

Patients Compliance between Hawley Retainers and Vacuum Formed Retainers Following Orthodontic Treatment A Questionnaire Based Study

Sharath Kumar Shetty¹, Mahesh Kumar Y², Neeraj NS^{3*}, Vijayananda K. Madhur⁴

¹Professor & HOD, Department of Orthodontics & Dentofacial Orthopaedics, K.V.G Dental College & Hospital, Sullia, Karnataka, India

²Professor, Department of Orthodontics & Dentofacial Orthopaedics, K.V.G Dental College & Hospital, Sullia, Karnataka, India

³Post Graduate Student, Department of Orthodontics & Dentofacial Orthopaedics, K.V.G Dental College & Hospital, Sullia, Karnataka, India

⁴Reader, Department of Orthodontics & Dentofacial Orthopaedics, K.V.G Dental College & Hospital, Sullia, Karnataka, India

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*Corresponding author: Dr. Neeraj N. S

Abstract

Original Research Article

Retention is considered as an important phase at the end of any active orthodontic tooth movement. **Aim:** The purposes of this study were to compare compliance between Hawley retainer (HR) and vacuum formed retainers (VFRs) and to detect the reasons for noncompliance. **Materials and Methods:** Questionnaires were distributed to those who completed orthodontic treatment and currently have experience with the orthodontic retainer. Items included demographic information and questions pertaining to evaluate and quantify retainer compliance during the postretention phase according to several variables, including time in retention, reasons for not wearing etc. **Results:** Out of the 80 questionnaires distributed, 75 returned and five were excluded from the study. The mean age of the participants in HR group were 23.2(±1.9) years and in VFR group it is 20.2(±1.8). Out of the 75 respondents 41 females and 34 males participated in the survey. While comparing the reasons for not using the retainer among the participants, in Hawleys group 39.4% does not wear due to its aesthetic problems, pain and discomfort, in 10.5 % the retainer didn't fit properly. In VFR group the 59.4 % of the participants not wearing the retainer the reason was found to be the problems associated with speech. In both groups the majority doesn't have any difficulty while removing and wearing the retainer and didn't experienced any wear or breakages during retainer period. **Conclusions:** Considering all factors related to compliance VFR and HR have equal level of compliance on different factors and the most surveyed reason for not wearing retainer is difficulty in speech and concerns regarding aesthetics.

Keywords: Hawley retainer (HR), vacuum formed retainers (VFRs).

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INTRODUCTION

In 1934, Oppenheim stated the phrase, "Retention is one of the most difficult problems in orthodontia; in fact, it is the problem [1]." Three-quarters of a century later that phrase still holds true. Orthodontic literature has been reporting studies on the biological importance of holding teeth in their desired final positions following orthodontic treatment for since the 1950's, yet at present day proper guidelines and protocols for optimal orthodontic retention is still under investigation. This is in part due to the difficulty in controlling and verifying variables such as cooperation, length of retention time, growth, and variations in appliance design [2].

The practice and the theory of orthodontic retention therapy have changed and continue to change over the years. It is currently believed that orthodontic patients should wear their retainers nightly throughout their life after treatment if they desire to maintain

optimal dental alignment. Current beliefs are in contrast to the previous position that retainers need not be worn once remodelling of the surrounding periodontium is complete [3].

After orthodontic treatment, there are both a retention phase and a post retention phase of therapy. The retention phase consists of the time during which the periodontium remodels after the skeletal and dental changes associated with orthodontic treatment. The various components that constitute the periodontium complete this process over varying lengths of time it is generally accepted that the retention phase is completed within a year of finishing treatment [4]. The post retention phase of treatment continues for the remainder of the patient's life. During this phase, movement of teeth can occur in response to changing forces in the periodontium caused by continued growth and development. Orthodontic retainers are worn during this phase to offset the effects of these changing forces [3].

Many types of removable retainers have been used after active orthodontic treatments to maintain teeth in the final functional and aesthetic position⁵. Hawley retainers (HRs) and vacuum-formed retainers (VFRs) are the most commonly prescribed removable retainers in the orthodontic practice [6]. Many studies have been performed to evaluate the effectiveness of HRs versus VFRs. Most studies have shown no significant difference between both appliances regarding quality of retention [7] except for lateral expansion cases in which HRs are recommended or maxillary/mandibular labial segments' corrections of crowding in which VFRs are recommended [8]. The most disadvantage of using removable retainers is the need of patient's compliance [9]. From reviewing the literature, it can be concluded that discomfort caused by orthodontic appliance wear has a negative influence on the appliance acceptance and on patient's compliance [10-12].

Because most orthodontic retainers are removable, patient compliance is an important factor in almost all cases. Many studies have focused on identifying personal characteristics strongly correlated with a compliant orthodontic patient. However, the data from much of this research have been contradictory, and other studies have yielded inconclusive results [13].

The purposes of this study were to evaluate and quantify retainer compliance during the postretention phase according to several variables, including patient age, sex, time in retention, reasons for not wearing etc.

OBJECTIVES

The aim of this study was to assess patients' compliance subjectively with vacuum-formed or Hawley retainers after active orthodontic treatment through a questionnaire survey.

Inclusion Criteria

1. Patients aged 15 to 35 years
2. Both upper and lower dental arches have been orthodontically treated.
3. Full arch orthodontics were performed.
4. The removable appliance has to be worn as retention for post orthodontic treatment.
5. Participants who had either one removable retainer for one arch or two removable retainers for both arches

Exclusion Criteria

1. Medically compromised patients
2. Patients requiring restorative dental work immediately following orthodontic treatment.
3. Early deboning patients. Those patients who had their braces removed early due to noncompliance, finances, or any other reasons
4. Invisalign Patients
5. Surgical Patients

MATERIALS & METHODS

This study was conducted via a questionnaire that was sent through phone to patients who had finished full fixed appliance therapy in the department of orthodontics and dentofacial orthopaedics, KVG dental college & hospital Sullia. 80 orthodontically treated patients who fully fill the inclusion and exclusion criteria were enrolled in the study. The surveyed patients included those from both rural and urban environments with various socioeconomic backgrounds. The questionnaires included several identifiers that allowed the respondents to be classified into subgroups. The questionnaire included demographic information and questions pertaining how often he or she was instructed to wear the retainers, how often the retainers were actually worn, and any reasons for not wearing the retainers as instructed the questionnaire is given below.

The survey is meant for patients who have received removable retainers following orthodontic treatment. If you have a removable retainer, your comments will provide valuable information for the study. No one will know the identity of the individuals who complete the questionnaire. Consequently, your retention appointments, or any further treatment, will not be effected in any way by your response to these questions. By completing and returning the survey, you are signing that you understand this study and consent to your participation in it.

Age :

Gender :

Type of removable retainer (check one)

1. Plastic with metal wire across the front teeth
2. All clear plastic with no wires

1. How long you been wearing the retainer?

- <3months 3-6months
 6-12months >1year

2. How long do you wear the retainer in a day?

- <10hrs 10-15hrs
 15-20hrs >20hrs

3. If you were not wearing your retainers as often as you were instructed, which of the following reasons you prefer not to wear the retainer?

- It affects the appearance Pain & discomfort
 It affects the speech It does not fit properly
 Others

4. How frequently do you clean your retainer?

- Morning Before sleep
 After every meal Twice in a day

5. Have you felt any oral hygiene problems after started to wear the retainer?

- Yes No

6. Do you feel any difficulty while wearing and removing the retainer?

- Yes No

7. Have you experienced any wear or breakages to your retainer?

- Yes No

8. Does the retainer wearing affects your social activity and confidence?

- Yes No

9. Do you feel the wearing of retainer after orthodontic treatment is important?

- Yes No

10. How often do you visit the doctor for follow up?

- Every month Once in 3 months
 Once in 6 months Annually

RESULTS

Out of 80 questionnaires distributed 75 returned with responses. 38 participants were using Hawleys retainer (HR) and 37 were using vacuum formed retainer (VFR). The mean age of the participants in HR group were 23.2(±1.9) years and in VFR group it is 20.2(±1.8). Out of the 75 respondents 41 females and 34 males participated in the survey. Demographic characteristics are reported in Table-1. When surveyed about the duration of the wearing retainer 78.94% of the participants of Hawleys group were wearing for 6-12 months, while VFR group 29.7% were wearing for 6-12 months and 35.1 % is wearing for more than 1 year. The duration of participants wearing retainer in a day was seen in both less than 1 year and more than 1 year group. 68.1 % who wore the retainer for more than 1 year were found to be using the retainer for more than >20hrs per day. While comparing the reasons for not using the retainer among the participants, in Hawleys group 39.4% does not wear due to its aesthetic problems, pain and discomfort, in 10.5 % the retainer didn't fit properly. In VFR group the 59.4 % of the participants not wearing the retainer the reason was found to be the problems associated with

speech. When compared for frequency of cleaning the retainer more than 65% of participants in both the groups cleaned the retainer twice a day. When asked about oral hygiene problems due to the retainer use 78.9% of participants in VFR group and 50% in HR group had oral hygiene problems. Almost 78% of participants in both group doesn't have any difficulty while removing and wearing the retainer and didn't experienced any wear or breakages during retainer period. In HR group 89.4% of participants had issues related to social activity and the wearing affected the confidence while the same problem experienced in VFR group is less than 78.9%. Among the participants more than 60 % doesn't think the retainer wearing is not important after orthodontic treatment. In HR group 60.5% participants visit their dentist for follow up once in 3 months while 89.1% of participants in VFR group visits dentists only annually. While assessing the compliance factors like reasons for not wearing the retainer, oral hygiene problems associated while using retainers, regular follow up to the dentists, and the importance for wearing retainer after orthodontic treatment was found to be statistical significant.

Table-1: Demographic characteristics

	N	Hawleys retainer group	Vacuum formed retainer group	P value
Age	75	23.2±1.9	20.2±1.8	0.43
Gender				0.22
Male	34	19(55%)	15(44.2%)	
Female	41	20(48.7%)	21(51.3%)	

	Hawleys retainer group	Vacuum formed retainer group	P value
N	38	37	
Duration of wearing retainer			0.6
<3 months	1(2.6%)	3(8.1%)	
3-6 months	4(10.5%)	10(27%)	
6-12 months	30(78.94%)	11(29.7%)	
>1 year	3(7.8%)	13(35.1%)	
Reason for not wearing retainer			0.03*
Appearance	15(39.4%)	2(5.4%)	
Pain	15(39.4%)	6(16.2%)	
Speech	2(5.2%)	22(59.4%)	
Fit	4(10.5%)	3(8.1%)	
Others	2(5.5%)	4(10.9%)	
Frequency of cleaning retainer			0.9
Morning	5(13.1%)	6(16.2%)	
Before sleep	4(10.5%)	4(10.8%)	
After meal	2(5.2%)	2(5.4%)	
Twice in a day	27(70.05%)	25(67.5%)	
Visiting the doctor for follow-up			0.04*
Every month	3(7.8%)	1(2.7%)	
Once in 3 months	23(60.5%)	1(2.7%)	
Once in 6 months	8(21%)	2(5.4%)	
annually	4(10.5%)	33(89.1%)	

	Hawleys retainer group	Vacuum formed retainer group	P value
N	38	37	
Oral hygiene problems	19(50%)	30(78.9%)	0.01*
Difficulty in use	8(21%)	8(21%)	0.5
Wear or breakage	30(78.94%)	30(78.9%)	0.7
Social activity and confidence	34(89.4%)	30(78.9%)	0.9
Importance of wearing orthodontic retainer after treatment	23(60.5%)	25(67.5%)	0.02*

	Years of using retainer		P value
	<1 year	>1 year	
N	53	22	
Duration of wearing retainer in a day			0.012*
<10 hours	1(1.8%)	1(4.5%)	
10-15 hours	17(32%)	2(9%)	
15-20 hours	31(58.4%)	4(18.1%)	
>20 hours	4(7.5%)	15(68.1%)	

DISCUSSION

The significant higher acceptance levels of appearance in the VFR group can be explained by the clear material of the VFR and the less visibility compared to the visible metallic labial bow of the HR. The labial wire of the HRs was visible, and a number of subjects expressed mild dissatisfaction. This agrees with the results of Hichens *et al.*, [14]. On the other

hand, Pratt *et al.*, found no differences regarding aesthetic aspects between the VFR and the HR group [15].

One possible explanation for the faster decrease in retainer compliance with VFRs is differences in durability between the 2 retainer types. Because VFRs cover the occlusal surfaces, they tend to

break down under the stresses of functional and parafunctional activities. For the most part, Hawley retainers do not cover the occlusal surfaces and are therefore less vulnerable to wear over time. Another factor that might influence compliance is the increased time required to maintain and clean a VFR. The wear and the flexibility of the VFR make it more susceptible to fractures, stains, and absorption of oral fluids [9].

The significant higher levels of comfort with the VFR may be due to the higher levels of appearance acceptance, oral hygiene perception, swallowing ability, talking ability, and self-confidence with significant less level of gingival irritation. The lighter weight of VFR may be an additional reason although it was not measured in the current study. Wong and Freer conducted survey research in 2006 that found a strong relationship between compliance with removable retainers and patient's perception on its comfort. Hichens et al discovered through a patient satisfaction questionnaire that most people preferred the vacuum-formed retainer over Hawley retainers. Mollov et al., reported in a survey study including mostly college students and dental students similar increase in patient satisfaction with VFR's as compared to Hawleys [16].

Higher significant levels of self-confidence were also assessed in this study in subjects of VFR group. The significant higher levels of self-confidence with the VFR may be related to its clear appearance with less visibility and higher ability to talk when the retainer is in situ This is consistent with the findings of Hichens et al., who found that using HRs caused more embarrassment than using VFRs [17].

The significant higher levels of perception of good hygiene with the VFR group can be a result of the apparently higher levels of visibility of food remnants beneath the appliances compared to the HRs. The significant less levels of gingival irritation with the VFRs can be attributed to the absence of retentive metal elements such as Adams clasps and the labial bow.

Due to their form, vacuum-formed thermoplastic retainers may have an increased accumulation of material inside their concavities and greater difficulty in cleaning the retainer with the toothbrush. In addition, the higher incidences of little and serious breakages of the vacuum-formed thermoplastic Essix retainers may induce the patient to perform a less vigorous cleaning of the retainer, with consequent plaque and calculus accumulations and gingival problems over time. Gingival problems were also confirmed by the higher percentage of bleeding sites in the Essix group (30.35%) compared with the Hawley group (11.30%) [18].

One issue that was addressed in this study was the frequency of follow-up visits. After deboning and retainer delivery patients were instructed to visit back to

the department for the regular follow up visits once in every month After the first year, retainer checks typically occur Very often. However, not all patients return for their retainer-check appointments. Retainer checks have several benefits, including reinforcing proper retainer wear, examining retainers for breakages and wear, evaluating the fit of the retainers, and identifying any other problems related to retention. In this study, we identified that in HR group 55% had regular monthly visit while it is 32% in VFR group. It is likely that those who returned for these follow-up visits would be more likely to have proper retainer compliance [19].

Another factor that might affect our results was the low percentage of nonrespondents in this study. This include less than 1% in both Hawley's and vacuum formed retainer group. Although this model is a good indicator of how the above factors impact patient compliance with retainers, the model would most likely better represent the general population if there had been full respondents. It is reasonable to assume that non respondents were less compliant on average with orthodontic retainers than those who did respond.

The results of this study also suggest that, although compliance is better with HRs than with VFRs, overall patient compliance with removable retainers is not acceptable as many participants which include 35% of HR and 25% of VFR who reported that they are not using retainers due to different above mentioned reasons or they had lost their retainer. Because of this fixed retention should be evaluated as a potentially preferred alternative to removable retainers [19].

CONCLUSIONS

Considering all factors related to compliance VFR and HR have equal level of compliance on different factors and the most surveyed reason for not wearing retainer is difficulty in speech and concerns regarding aesthetics. Among the participants majority had an opinion that retainer wearing is not important after orthodontic treatment hence, regular follow up by an orthodontist and motivation on wearing retainer will make much difference.

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