Invisalign is generally limited to less complicated cases.^[20] The impact of orthodontic therapy on QoL is also dependent on the time factor. Miller *et al.*,^[16] evaluated the differences in QoL impact between subjects treated with

Invisalign aligners and those with fixed appliances during the first week of orthodontic treatment using daily diary with modified Geriatric Oral Health Assessment Index. It was found that there was a significant time effect on the OHRQoL. For the clinician, the potential benefits are in treatment compliance and in medico- legal situations. Thus, this study was aimed to assess the changes of the OHRQoL “One Week” following insertion of fixed orthodontic appliance. A secondary aim of this study was to determine the changes of OHRQoL “One Week” following insertion of fixed orthodontic appliance by gender and age group. The information may be useful to improve patient’s compliance, as they will be aware of what is to be expected from an initial orthodontic treatment^[21] and hence might improve treatment outcome.

MATERIALS & METHODS

A total of 40 patients seeking orthodontic care at the Postgraduate orthodontic clinic, MA Rangoonwala dental college, Pune were selected using purposive sampling based on the inclusion and exclusion criteria.

Inclusion Criteria

A total of 40 patients seeking orthodontic care were selected; 42% males & 58% females with 64% adolescent and 36% young adult group

The inclusion criteria were:

1. Age group (14 and 28 years)
2. Mild Skeletal pattern Class I, Class II, or Class III (ANB \pm 3°)
3. Moderate Crowding or Spacing in upper and lower arches (4-8 mm).
4. Metallic brackets with 0.022” slots

Exclusion Criteria

The exclusion criteria were:

1. Patients with severe skeletal pattern (Class II or Class III patients).
2. Syndromic patients (cleft lips or palate or both)

These patients were reported to have had high levels of oral impact to their lives compared to “normal” population.^[22,23] An Indian short version of the Oral Health Impact Profile (OHIP) questionnaire was made, which is named as OHIP-16 [M], was used to measure OHRQoL. OHIP was chosen as the instrument to measure OHRQoL for this study because it is widely used in most of the studies for QoL. Pre-testing of the questionnaires was done to check for the face validity. The OHIP-16 [M] measures focus on the impact of one’s oral health condition on QoL, contributing to seven domains: Functional limitation, physical pain, psychological

discomfort, physical disability, psychological disability, social disability, and handicap. Responses of each item are made on a Likert scale and coded as: 1=never, 2=hardly ever, 3=occasionally, 4=fairly often, and 5=very often. Individual domain scores can be calculated by summing responses to the items within a domain, with higher scores indicating greater impact. Once patients have agreed to participate in the study, researcher explained about the study to the patients and the nature of their participation. Each patient was given an oral and a written information sheet about the study and written informed consent was obtained before the first questionnaire was administered. For patients below 18 years old, consent was obtained from the patients and parents. All patients signed informed consent forms that described the purpose, benefits, and drawbacks of the study. Patients completed the first questionnaire, which was used as the baseline, before insertion of the fixed orthodontic appliance, and they completed the second questionnaire One Week after insertion. For the assessment One Week after insertion, the questionnaire with researcher’s self-addressed envelope was administered to patients, which the patients submitted back to researcher after completion. The fixation of the orthodontic appliances followed the standard protocol given by the manufacturer. Only one operator did the fixation to reduce systematic bias. Brackets were bonded from the second permanent premolar to second permanent premolar and molar tubes were banded on all first permanent molars. These procedures were done on the same day. A 0.014” nickel–titanium arch wire was placed in both arches for initial alignment. The fixation of the brackets and molar tubes was performed 1 week after extraction in patients who required extraction in their treatment plan. The first questionnaires were also administered 1 week after extraction. This is to allow complete healing of the extraction wound as any pain from the extraction procedure might contribute to bias. All patients who agreed to participate were given oral healthcare products (consisting of orthodontic toothbrush, fluoride mouthwash, and inter-dental toothbrush).

RESULTS

Forty patients enrolled in the study. All the patients attempted all the questionnaires, which gave 100% response rate. 42.5% of the participants were males and 57.5% were female [Table 1]. Mean age for the samples was 21.6 years (SD=4.7 years), with 30%

Table 3: The comparison of pre and post OHIP-16 score for each domain and each item

Domain	Items	Pre-OHIP-16	Post-OHIP-16	P-value
Functional limitation	Difficulties in chewing	0.55 ± 0.21	1.31 ± 1.1	0.002
	Bad breadth	0.53 ± 0.98	0.95 ± 0.84	0.015
	Difficulties in pronunciations	0.23 ± 0.34	1.18 ± 1.23	0.001
Physical pain	Discomfort in eating	0.30 ± 0.21	1.48 ± 1.17	0.001
	Ulcer	0.18 ± 0.64	1.20 ± 1.10	0.001
	Pain	0.23 ± 0.14	1.38 ± 1.14	0.001
Psychological discomfort	Food stuck in between teeth	0.28 ± 0.14	1.98 ± 1.21	0.001
	Embarrassment	1.44 ± 1.53	0.74 ± 0.45	0.007
Physical disability	Avoidances of eating certain foods	0.30 ± 0.22	1.85 ± 1.44	0.001
	Avoiding smiling	1.00 ± 0.98	0.88 ± 0.76	0.675
Psychological disability	Disturbed sleep	0.50 ± 0.38	0.40 ± 0.87	0.562
	Concentration affected	0.48 ± 0.77	0.85 ± 0.76	0.038
	Avoided going out	0.33 ± 0.89	0.25 ± 0.67	0.660
Social disability	Difficulty carrying out daily activities	0.30 ± 0.75	0.73 ± 0.89	0.028
	Lack of self confidence	1.65 ± 1.45	0.78 ± 0.66	0.019
Handicap	Difficulties in cleaning	0.88 ± 0.65	1.30 ± 1.20	0.098

Table 4: The distribution of overall pre and post OHIP-16 score according to gender

Gender	Pre-OHIP-16	Post-OHIP-16	P-value-1 (Intra-group comparison)
Male (n=17)	11.4 ± 10.1	15.8 ± 9.6	0.110
Female (n=23)	7.4 ± 5.6	18.2 ± 10.5	0.001
P-value-2 (Inter-group Comparison)			
Male v/s Female	0.318	0.464	

Table 5: The distribution of overall pre and post OHIP-16 score according to two age group

Age groups	Pre-OHIP-16	Post-OHIP-16	P-value-1 (Intra-group comparison)
Adolescents (14 – 18)	14.0 ± 11.0	17.3 ± 9.8	0.261
Young adults (18 – 35)	7.0 ± 5.1	17.1 ± 10.3	0.001
P-value-2 (Inter-group Comparison)			
Adolescents v/s Young Adults	0.103	0.957	

in adolescent group (mean 16.3 years, SD=1.7) and 70% in young adult group (mean 23.9 years, SD=3.6) [Table 1]. Overall scores of OHIP-16 [M] increased significantly One Week following insertion of fixed orthodontic appliances ($P < 0.001$) [Table 2]. At baseline, the mean score of OHIP-16 [M] was 9.10 (SD=10.43) and increased to 17.20 (SD=10.06) after One Week following insertion. Almost all domains in the OHRQoL, i.e., functional limitation, physical pain, physical disability and psychological discomfort, were significantly affected One Week following insertion of fixed orthodontic appliances, except psychological discomfort, handicap domain and social disability [Table 2]. Almost all items in the OHIP-16 [M] were significantly affected One Week following insertion except avoiding smiling ($P=0.675$), disturbed sleep ($P=562$), avoided going out ($P=660$) and difficulties in cleaning ($P=.098$) [Table 3] and (Fig. 2). Females tended to report more negative

impact on OHRQoL than males. The mean differences were higher among female participants (mean 18.2, SD=10.5) compared to males (mean 15.8, SD=9.6), with NO significant difference found between them ($P < 0.05$) [Table 4]. Between the two age groups, the impact of OHRQoL One Week following insertion showed no significant difference ($P < 0.05$), although the young adult age group had slightly higher mean differences (mean 17.1, SD=10.3) compared to adolescent age group (mean 17.3, SD=9.8) with significant difference found between the young adult age group ($P < 0.05$) [Table 5].

DISCUSSION

The assessment of OHRQoL has an important role to play in clinical practice.^[24] It is now generally accepted that the measurement of oral health-related quality of life is an essential component of oral health surveys, clinical trials and studies evaluating the outcomes of preventive and therapeutic

programs intended to improve oral health. Of all the dental treatments that require the use of oral health related quality of life measures, the treatment of malocclusion, which has a large psychosocial component, calls for the use of these measures.^[25]

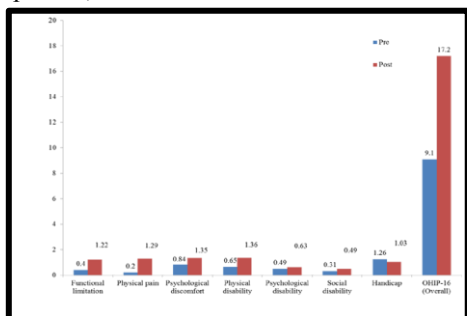


Fig. 1

Oral health-related quality of life measures can and should be used in the assessment of need and the outcomes of dental care. That was the basis for this study. The response rate to the study was high (100%) highlighting the feasibility of using a patient-centered outcome measure in orthodontic research. The research subjects were limited to those associated with fixed orthodontic appliance therapy. This study was carried out to assess any change in OHRQoL among patients wearing fixed orthodontic appliances One Week following insertion. The OHIP-16 scores at the pre-treatment were low. However, OHRQoL was poorer One Week following insertion of fixed orthodontic appliances. This supports findings that orthodontic treatments will have impact on patients' lives, especially during the initial treatment. Significant differences ($P < .001$) could be observed between pre-OHIP-16 and post-OHIP-16. Patients undergoing orthodontic treatment were more likely to report an oral health impact, which may suggest that the process of treatment causes oral health impacts and affects the patients' QoL. This supports findings that orthodontic treatment affects patients' lives.^[26,27] Patients, who were currently under fixed orthodontic therapy, especially at the first week, would exhibit a compromised OHRQoL compared with any other time, but the OHRQoL might improve gradually during therapy. All domains in this study were affected except the psychological disability, social disability and handicap domains. The domains affected in this study were similar with those reported in other previous studies that focused on the impact of orthodontic treatment after 1 week of fixation. Chen *et al.*,^[28] reported in their study that the greatest compromised OHRQoL domains were physical pain, psychological

discomfort, and physical disability within 1 week after fixation of the appliances. The impact on functional limitation, physical pain, psychological discomfort and physical disability was more pronounced in this study as the assessment was done One week following insertion. Impact on the psychological disability, social disability and handicap domain was minimal, which may be because these domains depended more on personality characteristics and general daily situations despite the oral condition. The most affected items in this study were discomfort in pronunciation, discomfort in eating, ulcer, pain, food stuck in between teeth and avoidances of eating certain food. The outcomes were similar with those reported by Chen *et al.*,^[28] who observed that eating, speaking, and smiling were affected within 1 week of orthodontic fixation. Many researchers studying pain and discomfort after fixation found that the pain and discomfort started 2 h following insertion, peaked at 24 h, and decreased during the next 3 days following initial arch wire placement.^[29-33] This is in accordance with our study wherein we found patients experiencing pain One Week following insertion. Brown and Moerenhout^[34] reported that pain from orthodontic treatments has a definite influence on the daily activities of patients. Several researchers reported that patients had to change their diet to adapt to the pain from orthodontic treatment. Scheurer *et al.*,^[32] reported that for patients wearing fixed appliances, eating is the greatest challenge contributing to their QOL. Patients encountered difficulty one week following insertion in performing normal oral functions such as eating, speaking, smiling, and cleaning with the appliances *in situ*. Mechanical adaptation of this condition triggered injury of the oral mucosa, which may cause ulceration. Patients in this study reported embarrassment and lack of self-confidence, One Week following insertion, which may be because fixation of the appliances attracted people as face is the center of attraction when communicating with people. The study revealed that difficulties in chewing, bad breath, difficulty in carrying out daily activities were also significant to effect functional limitation and social disability. The study also found that there were concentration affected One Week post fixation with fixed orthodontic appliances. Females experienced more negative impact compared to males as other previous studies claimed.^[32,35] This might be due to gender variations in expressing impact of OHRQoL on daily lives.

McGrath and Bedi^[36] reported that females perceived oral health as having greater impact than males, whether negative impact or positive impact. Kurtz^[37] claimed that it is easier for women to describe their characteristics, either positive or negative, whereas men tend to provide the same general descriptions about themselves; furthermore, men are thought to have been socialized to suppress outward signs of pain.^[38] The adolescent group (14-18 years) reported fewer changes in OHRQoL One Week following insertion of fixed orthodontic appliances, compared to young adult group. However young adult group (19-28 years) were more significant. Some studies reported adolescent patients feel less pain than older patients.^[30,32,34] Adolescents were reported to be more vulnerable to the undesirable psychological effects of treatment and had higher levels of pain than older patients.^[34] Muir^[39] reported that problems caused by fixed orthodontic appliances were more marked in adult patients than in younger patients. However, Scott *et al.*,^[29] reported age does not affect the level of discomfort in patients undergoing treatment. They also reported that gender has no effect on perceived discomfort experienced by subjects undergoing fixed appliance orthodontic treatment. The apparent paradox of improved sleep and concentration might be related to how subjects deal with their problems by undergoing treatment. In addition, it could be because fixed orthodontic appliances are now more popular and the general population is accustomed to such appliances so that psychological disability to fixed appliance reduces. In this report, patients were not grouped by the bracket type used. This was because the main interest of this study was to assess the changes of OHRQoL in patients one week following insertion of fixed orthodontic appliances, regardless of the bracket types used. This might be the limitation of this study as perhaps different bracket types might have different impact of the patient's OHRQoL. Some bracket types might either increase or decrease the impact of patient's OHRQoL One Week following insertion. Further studies are needed to assess the impact of OHRQoL following orthodontic treatment with regards to different bracket types used. Relatively small sample size was another limitation of this study; hence, the interpretation of the result was made within this limitation. Doctors, for their part, should also actively comfort patients and relay that the OHRQoL might improve gradually during therapy and that there will be no obvious difference between

pre-treatment and the end of the 1-month interval; in addition, doctors should impart that when the patient finishes orthodontic treatment, the OHRQoL will be significantly better than at pre-treatment. This will be indicative of either actual decreases in negative factors experienced, adaptation to treatment, or learned experience that will occur along with treatment. These clinical visit parameters will help doctors to get their patients' cooperation during therapy and achieve a more acceptable and positive treatment result for both. OHRQoL is a relative rather than absolute concept; thus, assessments of OHRQoL are merely indications of a subject's own experiences and perceptions. Furthermore, although statistically significant changes were observed, and in many cases they were large, it is unclear whether these statistically significant changes are clinically significant. As more research is undertaken in orthodontics with standardized OHRQoL assessment measures, our understanding of relative concept and how to achieve acceptable OHRQoL will be improved.

CONCLUSION

Fixed orthodontic appliance therapy does affect Indian patient's OHRQoL. OHRQoL deteriorates one week following insertion of fixed orthodontic appliances, affecting almost all domains. At One Week after the insertion of fixed appliances, the QoL was at the worst point because the combination of functional limitation, physical pain, psychological discomfort, and physical disability was at its highest level. The changes differ by gender. This information can be used for "informed consent," which may increase patients' compliance as they are aware of what is to be expected during the initial phases of orthodontic treatment.

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