

## Original Article

# Postretention phase: Patients' compliance and reasons for noncompliance with removable retainers

### ABSTRACT

**Background:** Retention is considered as an important phase at the end of any active orthodontic tooth movement.

**Aims:** 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 had an orthodontic treatment and currently have experience with the orthodontic retainer. Items included demographic information and questions pertaining to treatment satisfaction, perceived responsibility for retention, type of retainer prescribed, Likert scale to detect the reasons for discontinuing use of retainers, and relapse. Chi-square and *t*-test were used to compare the data.

**Results:** Out of the 150 questionnaires distributed, 98 returned and seven were excluded from the study. The compliant groups were 40, whereas the noncompliant group were 51. Sixty-four (70.3%) of the participants were using HR, whereas 27 (29.7%) were using VFRs retainer. Seventeen percent (Hawley) and 15% (VFRs) of the participants who did not comply reported that they had lost their retainer. For both retainers, those participants who did not comply, the majority agreed that they do not wear their retainer because it affects their eating (84.3%), speech (56.9%), comfort (47.1%), and breath odour (43.1%). A statistically significant difference in compliance levels in relation to the length of time since debond was also found ( $P < 001$ ).

**Conclusions:** The participants were more compliant with Hawley's than VFRs retainers and a significant difference in compliance levels in relation to the length of time since debond was found.

**Keywords:** Compliance, malocclusion, orthodontic, retainers, retention

### INTRODUCTION

A review of evidence relating to orthodontic retention and relapse, stated that stability could be achieved if forces from the periodontal and gingival tissues, orofacial soft tissues, occlusion, and posttreatment facial growth achieve a form of equilibrium.<sup>[1-3]</sup> Kaplan suggested that patients should be informed of the high probability that some relapse will occur after appliances are removed and of the natural adaptations that take place over time. In this way, patients become an integral part of the decision-making process, along with the orthodontist, regarding the appropriate duration of retention procedures.<sup>[4]</sup> Some orthodontists state that long-term retention is the only way to prevent relapse.<sup>[5]</sup> Rinchuse *et al.* believed that the combination of

various removable and fixed retainers enhance the stability of treatment and patient compliance.<sup>[6]</sup> Nevertheless, retainer type is not the only factor that affects the successful outcomes in orthodontic treatment.<sup>[7]</sup> Patients' compliance is another crucial factor for successful outcomes in orthodontic treatment, especially when removable appliances are used.<sup>[8-10]</sup> Sawhney reported that patients are more likely to

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**How to cite this article:** Almuqbil S, Banabilh S. Postretention phase: Patients' compliance and reasons for noncompliance with removable retainers. *Int J Orthod Rehabil* 2019;10:18-22.

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<b>Website:</b> <a href="http://www.orthodrehab.org">www.orthodrehab.org</a>	<b>Quick Response Code</b> 
<b>DOI:</b> 10.4103/ijor.ijor_27_18	

replace vacuum-formed retainers (VFRs) retainer than Hawley retainer (HR).<sup>[11]</sup> Apart from the factors and the reason for compliance and noncompliance with various orthodontic retainer, there are direct and indirect methods to assess compliance with prescribed wear times for the orthodontic retainer.<sup>[12,13]</sup> However, the increased cost increased size, and complicated use together with reduced reliability and inadequate accuracy in measurements have inhibited the widespread use of those methods and devices for research or clinical purposes.<sup>[8,14,15]</sup> Whereas several studies have investigated the attitudes and preferences of orthodontists toward various retention protocols.<sup>[16-21]</sup> There is a noticeable void in the published research regarding patients perceptions of orthodontic retainers and stability, especially among Saudi patients. Therefore, the purpose of the current study was to compare compliance between HR and VFRs retainer among Saudi patients and to detect what were the reasons for noncompliance.

## MATERIALS AND METHODS

After the study approved at the institutional level and informed consent were obtained. This study was conducted via a questionnaire that was distributed to the student at the College of Dentistry, who had completed fixed orthodontic therapy in either private or government hospitals/clinics. Patients who had been out of full fixed appliance therapy for <4 months were excluded because they were considered to be in the retention phase of treatment. None of the returned questionnaires identifies the respondents. One hundred and fifty patients were surveyed, ranging in the age group from 18 to 28 years. The study was conducted between January and October 2017. Items included demographic information and questions pertaining to treatment satisfaction, perceived responsibility for retention, type of retainer prescribed, reasons for discontinuing use of retainers, and relapse experienced. Surveys were administered to students during the last 15–20 min of their lecture. Students who fill-full our inclusion and exclusion criteria were requested to participate and collected after the lecture.

The inclusion criteria included first, those Saudi participants who finished their orthodontic treatment and currently have experience with the removable orthodontic retainer. Second, the removable appliance has to be worn as retention for postorthodontic treatment. Third, participants who had either one removable retainer for one arch or two removable retainers for both arches. Participants who had <4 months or >8 years, since the removal of orthodontic bands and participants with missing answer identify a subgroup was excluded from this subgroup. The participants have been classified as compiled,

noncomplied and not identified based on two questions. The first was “How many times your clinicians ask you to wear your retainer” and the second question was “How often do you wear your retainer.” Participants who do not remember the instruction or if the clinician did not instruct them have been classified as not identified and therefore excluded from this study. The reasons for noncompliance have been only taken from the noncomplied subgroup. The questionnaire used in this study constructed by combining two questionnaires from pretested, validated, self-administered researches.<sup>[7,10]</sup> To detect the reasons for noncompliance, a Likert scale was used.<sup>[10]</sup> The Likert scale has been recorded to give only agree, disagree, or natural answers. A pilot study was conducted with 12 questions to detect if there is any confusion or misunderstanding of any part of the questionnaire before the actual study start. The data have been analyzed using a Chi-square test by SPSS Statistical Package for the Social Sciences, IBM SPSS Statistics for Windows, Version 20.0 (IBM Corp., Armonk, NY: USA). Differences among groups, and differences and associations among responses were determined using Chi-square analysis with a statistical significance threshold of  $P \leq 0.05$ .

## RESULTS

Demographic characteristics of the groups surveyed are shown in Table 1. Out of the 150 questionnaires distributed, 98 returned and seven were excluded from the study. The compliant groups were 40 whereas the noncompliant group were 51. Out of the 91 participants, 45 were male and 46 were female. Sixty-four (70.3%) of the participants were using HR, whereas 27 (29.7%) of them were using VFRs retainer [Table 1]. The mean age of the participants was 21.6 years ( $\pm 2.5$ ) [Table 1]. Participants using HR showed more compliance (32 out of 64 participants; 50%), whereas compliant participants using VFRs were 8 out of 27 (29.6%).

**Table 1: Demographic characteristics of the participants**

Variables	n (%)
Gender	
Male	45 (49.5)
Female	46 (50.5)
Type of retainer	
VFRs	27 (29.7)
Hawley retainer	64 (70.3)
Current age (years)	
Mean	21.56
SD	2.526
Range	18-28
Time since treatment completed (years)	
Mean	2.5128
SD	1.99401
Range	0.5-8

SD: Standard deviation, VFRs: Vacuum formed retainers

However, there was no statistically significant difference association between HR and the VFRs retainer regarding patients' compliance [Table 2]. A statistically significant difference in compliance levels in relation to the length of time since debonding was found ( $P < 0.001$ ); [Table 3]. Seventeen percent (17.6%, 9 out of 51; Hawley) and 15% (15.7%; 8 out of 51; VFRs) of the participants who did not comply reported that they had lost their retainer. For both retainers, those participants who did not comply, the majority agreed that they do not wear their retainer because it affects the followings: eating (84.3%), speech (56.9%), comfort (47.1%) and finally both retainers got an effect on participant's breath odor (43.1%). However, for HR, the reasons for noncompliance were eating (78.0%), speech (59.4%), and comfort (37.5%). For VFRs, eating (94.7%), comfort (63.1%), and breath odor (57.9%) were the highest reasons for noncompliance [Table 4].

## DISCUSSION

This study attempted to compare the compliance between Hawley and VFRs retainer among Saudi patients and to detect what were the reasons for noncompliance. It is well known that the assessment of compliance for clinical or research purposes is difficult because of the wide variety of factors determining patients' compliance.<sup>[22]</sup> Nevertheless,

retention continues to be an important and continuing issue for the orthodontist because of relapse after active tooth movement.<sup>[3]</sup>

The importance of the current study is that it provides long-term information in the postretention period from 4 months to 8 years of retention when active orthodontic treatment was completed. The study also confirmed that Saudi patients were more compliant with Hawley's than with VFRs retainers and a significant difference in compliance levels in relation to the length of time since debonding was found. This result is not surprising as Hawley in the maxilla and fixed lingual retainer in the mandible were the most common retention protocols prescribe by Saudi orthodontist.<sup>[19]</sup> In addition, patients believed that their HR retainers were more durable than VFR at Saudi Consultant Dental Center.<sup>[23]</sup> In contrast, Ireland orthodontist reported that VFRs were the most common retainer of choice in the maxilla and mandible.<sup>[20]</sup> Malaysian orthodontist reported that vacuum-formed retainers were the most commonly used retainer among orthodontists in Malaysia followed by the HR and fixed retainers.<sup>[21]</sup> Western studies found higher levels of compliance with VFRs retainers when compared directly over HRs among the American; British, and Canadian patients.<sup>[7,10,11,24,25]</sup> Mirzakouchaki *et al.* (2016) reported that Iranian patients were more compliant with VFRs than with HRs.<sup>[26]</sup> One explanation of the diversity of levels of compliance with different retainers related to orthodontist retention protocol, logically the retention protocol will have a consequence on patients' compliance and we can see that clearly as different researchers around the world with diverse population found a mixed result. Another way of exploring the patients' compliance is to compare short- and long-term compliance. We can clearly see some difference in the result in terms of compliance duration. Overall, it was found that long-term compliance of those patients who keep their retainer for >5 years was greater in the HR group which agrees with our result.<sup>[7]</sup> Nevertheless, short-term period studies result since debonding showed VFR retainers were preferred over HRs.<sup>[11,10,24,26]</sup>

**Table 2: Patient compliance with vacuum formed retainer and Hawley retainers**

	Compliance		Total
	Compliant (%)	Noncompliant (%)	
VFR retainer	8 (29.6)	19 (70.4)	27 (29.7)
Hawley retainer	32 (50.0)	32 (50.0)	64 (70.3)
Total	40 (44.0)	51 (56.0)	91 (100)

$P=0.074$ . VFRs: Vacuum formed retainers

**Table 3: The relationship between compliance level and the length of time since debonding**

Compliance	n	Mean rank	P
Complained	40	30.41	<0.001
Noncomplained	51	58.23	

**Table 4: Patient reasons for noncompliance with vacuum formed retainers and Hawley retainers**

	Hawley retainer (n=32), n (%)	VFR retainer (n=19), n (%)	Total (n=51), n (%)	$\chi$	P
Eating	25 (78.1)	18 (94.7)	43 (84.3)	2.8	0.246
Speech	19 (59.4)	10 (52.6)	29 (56.9)	0.223	0.894
Comfort	12 (37.5)	12 (63.2)	24 (47.1)	3.179	0.204
Breath odour	11 (34.4)	11 (57.9)	22 (43.1)	4.189	0.123
Relax or sleep	11 (34.4)	9 (47.4)	20 (39.2)	2.125	0.346
Appearance	11 (34.4)	6 (31.6)	17 (33.3)	0.049	0.976
Smiling or laughing	8 (25.0)	9 (47.4)	17 (33.3)	2.701	0.259
Mood	7 (21.9)	6 (31.6)	13 (25.5)	0.786	0.675
School life	5 (15.6)	3 (15.8)	8 (15.7)	0.013	0.994

VFRs: Vacuum formed retainers

One possible explanation for the difference between short- and long-term results could be related to differences in durability between the two retainer types. Because VFRs cover the occlusal surfaces, they tend to break down under the stresses of functional and parafunctional activities and the time required to maintain and to clean a VFR. The wear and the flexibility of the VFR make it more susceptible to fractures, stains, and absorption of oral fluids.<sup>[7]</sup> The present study found a significant difference in compliance levels in relation to the length of time since debonding. As one-third of the Saudi orthodontists instruct removal of the retainers 2–5 years after debonding,<sup>[19]</sup> This seemed due to patients were not wearing retainers for the amount of time instructed by the orthodontist but, rather, of their own choice. This important finding was supported by logistic regression model on the American patients.<sup>[7]</sup> Similarly, Kacer *et al.* found a significant difference in the compliance levels in relation to the length of time since debonding.<sup>[27]</sup> In contrast, no statistically significant associations were noted between individual retainers or groups of retainers prescribed per patient and time since debond on Canadian patients and the researcher related that to the variation of the definition of compliance and retention protocol.<sup>[11]</sup> According to reasons of noncompliances, our study found that the majority of our patients agreed that they do not wear their retainers because it affects their eating (84.3%), speech (56.9%), comfort (47.1%), and odor (43.1%). This result is surprising with eating as the first reasons that contributed to our patient's noncompliances. As a common orthodontic instruction that usually delivered to the patients is to take his retainers out when eating and always put their retainers in their case. Therefore, we find it very surprising that this reason was the first reason that contributed to our patient's noncompliances. One explanation would be related to either our orthodontists were not spending sufficient time to deliver retainers instructions or the patients were not understanding and/or following their orthodontist instruction, and they are eating with their retainer. We may also anticipate that some of the orthodontists may put considerable stress on retention and relapse that lead their patients to wear their retainer during eating. However, whatever the reasons behind this, they certainly need further investigation. The study agrees with another cross-sectional study which considered speech as the second most reason for noncompliance and HR was slightly higher than VFRs and this might be related to occlusal coverage of VFRs and acrylic plate of HR retainer which may have resulted in speech impairment and therefore, a lower compliance rate.<sup>[11]</sup> Pratt *et al.* reported that talking with VFR was hard more than HR.<sup>[7]</sup> Wild reported that there were significant differences in the patients' perception of comfort, looks, speech, and likability in favor of VFRs compared to

HR.<sup>[10]</sup> Nevertheless, Pratt reported that the percentages of people who listed esthetic concerns as a reason for not wearing their retainers were equal for patients with HR and VFRs.<sup>[7]</sup> However, the current study could not overcome some methodological limitations. First, the small sample size, especially when assessing groups of patients with multiple prescribed retainers. Second, the generalization of the results to a larger population is limited because the sample subjects were taken from the university population. This source of study patients could introduce a potential selection bias into the investigation, making our results more applicable to local populations than to the general public. A clinical recommendation based on the data from this study that may improve patient compliance would result from the initial use of a VFR retainer, followed by the long-term prescription of a Hawley. The timing for the change should be about 2 years and could approximately coincide with the transition between the retention and postretention phases. Therefore, it is apparent that no single approach is appropriate for all patients and that orthodontic retention decisions should be made with consideration of differences among individuals. Most likely, the best way to achieve long-term patient satisfaction is to devise an appropriate retention plan with input from both the orthodontist and the patient so that the patient is informed of the options available and is motivated to share responsibility for maintaining the outcome.<sup>[25]</sup> 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 who didn't comply reported that they had lost their retainer and fixed retention should be evaluated as a potentially preferred alternative to removable retainers.<sup>[7]</sup> Future studies can investigate the possible correlations between wear time and several parameters, such as sex, age, type and character of the appliance, and treatment outcome, in larger samples by using multivariate analysis models with standardized orthodontic treatment protocols to determine the influence of different parameters on patients' compliance and treatment result.

## CONCLUSIONS

The participant were more compliant with Hawley's than VFRs retainers and a significant difference in compliance levels in relation to the length of time since debond was found.

## Acknowledgments

The authors gratefully acknowledge the students at Qassim University, KSA, for facilitating our research.

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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