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A Survey To Evaluate Patients' Acceptance To Various Fixed Functional Appliance

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ABSTRACT

Fixed functional appliances correct class II malocclusion by bringing the mandible forward into a new position. Patients using Fixed Functional Appliances complain of difficulty in oral hygiene, soft-tissue irritation, appliance breakage, and difficulty in mastication. Hence, the aim of this study was to conduct a survey evaluating patients' acceptance of various fixed functional appliances in a university set up. This questionnaire-based study was a university-based setting which consisted of 10 closed-ended and open-ended questions out of which 2 were open-ended questions and 8 were close-ended. It covered discomfort, difficulty in speech, brushing, mastication, oral hygiene and fracture of the appliance. Descriptive statistics were performed. Chi-square test was used to determine the discomfort experienced due to the duration of wear. The significance level for the p-value was set at 0.05. Chi-square test reported that statistically, the insignificant association observed between duration of wear and level of discomfort ($p > 0.31$). All functional appliances have their own disadvantages and discomfort, which is dependent on the intricate fabrication as well as their implementation. Within the limits of the study, it was observed that discomfort was more in the initial few days but reduced over a period of time as the patients got adapted to the appliance.



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INTRODUCTION

Orthodontic appliances are foreign objects inserted into the mouth, which can lead to discomfort in the mouth (Al-Sayagh *et al.*, 2012). Discomfort caused due to orthodontic appliances may cause decreased compliance, dissatisfaction with

the treatment and cause of stress between the practitioner and patient (Charavet *et al.*, 2019). Class II skeletal discrepancy is the most commonly observed discrepancy in the field of orthodontics. It is a discrepancy caused due to either mandibular retrognathism or maxillary prognathism, or a combination of both. The severity of this can range from mild to severe and along with it, other discrepancies such as anteroposterior discrepancy is also observed. Class II malocclusion causes flaring of the upper incisors, which if not paid attention to at the earliest causes fracture of the upper incisors and sometimes even leading to non-vital of the teeth (Felicita, 2018, 2017b).

Methods to correct this discrepancy include use of extraoral appliances, functional appliances and fixed appliances associated with the use of class II intermaxillary elastics. On the other hand, correction of Class II malocclusion in non-growing patients include orthognathic surgery or selective extrac-

tion of permanent premolars with subsequent dental camouflage to mask the skeletal discrepancy. On extracting selective premolars for camouflage treatment, en-masse retraction of the anterior teeth has to be carried out to reduce the proclination and correct the skeletal discrepancy (Felicita, 2017a). During this time, it is best to avoid NSAIDs as it can hamper with the en-masse distalization (Krishnan et al., 2015). Retraction can either be carried out by friction or frictionless mechanics. Friction mechanics is with the help of mini-implants which involves the sliding of the arch wire through brackets and tubes. Mini-implants also carry out intrusion if there is excessive proclination along with extruded upper incisors (Sivamurthy and Sundari, 2016; Jain et al., 2014).

Fixed functional appliance aims to correct malocclusion by enhancing the growth of mandible in the sagittal direction (Felicita et al., 2013). This brings about a change in the gonial angle and causes a drastic change in the face, improving the profile of the patient (Rubika et al., 2015; Pandian et al., 2018). Rigid fixed functional appliances such as herbst, MARA; fixed flexible, functional appliances such as jasper jumper and fixed hybrid appliances require less patient cooperation. This is a successful bite-jumping treatment for non-compliant patients. Also, it helps the patients suffering from obstructive sleep apnoea as it brings the mandible forward (Viswanath, 2015).

These appliances have advantages and disadvantages regarding oral hygiene, soft-tissue irritation, appliance breakage and limitation of mandibular movements. Effects of the functional appliances on skeletal and dental tissues have been heavily investigated, whereas the patient's perception of these appliances has not been questioned (Samantha, 2017). Stress and compliance from fixed functional appliances should be studied further. The investigations will help evaluate the acceptability of fixed functional appliances and increase awareness (Kamisetty, 2015). Therefore, the aim of the study is to evaluate the acceptance of fixed functional appliances.

MATERIALS AND METHODS

Study setting

This questionnaire-based study was a university based setting which consisted of 10 close-ended and open-ended questions. The questions were designed to be simple and comprehensible by the subjects. It consisted of 10 multiple-choice questions. The survey covered issues regarding discomfort, difficulty in speech, brushing, mastication, oral

hygiene and fracture of the appliance.

Inclusion criteria

1. Patients in the age group of 14-20 undergoing fixed functional therapy.
2. Patients at least 2 months into the treatment.

Exclusion criteria

Patients who have already undergone orthodontic treatment.

Sampling

After applying the inclusion and exclusion criteria, a total of 10 subjects (7 males and 3 females) were sent the questionnaire for this study. The sampling method carried out was randomized sampling and to minimize sampling bias, simple random sampling was carried out.

Data collection

Data of the subjects undergoing fixed functional therapy was recovered from patients' record in saveetha dental college and hospital. The questionnaire was sent on their electronic mail IDs after their contact details recovered from the same.

Statistical analysis

After collection of the data from the subjects, the data was analyzed. Descriptive statistics using percentages and mean used to analyze the results. Chi-square test was done using IBM SPSS statistical software (Version 22.0) to determine a statistically significant linear relationship between the discomfort experienced due to the duration of wear. $P < 0.05$ was considered as statistically significant.

RESULTS AND DISCUSSION

It was observed that 90% of subjects observed a significant change in the face after wearing the appliance (Figure 1).

100% of them experienced difficulty just after insertion of the appliance (Figure 2).

After a few days of insertion, 90% of the subjects still experienced discomfort and pain in the jaws (Figure 3).

Most of them complained of ulcerations in the mouth immediately after the insertion of the appliance (90%) (Figure 4).

70% of subjects reported breakage or cracking of appliance mid-treatment (Figure 5).

80% experienced difficulty while eating, brushing, as well as while opening and closing the mouth in the initial few days (Table 1)(Figure 8).

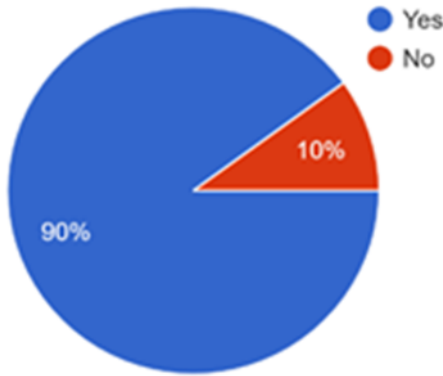


Figure 1: Frequency distribution on profile improvement after insertion of the appliance

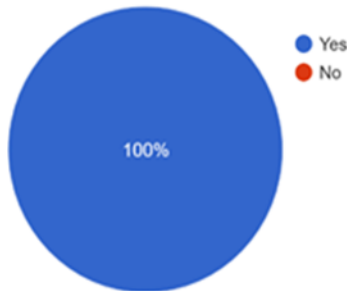


Figure 2: Discomfort immediately after insertion of the appliance

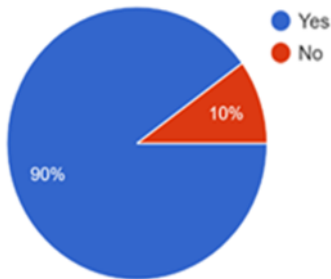


Figure 3: Discomfort experienced after a few days of insertion of the appliance

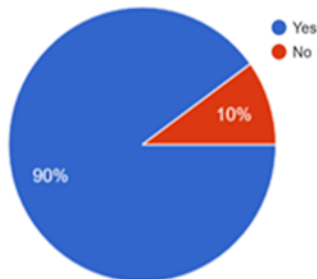


Figure 4: Pie chart depicting oral ulceration

Table 1: Depicting chi-square test

	Value	Degrees of freedom	Asymptotic Significance (2-sided)
Pearson Chi-square	1.071	1	0.301

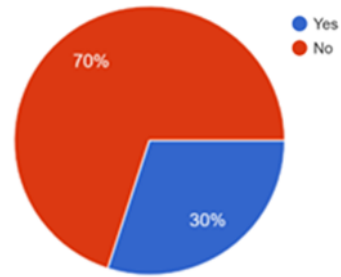


Figure 5: A pie chart depicting appliance breakage

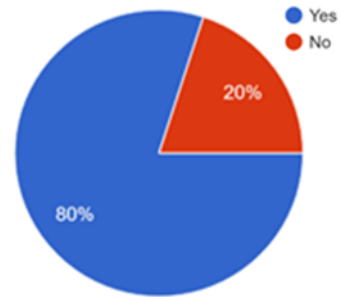


Figure 6: Pie depicting over-all pleasant experience

80% reported to the hospital in between their regular appointments to their orthodontists (Figure 7).

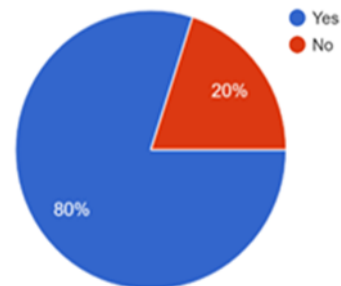


Figure 7: A pie chart depicting the need for in-between appointments

Overall 80% had a good experience with the appliance (Figure 6).

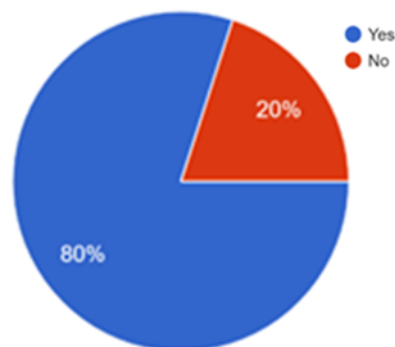


Figure 8: A pie chart depicting difficulty faced during eating, brushing or opening and closing of the mouth

There was a statistically non significant association observed between the discomfort experienced due to the duration of wear of the appliance on performing chi-square test.

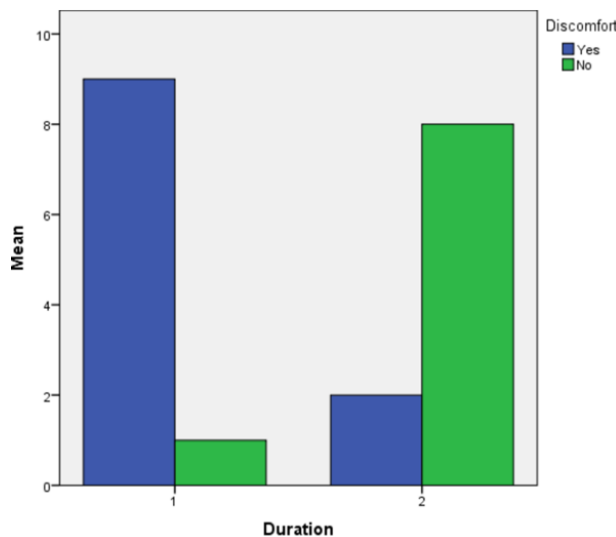


Figure 9: Bar graph representing the association between duration and discomfort on wearing the appliance

Figure 9 shows that X-axis represents the duration of appliance wear in months and Y-axis represents the no. of patients who responded to discomfort as yes or no. Chi square test was done and found to be not significant (Chi square test value-1.071, p value =.30, $p > 0.05$). Discomfort associated with FFA reduced in the second month when compared to the first month. Depicts the association between duration and discomfort of wearing the appliance ($p = .30$, $p < 0.05$).

In the initial few weeks after insertion of the appliance, the findings of the study indicated that the majority of the subjects faced difficulty in adjusting to it. They complained of ulcerations in the mouth due to the constant rubbing of the appliance against the mucosa of the soft tissues and also faced difficulty in brushing, mastication, breakage of appliances, etc. Due to these difficulties, they had to visit the orthodontist in the first week, but as they got used to the appliance, they complained of less difficulty. The likelihood of patient cooperation is one of the most important factors influencing fixed functional appliances (Kumar et al., 2011; Dinesh et al., 2013). The present study reported a statistically insignificant association observed on the discomfort and duration of wear.

The majority complained of pain and difficulty while eating and brushing teeth in the initial week. This study did not evaluate the long-term effects of the appliance. Lena Y et al. reported in their study

that the longer the duration of wear, less compliance and more discomfort was experienced by the patient but did not evaluate the acceptance of the appliance (Lena et al., 2017). Sergl et al reported similar findings and also reported that the patients' attitude was important as it influenced the wear of appliances (Nanda and Kierl, 1992; Lena et al., 2017).

Other studies such as Celikoglu et al. reported that patient's compliance is not required on delivering a fixed functional appliance as it is fixed in the mouth and cannot be removed by patient thus eliminating the need of compliance, but they did not evaluate patients' acceptance (Celikoglu, 2014; Vikram, 2017). Similarly, Ishaq et al reported that fixed appliances eliminated the need for compliance (Ishaq, 2016). Chaudhary et al reported that a fixed appliance causes less dependency and less compliance (Chaudhry, 2015).

The small sample size is a limitation of this study. Also, a long-term evaluation of the patient-related problems of the fixed appliance was not carried out. Future scope of this study includes a good understanding of the patient's attitude towards the appliance allowing the orthodontist to explore and use other appliances.

CONCLUSIONS

Within the limitations of the study, it can be concluded that the overall patient acceptance was satisfactory with fixed functional appliances. They were associated with some discomfort in the initial period, which subsided later, but this finding is not supported by statistics since there was no significant association between duration and discomfort on wearing the appliance.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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