The Impact of Fixed Appliances (Braces) on Quality of Life
Azrul Hafiz1*, Atiqah Jamal1, Nurazfalina Azura1, Rahimah Sahudi2, Murshida Marizan Nor3

1. Faculty of Dentistry, Universiti Sains Islam Malaysia.
2. Ampang Hospital, Ministry of Health Malaysia.
3. Faculty of Dentistry, Universiti Kebangsaan Malaysia.

Abstract
Patient own quality of life is an important aspect in providing holistic and well-balanced treatment to patient. Any dental treatment done should not be detrimental to patient’s daily life and normal routine. Orthodontic therapy has been known to influence patient’s mental and psychical health during treatment.

This study explored the relationship between quality of life and fixed appliances (braces) by adopting a set of questionnaires. A total of 102 (83% females and 17% males) patients were randomly invited and consented to this study. They were asked to answer questions regarding diet changes, pain perception, physical changes and psychological effect.

The results showed that 76.5% have difficulties in eating, 74.5% experience pain in the mouth, 45% could not pronounce words correctly and 41% complaint that their meal routine were interrupted.

In conclusion, this study shows that fixed appliances (braces) have some detrimental effect to patient’s quality of life and will influence their oral health impact profile.

Keywords: Fixed appliances, Quality of life, Oral health impact profile.


Introduction
Patient with dental malocclusion have become more concern regarding their appearance and request fixed appliances to treat the condition. Nowadays, it has become a burden to the government to fund the expensive treatment and a lucrative income for the private sector. Thousands of dollars were spent per patient to have straight teeth and a nice smile. In recent study, more than 74.57% of the population suffered from dental malocclusion and it give a big impact on individual's physical, social and psychological well-being1. Dental malocclusion such as crowding and spacing could reduce patient's self-esteem and could hinder them from their normal social life. Thus, it is important to get an early orthodontic treatment in order to treat the dental condition. There are many challenges that will be face by orthodontic patient such as pain, difficulty in eating, diet changing, problem pronouncing words and ulcers. These challenges could affect their quality of life. Moreover, this condition might become worse if periodontal problem occur in adolescent patient. Reduced periodontal support could cause tooth drifting, rotation and mobility2. As high as 90.1% of adolescent with orthodontic appliances (both fixed and removable appliances) claim the treatment affect their eating and speaking3. This unfortunate event has directly resulted in a negative social impact on their daily life. Food contained sticky sugar and carbonated drinks should also be avoided when wearing fixed appliances because it could make cleaning difficult and could damage tooth surface (enamel decalcification). However, white spot lesion before the start of treatment should not be confused with decalcification after fixed appliances treatment4.

Apart from that, orthodontic treatment could cause feeling of discomfort and pain that usually experience by the patient5. Fixed appliances specifically have more impact on the daily routine rather than removable appliances6. Thus, it is crucial to do a study on the effect of this treatment to oral health and the quality of life. Fixed appliances were known to affect speech in...
early stages of the treatment. Few studies found that, it was common to have some difficulties or changes in pronouncing certain words especially with letter S, I and Z.\(^6,7\) This alteration of pronunciation may persist for a few days and few weeks for some. In another study, patients who had labial fixed appliances will experience more speech difficulties approximately up to 7 days compared to lingual appliances\(^6\). Moreover, some malocclusion such as Class III occlusion, diastema, increased in overjet, open bite, deep bite and asymmetry if not properly treated could lead to higher risk of speech disorder like dyslalias\(^8\). When speech is affected, it directly affects their daily work especially those who work in the front-line services area such as sales, teachers, lawyer, health personal and other profession which needs direct communication. Apart from that, Muslim patients would also have difficulty in reciting the holy Quran properly when speech is affected. Orthodontic fixed appliances also affect dietary habits. Patient usually need to make changes to their diet especially on what they eat and how they prepare the food. They tend to have smaller pieces of food to help them bite and chew\(^9\). However, drastic changes in diet could result in weight loss for some patients. This is a classic example whereby fixed appliances treatment could directly affect and reduce patient’s quality of life.

The pain experience during treatment was among the most frequent complaint from patients. As high as 39% of patients, complaint of discomfort and mild pain during the placement of arch wire into bracket slot\(^10\). Patient with fixed appliances suffered the highest pain intensity between one to five days after activation compared to removable appliances. These might give an adverse effect on school and leisure activities\(^11\). Intolerance to pain could also jeopardized the whole treatment plan where patient might request to stop and terminate the treatment completely. Nevertheless, Hans et al stated that, patient will slowly adapt to the pain after few days of treatment and those who have a positive mind set and attitude will able to adapt faster and have lesser pain\(^8\). Therefore, it is recommended to take NSAIDs medications to reduce the pain at the early stage of treatment and every time after each visit. However, allergic reaction and adverse effect should be deeply considered before taking the medication\(^12\). In summary, this study is aimed at oral health impact on patient undergoing orthodontic treatment and to study the effect of fixed appliances on the quality of life.

### Materials and methods

This cross-sectional study was conducted at the Orthodontic Specialist Clinic, Islamic Sciences University of Malaysia (USIM), located in Kuala Lumpur, Malaysia. A total of 120 patients who were undergoing orthodontic treatment with fixed appliances (braces) were randomly selected. Whereas patients who had a history of using removable or functional appliances were excluded. They were excluded because these appliances could increase the treatment time of orthodontic treatment to more than one year. Hence, this could affect the motivation and their perception towards the treatment. All of the subjects were given a self-administered fourteen-item questionnaire. Consent were acquired prior to the study. The questionnaire was modified from the oral health impact profile by Slade and Spencer\(^13\) and were constructed in bilanguage (English and Malay language). Prior to the study, a pre-test of few questionnaires was conducted for content validity. Reliability was computed using Cronbach’s alpha. Then, minor correction was done to the questions to make it simple and easily understood.

A total of 14 questions related to the effect of fixed appliances on patient’s oral health impact profile were included using a 6-point Likert scale from 0=very often to 5=don’t know. Negative statements were included to reduce response set bias. They were divided into 4 segments which were related to diets changes, pain perception, physical changes and psychological effect. The total score of the questionnaire will be calculated by rounding the overall score from each domain. A higher score indicates a good oral health impact profile and reflect a better quality of life.

### Results

From 120 patients, 16 patients declined to participate, and 2 questionnaires were discarded due to incomplete data. Final respondents were 102 where 83% were females and 17% were males. Demographically, 88% of patients were from Malay ethnicity, 11% were Chinese and 1%
was Indian. However, this study does not resemble Malaysia’s population as a whole because Malays only comprised of 45% of the population. Majority of the patients were Malay because the clinic is situated in Malay housing area and community. Table 1 presents the socio-demographic characteristics of the study population. The respondents mean age was 21 years old ± 5.33 years with a median of 17 years old. The youngest patient was 13 years old and the oldest was 36 years old. Teenagers (10 to 19 years old) make up the largest group at 49% followed by 42% young adults (21 to 29 years old) and 9% adult patient (30 to 39 years old). Table 2 demonstrates that the highest complaint during wear of fixed appliance was difficulties in eating with 76.5% patients had difficulties to consume food. Apart from that, 41.2% patient’s complaint of their meal routine being interrupted during treatment affected their work and could reduce their productivity. Lastly, the total score for the questionnaire in this sample was 4447 which was considered as having a moderate oral health impact profile.

### Table 1. Demographic characteristics in three age groups.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>n (%)</td>
<td>12 (12%)</td>
<td>38 (37%)</td>
</tr>
<tr>
<td>Race</td>
<td>Malay</td>
<td>Chinese</td>
</tr>
<tr>
<td>n (%)</td>
<td>40 (39%)</td>
<td>9 (9%)</td>
</tr>
</tbody>
</table>

### Table 2. List of questions and the percentage of answer.

<table>
<thead>
<tr>
<th>No.</th>
<th>Questions in summary</th>
<th>Yes n (%)</th>
<th>No n (%)</th>
<th>Unsure n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Difficulties pronouncing words</td>
<td>46 (45.1)</td>
<td>54</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>2</td>
<td>Worsening taste sensation</td>
<td>10 (9.8)</td>
<td>91 (89.2)</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>3</td>
<td>Pain in the mouth</td>
<td>76 (74.5)</td>
<td>24 (23.5)</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>4</td>
<td>Difficulties in eating</td>
<td>78 (76.5)</td>
<td>24 (23.5)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>5</td>
<td>Reduce self esteem</td>
<td>26 (25.5)</td>
<td>72 (70.6)</td>
<td>4 (3.9)</td>
</tr>
<tr>
<td>6</td>
<td>Feeling tense</td>
<td>18 (17.6)</td>
<td>82 (80.4)</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>7</td>
<td>Unsatisfactory diet</td>
<td>18 (17.6)</td>
<td>80 (78.4)</td>
<td>4 (3.9)</td>
</tr>
<tr>
<td>8</td>
<td>Meal routine interrupted</td>
<td>42 (41.2)</td>
<td>59 (57.8)</td>
<td>1 (1.0)</td>
</tr>
<tr>
<td>9</td>
<td>Unable to rest</td>
<td>28 (27.5)</td>
<td>72 (70.6)</td>
<td>2 (2.0)</td>
</tr>
<tr>
<td>10</td>
<td>Feeling embarrass</td>
<td>12 (11.8)</td>
<td>87 (85.3)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>11</td>
<td>Uncomfortable to others</td>
<td>7 (6.8)</td>
<td>92 (90.2)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>12</td>
<td>Disturbed daily work</td>
<td>17 (16.7)</td>
<td>85 (83.3)</td>
<td>0 (0.0)</td>
</tr>
<tr>
<td>13</td>
<td>Depression with life</td>
<td>11 (10.8)</td>
<td>88 (86.3)</td>
<td>3 (2.9)</td>
</tr>
<tr>
<td>14</td>
<td>Unable to function</td>
<td>8 (7.9)</td>
<td>92 (90.2)</td>
<td>2 (2.0)</td>
</tr>
</tbody>
</table>

### Discussion

Study on quality of life and oral health impact is not a new science. Dental patient’s quality of life has been studied since 1980s while oral health impact profile has been developed since 1990s. This research tools have allowed researchers to correlate between the impact of dental health and sickness towards the well-being of patient both psychologically and physically. In this study, high school children and young adults comprised of more than two-third because the cost of orthodontic treatment in USIM was considered inexpensive and affordable. Apart from that, the waiting time to received treatment of more than two years might force many adult patients to seek immediate treatment in private clinic. The overall results indicate that the highest complaint during treatment with fixed appliances (braces) was eating disarray. This finding was concurrence to other research looking at eating behaviour during orthodontic treatment. In their study, they found that 51.4% and 86.5% patients’ complaint of uncomfortable to consume food. Most of them complaint of difficulty during biting and chewing food. Because of this condition, patient...
tend to avoid carrots, meat dishes, toffees and crisps. They also consume more soft diet such as mashed potato, cheese, banana, soup, and boiled vegetable9. Interestingly, most patient adapt more healthier diet due to the discomfort of eating hard food by consume less of pan-frying food and snack.

Having a well-balanced diet and a good meal is important to human well-being. A sudden change in normal diet could have detrimental effect on the body and weight. Patients undergoing orthodontic treatment were usually advised to take soft diet and avoid hard food to prevent any breakages of the fixed appliances. Breakage if left untreated could lead to prolong treatment time and could incur in extra cost to the patient. Although, 41.2% patients had to make changes to their diet and consume more soft diet, 78.4% feel that their meal was still satisfactory. This could be because most Malaysian consume soft boiled rice, noodle and bread as their main meal. Apart from that only 10% complaint that their taste sensation become worse during the initial period of fixed appliances treatment. This could be because of residual bonding agent; acid etch or composite still lingering in the mouth after bonding up procedure. Patients also admit that the taste alteration is just temporary event. However, there were no evidence that orthodontic appliances could affect taste and flavour between various treatment20. The second highest complaint was the occurrence of pain during the treatment whereby 74.5% patients reported of pain and discomfort. The forces used to trigger tooth movement could be the cause constant pain throughout the treatment. This result coincides with other studies where the most common pain experienced during the first two hours after activation21 and could last between 3 to 5 days after placement of new arch wire9. It has been suggested that patient should take some form of pain control such as acetaminophen, ibuprofen or aspirin to relief the pain22.

Almost half of the patient’s complaint of difficulties in communication due to inability to pronounce certain words in the early stage of the treatment. However, this is well known occurrence with orthodontic treatment. It has been reported that, patient with fixed appliances experience difficulties in pronouncing words which affect their speech and communication6,7. Nevertheless, this situation is usually temporary and will improve with time and practice. In this study, 25% of the patients admitted having low self-esteem 11% felt embarrassed and 6% felt uncomfortable to others due to when wearing fixed appliances. This could be due to the metal braces sticking in front of the teeth, which can also affect their self-image. Furthermore, 10% reported of depression and 7.8% felt unable to function normally. This showed that orthodontic treatment does have negative impact on psychological of a patient. For some, oral health quality of life can temporarily worsen compared to before the start of the treatment23. It has also been reported that, adolescent age group have lower levels of psychological well-being and were more vulnerable to undesirable psychological effects of treatment compared to preadolescent and adults24. However, psychological effect changes after treatment, where it became more positive. This is in agreement with study regarding the correction of dental malocclusion and orthodontic treatment which have shown positive psychological effect on patients25. Reduction of this percentage during and after treatment was a good sign that the treatment does improve patient’s self-esteem.

Conclusions

In short, this study has shown that fixed appliances (braces) have some effect to patient’s quality of life and could influence their oral health impact profile. Furthermore, pain, discomfort, diet changes and detrimental psychological effect in dental patient is real and should be advised accordingly prior to the start of the treatment. Patient selection is very important and explanation on the physical and psychological changes that might happen should be discuss with patient prior to the treatment.

Declaration of Interest

Authors have declared that they have no conflict of interest in this study.

References