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Original Article

Dentistry Section

Quality of Life Before and After Orthodontic Treatment in Adult Patients with Malocclusion: A Quasi-experimental Study

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ABSTRACT

Introduction: In adult patients seeking orthodontic treatment, some common reasons include unesthetic appearance and functional impairment such as difficulty in speaking or breathing. Thus, malocclusion and orthodontic care have become a Quality of Life (QoL) issue.

Aim: To investigate the oral health-related quality of life in adults before and after orthodontic treatment.

Materials and Methods: This quasi-experimental study was conducted in Faculty of Dental Sciences, M.S. Ramaiah University of Applied Sciences, Bangalore, India over a two year period from December 2014 to October 2016. Finally, 34 patients were included in the study. Longitudinal data which included OHRQoL (Oral Health-Related Quality of Life) and study casts for assessing the outcome by the Peer Assessment Rating (PAR) index was collected from two periods: (i) pretreatment data (T1), and (ii) post-treatment data (T2) collected one month after fixed orthodontic appliance debonding. Pretreatment and post-treatment Oral Health Impact Profile (OHIP-14) and PAR scores were compared using Paired t-test. Correlations between occlusal indices (PAR) and OHRQoL (OHIP-14) were determined by Spearman's rank correlation coefficient.

Results: Total of 42 patients were included in the study, out of which 34 patients responded to the questionnaire in which 11 were males and 23 females in the age range 18-30 years. From pre to postorthodontic treatment mean OHIP-14 summary score had significantly improved (score reduced) from 30.3 to 16.0. Similarly, mean PAR scores had reduced from 17.62 to 3.44. Significant correlation (p-value <0.05) existed between improvement in OHRQoL scores and improvement in occlusion after orthodontic treatment.

Conclusion: The present study concluded that there was an improvement in oral health following fixed orthodontic treatments which were associated with changes in OHRQoL, PAR scores and changes in occlusion.

Keywords: Fixed orthodontic treatment, Occlusion, Oral health, Peer assessment rate

INTRODUCTION

There has been a marked increase in demand for orthodontic treatment among adult patients not because of anatomical irregularities per se to prevent the destruction of tissue within the oral cavity, but because of the consequences of aesthetic or functional impairment that malocclusion gives rise to [1-3].

The term Health-Related Quality of Life (HRQol) has been used to describe an individual's assessment of his or her well-being [4,5]. When the considerations centre around the orofacial region, OHRQoL is assessed. In recent decades, a number of valid and reliable measures have been developed to assess the impact of oral health related quality of life among adult patients [6].

Understanding the physical, social and psychological consequences of malocclusion and its treatment, as well as, its influence to QoL is of considerable interest in recent times within orthodontics [7]. However, a number of issues remain unclear. Firstly, there is no clear protocol for assessing the need for orthodontic treatment and its correlation with OHRQoL. Secondly, the impact of ongoing orthodontic treatment on everyday life of adult patients has not been analysed. Thirdly, there is a dearth of information regarding changes in OHRQoL that occur following orthodontic treatment, particularly among adult patients. This has implications in understanding the benefits and improvement in oral as well as overall health due to orthodontic treatment.

Thus, the aim of the present study was to evaluate the OHRQoL in adults before and after fixed orthodontic treatment. The objectives of the study were to compare the OHRQoL using OHIP scores before and one month after fixed orthodontic appliance therapy, to compare the occlusal indices (PAR) before and after fixed orthodontic appliance therapy and to correlate the OHIP scores improvement and occlusal indices (PAR) scores improvement before and after fixed orthodontic appliance therapy.

MATERIALS AND METHODS

This quasi-experimental study was conducted in Faculty of Dental Sciences, M.S. Ramaiah University of Applied Sciences, Bangalore, India over a two year period from December 2014 to October 2016. Ethical clearance was obtained from the Institutional Ethical Committee. Adult patients seeking orthodontic treatment were screened according to the inclusion and exclusion criteria as follows:

Inclusion criteria:

- Patients with Angle's class I, II and III dental malocclusion and full complement of permanent teeth who were to undergo orthodontic treatment.
- Male and female patients in the age group of 18-30 years.
- Patients with mild to moderate anteroposterior discrepancies (-1<ANB<6°).

Exclusion criteria:

- Patients with severe skeletal and dental malocclusion, who require orthognathic surgery.
- Patients with craniofacial anomalies and syndromes.
- Patients who have undergone any previous orthodontic treatment.
- Patients with missing or grossly malformed teeth.

- Patients with history of mental disorders, depression, anxiety or under any medication.

Sample size calculation: Total of 42 subjects who fulfilled the inclusion and exclusion criteria were selected to participate in this study. One correlation power analysis was used for the sample size. The sample size has been estimated to be 40 considering power at 80%, Alpha at 0.05 and Beta at 0.197(Alpha is the probability of rejecting a true null hypothesis. Beta is the probability of accepting a false null hypothesis).

Study Procedure

Data collection was done during two time periods-

(i) Pretreatment (T1): It included data of OHRQoL as assessed by the OHIP-14 questionnaire and pretreatment study casts were retained for assessing the outcome of orthodontic treatment.

(ii) Postorthodontic treatment (T2): Data of this was collected 1 month after fixed orthodontic appliance debonding which included OHRQoL as assessed by the OHIP-14 questionnaire and post-treatment study models.

Assessment of OHRQoL: OHRQoL questionnaires were answered by subjects who participated in this study before and after their orthodontic treatment. OHIP-14 questionnaire consists of 14 questions across 7 domains with 2 items per domain to assess the burden of oral health status on life quality [8]. Subjects were asked to rate the frequency of an event described by the questions. Responses are rated on a 5-point Likert scale: 0=never; 1=hardly ever; 2=occasionally; 3=fairly often; 4=very often/every day. A comprehensive measure of self-reported dysfunction, discomfort and disability arising from oral conditions is provided by the index. Higher OHIP-14 scores indicate worse and lower scores indicate better OHRQol.

The OHIP-14 scores can range from 0-56 and domain scores can range from 0-8 and has been summarised in [Table/Fig-1].

OHIP-14	Number of items	Range
Overall	14	0-56
Domains:		
Functional limitation	2	0-8
Physical pain	2	0-8
Psychological discomfort	2	0-8
Physical disability	2	0-8
Psychological disability	2	0-8
Social disability	2	0-8
Handicap	2	0-8

[Table/Fig-1]: Scoring criteria for OHIP-14.

Assessment of orthodontic treatment outcomes: The same trained and calibrated examiner assessed the pre and post-treatment study models using PAR to determine the orthodontic outcomes. There were five components to consider in the PAR: Upper and lower labial segment alignment, Buccal occlusion, Overjet, Overbite and Centreline [9].

STATISTICAL ANALYSIS

Statistical Package for Social Sciences [SPSS] for Windows version 22.0 Released 2013. Armonk, NY: IBM Corp., was used to perform statistical analysis. The level of significance was set at $p<0.05$. In assessing changes in OHRQoL following comprehensive fixed orthodontic treatment, pretreatment OHIP-14 scores were compared with post-treatment scoring using Paired t-test. Similarly, changes in occlusion following comprehensive fixed orthodontic treatment were assessed by comparing pre- and post-treatment PAR scores using Paired t-test. Correlation between pretreatment and post-treatment occlusal indices scores (PAR change scores) and OHRQOL (OHIP-14 summary score changes) were determined by Spearman's rank correlation coefficient.

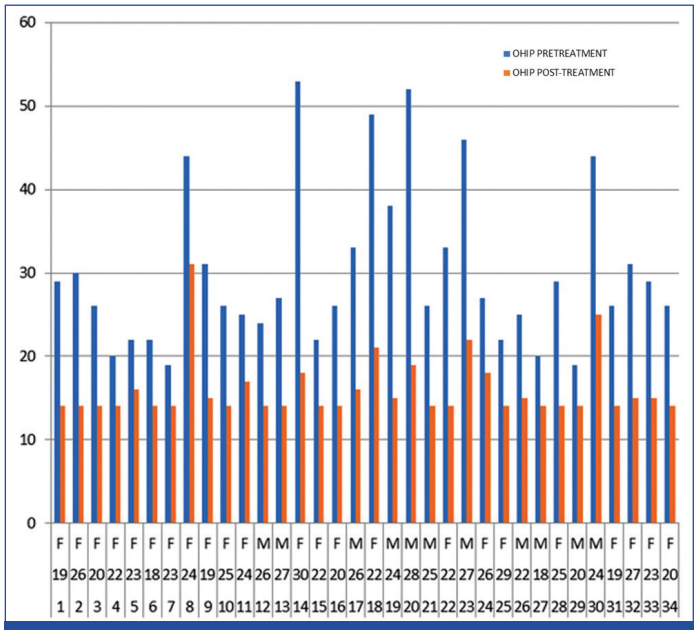
RESULTS

Total of 42 patients were included in the study, out of which 34 patients responded to the questionnaire consisting of 11 males and 23 females from the age range 18-30 years. The response rate of this prospective study was good (80.95%) indicating the feasibility of considering OHRQoL in the orthodontic clinical environment.

Comparison of OHRQoL before and after fixed orthodontic appliance therapy: Prior to orthodontic treatment, the mean OHIP-14 summary score was 30.3. During post orthodontic treatment, the mean OHIP-14 summary score had significantly improved (score reduced) to 16.0 with the domains of psychological discomfort and social disability showing maximum improvement. Comparing before and after fixed orthodontic appliance therapy, there was a significant reduction in OHIP-14 summary scores before and after treatment. (p-value <0.001) [Table/Fig-2,3].

Variables	Pretreatment mean	Post-treatment mean
Summary OHIP-14	30.03	16.00
Domains:		
Functional limitation	4.86	2.10
Physical pain	4.32	3.05
Psychological discomfort	5.76	2.16
Physical disability	4.27	3.07
Psychological disability	3.35	2.00
Social disability	4.45	1.39
Handicap	3.02	2.23

[Table/Fig-2]: Pre and post-treatment OHIP-14 scores.
p<0.001; Paired t-test; p<0.05: significant

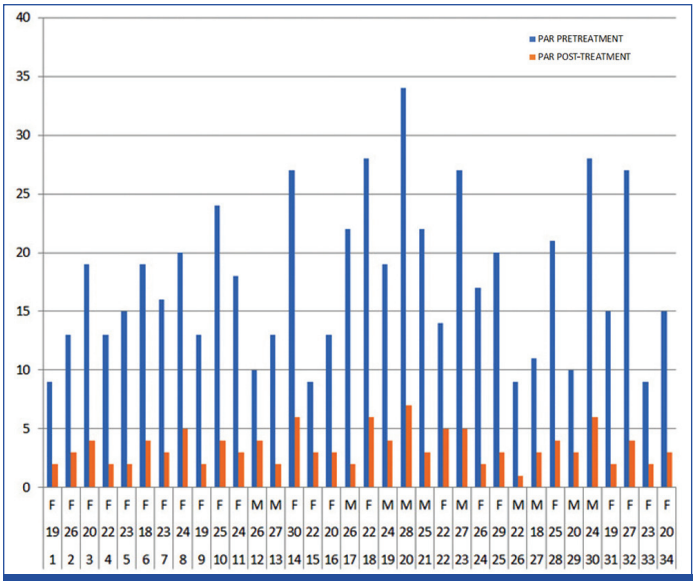


[Table/Fig-3]: Comparison of OHIP pre and post-treatment with patient's age and sex.

Comparison of occlusal indices (PAR) before and after fixed orthodontic appliance therapy: Prior to orthodontic treatment the mean of PAR scores was 17.62 and in the post-treatment the mean PAR Score had reduced to 3.44. Comparing before and after fixed orthodontic appliance therapy, there was a significant reduction in PAR scores before and after treatment (p-value <0.001) [Table/Fig-4,5].

Variables	Pretreatment mean	Post-treatment mean	p-value
PAR scores	17.62	3.44	0.001

[Table/Fig-4]: Pre and post-treatment PAR scores.
Paired t-test; p<0.05: significant



[Table/Fig-5]: Comparison of PAR Pre & Post-treatment along with patient's age and sex.

Correlation between OHRQoL scores improvement and occlusal indices scores improvement: Significant correlation existed between PAR and OHRQoL scores. Correlation between occlusal indices scores and OHRQoL summary scores both pre (r=0.718, p=0.001) and post-treatment (r=0.538, p=0.002) were significant [Table/Fig-6].

Variables	Sample (n)	Correlation coefficient (r)	p-value
OHIP before and PAR before	34	0.718	0.001
OHIP after and PAR after	34	0.538	0.002

[Table/Fig-6]: Spearman's rank correlation between OHIP and PAR.

DISCUSSION

It is now a widely held consensus that oral health is not simply the absence of disease or deformities but relates to physical, social and psychological experiences of their status [10]. Within orthodontics, traditionally the focus has been on correcting malocclusion with an aim of improving occlusion or ultimately producing a normal or ideal occlusion [11].

This study was done to determine the effect of fixed orthodontic appliance therapy on quality of life of adult patients one month after debonding. The response rate of this longitudinal study was good (80.95%) indicating the feasibility of considering OHRQoL in the orthodontic clinical environment.

Significant changes in OHRQoL were observed in this study one month after completion of orthodontic treatment with the score improving from 30.3-16 which supports earlier literature findings that wearing fixed orthodontic appliance does impact OHRQoL. Bernabe E et al., reported that one in four Brazilian adolescents undergoing orthodontic treatment experienced side effects related to wearing orthodontic appliances in a cross-sectional study [12]. Zhang M et al., reported that when compared with pretreatment, adolescents' OHRQoL was frequently worse during fixed orthodontic treatment (oral symptoms, functional limitations), although it was better in some aspects (social and emotional well-being) [10]. Agou S et al., provided a brief communication on changes in OHRQoL following orthodontic treatment among children employing the Child Perception Questionnaire (among 45 children) and the Parental Perception Questionnaire (among 26 parents). The authors concluded that there were significant changes in OHRQoL comparing pretreatment scores to that of post-treatment (first recall appointment after debonding) [13].

Studies on the effect of orthodontic treatment on quality of life showed several limitations. Firstly, although these studies have made inferences to the effects of orthodontic treatment on 'quality of life', most of the studies did not employ standardised HRQol or OHRQoL measures, but instead used psychological assessment scales [13,14]. Clearly, self-concept and social experiences cannot themselves be said to be comprehensive enough in the assessment of quality of life related to orthodontic treatment.

The findings of the present study indicate a significant change (improvement) in OHIP-14 scores from pretreatment to after fixed orthodontic treatment among young adults have been identified. However, the magnitude of the statistical changes could best be described as moderate (effect sizes less than 0.50) [15]. Thus, the findings support the notion that orthodontic treatment does improve quality of life, atleast in the short-term for young adults but the range of improvement it brings to quality of life is not very large.

Changes in occlusion were also associated with the magnitude of changes in quality of life. The strength of the correlations between improvement in OHIP-14 and improvement in occlusion (as assessed by PAR) were significant. A similar study showed that improvement in occlusion and improvement in PAR had a positive correlation [16]. Thus, it can be claimed that, OHIP-14 can be used to assess the changes in occlusion brought about by orthodontic treatment. The findings of the present study indicate that orthodontic treatment improved both occlusion and OHRQoL, and patients are more likely to perceive an improvement in their overall oral health due to orthodontic treatment. This concurs with the previous opinions that both oral health-related quality of life measures and occlusal indices should be considered in evaluating orthodontic treatment need and effects [5,16,17].

Limitation(s)

The major limitation of this study was a small sample size. A larger sample size could be considered to evaluate the effects of orthodontic treatment on the oral health related quality of life of the general population. Assessing the improvement of quality of life in complex malocclusions can be done by considering the correlation between various orthodontic indices and OHrQoL.

CONCLUSION(S)

There was a significant improvement in OHRQoL (OHIP-14) and occlusion (PAR) following completion of fixed orthodontic treatment. This study also highlights the impact of malocclusion on the OHRQoL of young adults and emphasise the importance of orthodontic treatment in improving the quality of life of patients.

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