



Patient's Compliance on Removable Orthodontic Appliance

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ABSTRACT:

Patient compliance towards any treatment will determine the successful of the intended outcome. Compliance on removable orthodontics appliances can be assessed by the duration of wear whereby duration of less than 12 hours per day could indicate a non-compliance. A non-compliant patient will result in failure of the planned treatment. Orthodontics treatment using removable appliance usually will fail without determination, attitude, and patient cooperation. This study explores the reason why patient does not comply with orthodontics treatment using removable appliances. In total forty-five patients were involved in this cross-sectional study. Written consent was obtained from every participant prior to the study. Questionnaire on demographic, compliance towards treatment and factor affecting compliance were distributed to all participants. In this study, factors affecting compliance were found to be discomfort ($p=0.336$), pain ($p=0.036$), knowledge on importance of appliance wear ($p=0.205$), dentist-patient relationship ($p=0.021$) and self-assessment on malocclusion severity ($p=0.072$). With p value set at <0.05 , factors such as pain and dentist-patient relationship show significant influence towards compliance. In conclusions, compliance towards removable appliance were determined by pain experience and dentist-patient relationship were discovered to be statistically significant contributor to it in this study.

KEYWORDS: compliance, pain, discomfort, removable appliance, orthodontics

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I. INTRODUCTION

Removable orthodontic appliance is a type of orthodontic treatment modality that allows tipping movement of teeth, modification of condylar position and differential eruption of teeth. As the name suggest, removable appliance can be easily removed by patients to facilitate cleaning of the teeth and the appliance. However, when tendency of being left out is high, patient's motivation and adherence towards the appliance is important to ensure the successful outcome of the treatment. Thus, the aim of this study is to explore the factors contributing patient compliance towards orthodontic removable appliance.

Apart from excellent appliance design and construction by the practitioner, patient's compliance towards the treatment procedure also contributes to the success of a removable appliance. As suggested by Sackett and Haynes [1], compliance is defined as 'the extent to which a person's behaviour (in terms of taking medications, following diets or executing lifestyle changes) coincides with medical or health advice. Other terms such as adherence, cooperation, mutuality and therapeutic alliance were also used as alternative to the word compliance. Apart from consistency in wearing the appliance, patient's compliance can be assessed through oral and appliance hygiene maintenance, punctuality in keeping appointments and the use of elastics or headgears [2]. In removable orthodontic treatment, the average prescribed wear time for functional appliance is between 15 hours and 16 hours daily [3]. Adequate wear time is crucial as teeth movement does not only rely on the magnitude of force but also the duration the force is acted on the teeth. In another study, the most important factors that could affect compliance or concordance (a new term to describe compliance) was dentist-patient interaction and the pre discussion regarding the treatment alternative and the outcome [4].

Patient attitude towards treatment can manifest at different level, some might refuse treatment prematurely, stop at the middle of the treatment and some might not start the treatment at all. Lack of patient commitment and compliance will cause slow treatment response or failure especially in young children. This might lead to frustration and anxiety for the dentist, parent and patient. Young children were known to have poor compliance regardless their gender and maturity as reported by Angela *et al* in 2017 [5]. Non-compliance

in young children can be due to many reasons. For example, young children might feel ashamed to wear removable appliance due to the embarrassment of their bulky appearance and speech alteration. Moreover, they could feel inconvenience during social activities and sport event. These examples show immediate consequences experience by patients underwent orthodontics treatment with removable appliance. This will then result in early withdrawal or non-compliance towards the treatment.

Patient's compliance towards treatment modalities is a multifactorial issue [6]. They suggested compliance depended on social interaction between dentist, parent and peers. Apart from that, physical and psychological attitude towards removable appliance could also lead to adherence to the treatment. There are various factors that encourage patients to adhere to treatment with removable appliance. Those factors include social influences, patient's general behaviour, appliance factor and provider-patient relationship. Examples of appliance factor are pain and discomfort while wearing the appliance. For social influence, parents' participation in removable orthodontic treatment is important to ensure children's adherence to the appliance. Parents who show interest towards the treatment with high degree of concern of the child's malocclusion and strictly supervising will result in good patient's compliance towards the treatment. Patients who are generally obedient, have good academic performance and view their malocclusion as severe usually show better compliance. A comfortable appliance which evokes no pain response will also be adhered by patients [7]. They also found that compliance in orthodontics treatment can be anticipated by the level of initial discomfort and pain. A good relationship between patient and treatment provider may also result in patients' cooperation with the treatment. Better compliance is seen in patients who feel accepted and comfortable during the treatment session.

Many interventions have been done by dentist to increase patient's compliance towards dental treatment. One is by ensuring patient's understanding about the treatment objectives and consequences of non-compliance. A study by Feiou *et al* indicate that verbal instruction together with images that show treatment relapse could increase compliance [8]. They also suggest that parents play an important role to support adherence and compliance in their children towards the treatment plan.

II. METHODOLOGY

This cross-sectional study was conducted during clinical session at the faculty polyclinic. Ethical approval (Project code: USIM/JKEP/2019-57) was granted by the ethical committee from university board of medical ethic committee. Each participant received a written information and explanation regarding the study design and acknowledging that involvement was voluntary. Signed consent were also obtain from all the participant prior to the study. The respondent was approached prior to the clinical session and was given a questionnaire to answer. The inclusion criteria for this study were patients who worn removable orthodontic appliances, able to communicate and understand in basic language while the exclusion criteria are patient who are not healthy and mentally compromised.

The questionnaire was developed from several study and adapted into a set of questions. The questionnaire was then pre-tested on ten students and staffs. At the end of the study, from hundred sample, only forty-five patients answer the questionnaire. The questionnaire comprises of three sections which are: Section I (demographic), Section II (self-assessment of compliance level) and Section III (factors affecting compliance). Statistical data analysis was carried out using SPSS (Statistical Package for the Social Sciences for Windows, Chicago, IL, USA) version 26.

III. RESULTS

Patient age group as shown in Table 1. The age distribution were 11 to 15 years old: 22.2%, 16 to 20 years old: 11.1%, 21 to 25 years old: 46.7%, 25 to 30 years old: 15.6%, and more than 31 years old: 4.4%). In total, thirty participants (66.7%) were compliance in wearing removable orthodontic appliance, while another fifteen participants (33.3%) reported not compliance in wearing removable orthodontic appliance. Considering the oral hygiene of participants, almost all the participants brush their teeth at least two times a day including the removable orthodontic appliance. Only three participants (6.7%) reported did not brushed, while the other forty-two participants (93.3%) brushed their teeth.

Table 1. Demographic characteristic of participants

	Gender	
Female	32	71.1%
Male	13	28.9%
Total	45	100%
Age (Years)		

11-15 years old	10	22.2%
16-20 years old	5	11.1%
21-25 years old	21	46.7%
26-30 years old	7	15.6%
>31 years old	2	4.4%
Total	45	100%

Moreover, there are a few factors that influence the patient's compliance in wearing removable orthodontic appliance which were pain, discomfort, dentist-patient relationship, severity of malocclusion, and knowledge toward the importance of compliance in wearing removable orthodontic appliance as shown in Table 2. Eleven of the participants (24.4%) complained of pain and twenty-four of participants (53.3%) complained of discomfort when wearing removable orthodontic appliance. However, the percentage of participants who did not report any pain or felt uncomfortable when wearing removable orthodontic appliance were higher which were 75.6% and 46.7%. Most of participants have a good dentist-patient relationship which was 41 participants (91.1%) when receiving orthodontic treatment at the polyclinic. Thirty participants (66.7%) have severe malocclusion that motivated them to be compliant in wearing removable orthodontic appliance. Surprisingly, all the participants (100%) knew the importance of compliance in wearing removable orthodontic appliance.

Table 2. Factors influencing the patient's compliance.

	Frequency (N)	Percentage (%)
Patient Complained of Pain		
Pain	11	24.4%
No Pain	34	75.6%
Total	45	100%
Patient Complained of Discomfort		
Discomfort	24	53.3%
Comfortable	21	46.7%
Total	45	100%
Dentist-Patient Relationship (DPR)		
Good	41	91.1%
Poor	4	8.9%
Total	45	100%
Severity of Malocclusion		
Severe	30	66.7%
Not Severe	15	33.3%
Total	45	100%
Patient's Knowledge		
Know	45	100%
Not Know	0	0%
Total	45	100%

The relationship between categorical variables were analyzed by using Pearson Chi square test, SPSS version 26 with its confidence interval (95% CI). A p -value ≤ 0.05 was set to indicate statically significant differences. This study showed that significantly more non-compliant participant than compliant participant (66.7% vs 33.3%) has severe malocclusion. Statistically significant associations were also found when compared between the severity of malocclusion and patient's compliance in wearing removable orthodontic appliance. Furthermore, non-compliant patient had experienced more discomfort when wearing removable orthodontic appliance. In contrast, the participants who complained of pain was lower than who did not complained of pain (24.4% vs 75.6%). Lastly, all participants have the knowledge on the importance of compliance in wearing removable orthodontic appliance.

IV. DISCUSSION

The main objective of this study is to assess patient's compliance in wearing removable orthodontic appliance and to explore the reasons for non-compliance. Several factors were associated with non-compliance patient such as pain and discomfort, dentist-patient relationship, the severity of the malocclusion and patient

knowledge. Apart from that, patient motivation, awareness and personality have also been found to influence patient compliance at some level [9]. Patient with severe malocclusion were found to have negative impact on their psychosocial and self-esteem [10].

Pain and discomfort have been recognized to be the main factor of non-compliance patient in this study. Pain could arise from the force to move teeth and accidental trauma to oral mucosa. Pain from the activation of removable appliance could not be prevented but could be reduce by practicing minimal force. This can be done by activation of less than half tooth wide on the active component. Apart from that, interval of one-hour rest can be applied on 16 hours wear for functional appliance in young children. This could increase their motivation and cooperation during the duration of the treatment. The worst experience of pain among orthodontics patient is reported to be within a month of appliance insertion [11]. More than half will complaint of pain after the insertion of the removable appliance [12,13]. However, the pain will then gradually reduce to acceptable level after that. This indicate that, during the first month of appliance insertion, extreme care and measure must be taken to reduce the pain experience. Activation of appliance should not be done in the first month of treatment and analgesic to reduce pain should be prescribe to the patient. Accidental trauma to oral mucosa should also be explain to patient so that patient could mentally prepare for this to happen. Patient should be warned not to wear the appliance if the appliance was broken or dislodged during sleep. Sharp edges should be trimmed and component wire should not be extended. Many discomfort experiences by patient during removable appliance treatment such as increase in saliva flow, altered speech, disrupt sleep and disturb eating. This discomfort is temporary and will eventually settle after few days.

Dentist-patient relationship plays an important role in the successful treatment outcome. In this study, patient show more cooperation and compliance when the relationship is healthy between both parties. An ideal relationship can be defined as having good communication, respect and being comfortable between each other. Patient did not feel intimidate or scared during treatment is a good indication. An affective (emotional) communication is perceived to be better than instrumental information to rely on instruction to patient [14]. Communication that includes empathy towards patient especially young children and ageing group could increase the compliance towards treatment. Some study suggests that patient with lack of trust and confident towards their dentist were likely experienced poor oral hygiene and treatment outcome [15,16]. In order to overcome this, communication training has been introduced to counter patient anxiety and improve dentist-patient relationship in dental school.

Perception on the severity of malocclusion by the patient usually will reflex on their attitude and behavior towards dental treatment. In this study, patient that perceive their malocclusion as worst tend to have better compliance with removable appliance. Patients feel the need to follow the given instruction to treat their teeth condition. They are aware that, something needs to be done and more persevere toward pain or discomfort during treatment. Unfortunately, patient with mild malocclusion were likely be less compliance with removable appliance [17]. This could be due to not much improvement can be made on their malocclusion versus the commitment they have to make for the treatment.

In this study, no statistically different were found between compliance and non-compliance patient regarding their knowledge. Both groups exhibit similar knowledge on their treatment. This could be because every patient was given verbal instruction on every appointment visit. All patient claim to have all the necessary knowledge regarding their appliance and treatment. Patient equipped with dental knowledge will have better attitude and behavior towards oral hygiene care [18]. Oral hygiene and compliance to treatment is better in patients who are aware of the treatment reason, steps and outcome.

Lastly, a systemic review has shown that patient routinely overestimate the duration of wear and the compliance with removable appliances are sometime suboptimal [19]. Other study has shown that electronic wear-time of patient compliance is much more comprehensible measurement [20]. Although wear time recording device could not guarantee sufficient patient compliance with removable appliance but still it helps to record the accurate time wear [21]. Patient should be encouraged to have a daily dairy to record their daily wear to increase compliance.

V. CONCLUSION

The result of this study shows that factors that contribute to compliance were pain and discomfort, patient-dentist relationship and severity of the malocclusion itself. It is recommended that pain and discomfort should be keep to minimal during treatment. Apart from that, the relationship between patient-dentist should be improved to increase the patient compliance and satisfaction of the treatment outcome. Successful treatment with removable appliance depends on the pain perception of patient especially in young children. In order to guarantee compliance among patient is to keep pain and discomfort to a minimal level.

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