Research Article

Oral health-related quality of life assessment in patients wearing conventional and self-ligating brackets

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ABSTRACT

Aim: The aim of this study was to compare oral health-related quality of life (OHRQoL) of patients treated with conventional and self-ligating brackets in different therapeutic phases. **Background:** Pain and discomfort are recognized side effects of orthodontic treatment. Pain starts about 4 h after insertion of the appliance, peaks between 12 h and 3 days after insertion and then decreases for up to 7 days. Almost all patients (95%) report and suffer pain or discomfort 24 h after insertion of fixed appliances, and fixed appliances may produce higher pain responses than removable appliances. Pain scores tend to be higher in anterior than in posterior teeth. Studies have indicated that self-ligating brackets resulted in lower pain intensity. **Materials and Methods:** A questionnaire, previously found to be valid and reliable, was used for evaluation at the following time points: T1 - Immediately after bonding, T2 - 24 h after bonding, and T3 - Immediately after the first review. The sample size is 15 patients per group. OHRQoL was measured with a self-administered modified 16-item Malaysian version of the Oral Health Impact Profile for impact assessments of the bonding and activation phases. Data were analyzed with the Kruskal–Wallis and Chi-square tests. **Objectives:** The objective of the study was to conduct a study to compare QoL between self-ligating and conventional brackets using a questionnaire. **Results:** No significant differences in the prevalence and severity of immediate and late impacts on the OHRQoL of the patients were noted in any therapeutic phase. The commonly affected domains were "physical disability," "functional limitation," "physical pain," and "psychological discomfort."

KEY WORDS: Conventional, Oral health, Orthodontic treatment, Self-ligating brackets

INTRODUCTION

The goal of orthodontic treatment is to improve functional occlusion and facial appearance.[1] Awareness of how facial appearance affects the quality of life (QoL) has rapidly increased the demand for such treatment. Mostly, the major driving factor for seeking orthodontic treatment is to enhance facial esthetics thereby minimizing psychosocial problems.[2,3] Studies of oral health-related QoL (OHRQoL) in orthodontics are of great significance as they provide information regarding the therapeutic requirements and outcome as well as the long-term health improvement.[4] Based on the patient's perception, they can ensure better treatment choices.[5] Self-ligating brackets are famous in orthodontics due to their proposed superior properties including low static frictional resistance, full and stable archwire engagement, improved oral hygiene, preserved anchorage, reduced chair time and therapeutic time, and prolonged intervals between appointments.[6-9] Several authors have compared treatment efficiency,[7] friction,[8] speed of archwire changes,[9] treatment time,[10] and initial alignment of the mandibular arch[11] between self-ligating and conventional brackets, but the patient's views were often not given importance. Further, although studies of pain and discomfort have been performed in orthodontics,[12-15] OHRQoL has not been assessed in patients wearing self-ligating and conventional brackets. Such an investigation would provide information on how orthodontic treatment affects the patient's physical, social, and psychological well-being in the day to day activities. It would also improve the patient's understanding of the potential benefits and shortcomings of treatment.[16] The objective of this study was to compare the OHRQoL of patients wearing conventional and self-ligating brackets in different therapeutic phases. The null hypothesis was that the prevalence and severity of the effect on OHRQoL would not differ among the patients in any therapeutic phase.

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MATERIALS AND METHODS

A questionnaire was developed to gather information on social and demographic data. OHRQoL was measured using a modified 16-item Malaysian version of the Oral Health Impact Profile [Figure 1], adapted from Saub *et al*.[17] This questionnaire was chosen because it is used in most of the orthodontic studies of OHRQoL. It mainly focuses on the effect of oral health on QoL through seven categories: "Functional limitation," "physical pain," "psychological discomfort," "physical disability," "psychological disability," "social disability," and "handicap." Responses to each question are scored as follows: 1 = never; 2 = hardly ever; 3 = occasionally; 4 = fairly often; and 5 = very often. For this study, three topics were added on the basis of the outcome of a previous test: "Problems in speech," "problems in cleaning," and "pain." The question - "have you had to spend a lot of money?" - was removed because most of the patients were school going children who were sponsored by their parents. The total score ranged from 16 to 80, where 16 indicated that there was no impact on the OHRQoL and 80 indicated that it had the maximum or worst impact on OHRQoL. The questionnaires were prepared in English. They were checked earlier for the face validity. The sample size was 15 subjects under conventional bracket systems and 15 under self-ligating bracket system.

After an initial examination, record taking, diagnosis, and treatment planning, the patients completed the baseline questionnaire to assess OHRQoL before any intervention. In the next appointment, bonding was done using the brackets either conventional or self-ligating according to the manufacturers' protocols. Activation was performed according to the manufacturers' specifications at intervals of 4,

6, and 8 weeks in the conventional and self-ligating groups. Assessments were made at three time periods: T1 - Immediately after bonding, T2 - 24 h after bonding, and T3 - Immediately after the first review.

Patients who fulfilled the criteria were asked whether they were willing to participate in the study; all who were approached agreed to participate. The following criteria were used: (1) Over 16 years of age at the start of treatment with full compliment of permanent dentition, (2) maxillary and mandibular fixed appliances required, and (3) patients requiring all 4 first premolar extractions.

Patients who fulfilled at least 1 of the following criteria were excluded from the study: (1) Under the age of 16 and not accompanied by a parent or legal guardian, (2) undergoing active headgear treatment, or (3) undergoing maxillary expansion with either a quad-helix, rapid maxillary expansion device or a maxillary removable appliance with a midline expansion screw.

Statistical Analysis

Two parameters of Ontario Health Insurance Plan (OHIP)-16 [M] were computed according to Locker and Saub.[18]

- Prevalence: The percentage of patients reporting one or more answers as "very often" or "quite often." This variable identifies those whose oral health impacts are chronic rather than intermittent.
- Severity: The total sum of the response scores of the 16 topics, which considers impacts experienced at all frequency levels.

The prevalence and severity values were not normally distributed. Therefore, the Kruskal–Wallis and Chi-square tests were used for analyzing the continuous and categorical data, respectively, (P = 0.05). All measurements were analyzed using the Statistical Package for the Social Sciences version 19.0 (Inc., Chicago, IL, USA).

RESULTS

The response rate was 100% and all the subjects completed the questionnaires in all the therapeutic phases. The groups did not show significant differences in age and gender. They did not show significant differences in the prevalence and severity of effects on OHRQoL at the baseline and immediate and late assessments.

The impacts after bonding were more prevalent and severe than the impacts following the first review regardless of the group. The post-bonding phase had the greatest effect on the OHRQoL.

Similar OHIP-16[M] domains ("physical disability," "functional limitation," "physical pain," and

Figure 1: The oral health-related quality of life questionnaire

"psychological discomfort") were affected in the therapeutic phases [Table 1].

The "social disability" and "handicap" were the least affected domains or topics in both the groups. Significant differences in the prevalence of "physical pain" and severity of "social disability" were noted at the activation phase, with the self-ligating group showing the highest values.

There were also significant differences observed in the severity of "food stuck between teeth" and "lack of self-confidence" at the late assessment of the bonding phase. Further, the prevalence of "difficulties in chewing" and severity of "avoided going out" and "difficulty in performing daily activities" showed significant differences at the late assessment of the activation phase. The SL group had the most severe impacts according to the OHIP-16[M] items in this phase.

DISCUSSION

In our study, the absence of significant differences in the effect of prevalence and severity on OHRQoL during any stage of the treatment proves our null hypothesis. In this study, the prevalence of impacts was quite high (65−75%) at the baseline. This value is higher than that (slightly over 50%) found by Saub and Locker[18] in Malaysian adults. The difference was a previously expected one because the subjects in the current study were patients with malocclusion who requested for treatment.

Interestingly, patients or subject bonded with conventional brackets had the highest severity score, indicating poorer OHRQoL than those with self-ligating brackets. The tension and compression of the periodontal ligament during orthodontic treatment cause pain.[19] This situation would be more apparent in patients with conventional brackets due to elastomeric ligatures, which produce friction which, in turn, causes the pain when compared with self-ligating brackets, which are frictionless due to the absence of any elastomeric ligatures. The pain caused will affect eating abilities, as reflected by the most affected domain ("physical pain") in the present study. The subjects bonded with the conventional brackets also reported the highest prevalence of late impacts after bonding. Although elastomeric ligatures reportedly have force decay tendencies, the failure load remained comparably high (67%) *in situ* even after 6 weeks.[20] The late assessment of the bonding phase was performed after 4 weeks, so the effect of elastomeric ligation would have still been perceptible. The lower prevalence of impacts of the subjects bonded with self-ligating brackets may be attributable to the adaptation to the relatively bulky brackets and frictionless system.

Table 1: *P* value of the Chi-square and Kruskal–Wallis tests in each parameter at the treatment phases

Treatment phase	Functional limitation		Physical pain		Psychological discomfort		Physical disability		Psychological disability		Social disability		Handicap	
	Prevalence	Severity	Prevalence	Severity	Prevalence	Severity	Prevalence	Severity	Prevalence	Severity	Prevalence	Severity	Prevalence	Severity
T1	0.93	0.29	0.41	0.37	0.52	0.19	0.33	0.76	0.88	0.31	0.36	0.86	0.32	0.12
T2	0.80	0.93	0.43	0.47	0.25	0.14	0.41	0.43	0.32	0.24	-	0.49	0.59	0.019
T3	0.53	0.45	0.54	0.43	0.52	0.47	0.93	0.40	0.343	0.154	0.36	0.70	0.59	0.43

T1: Immediately after bonding, T2: 24 h after bonding, T3: Immediately after the first review

This study has various limitations in terms of sample size and administration of questionnaires. Strict inclusion and exclusion criteria were used to optimize group homogeneity because factors such as age and severity of malocclusion play a role in the reporting of impacts on OHRQoL.[21,22]

Although the small number of participants in each group could cause bias, the operator had no control over the responses, so the bias may not be that significant. Further, the bracket systems particularly the self-ligating brackets used in this study had different manufacturer-specified therapeutic intervals, which could have introduced bias because a longer interval would have allowed adaptation to the appliance and thus affected the reporting of OHRQoL. The study was initially planned to have a sample of 30 patients per group, as proposed by Roscoe.[23] However, due to the stringent inclusion criteria and required therapeutic time, only 15 patients could be recruited in each group.

CONCLUSION

Within the limitations of this study, we conclude that no bracket system offers superior OHRQoL. Patients may experience some impacts in the initial therapeutic phase. These findings would be useful when clinicians want to modify the standard protocol of the manufacturers, such as the archwire sequences or therapeutic intervals, to achieve patient comfort, as long as treatment is not jeopardized. They could also be applied when explaining the therapeutic phases, especially the initial one, and selecting the optimal bracket system based on the patient's preference.

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