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# Laypeople Perception Concerning Post Orthodontic Treatment

A Project Submitted to

The College of Dentistry, University of Baghdad, Department of  
Orthodontics in Partial Fulfillment for the Bachelor of Dental  
Surgery

By

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَاللَّهُ أَعْلَمُ بِمَا تُكْسِرُونَ

صَدَقَ اللَّهُ الْعَظِيمُ

## **Certification of the Supervisor**

I certify that this project entitled " **laypeople perception concerning post orthodontic treatment**" was prepared by the fifth-year student **Teba Raed Mohammed** under my supervision at the College of Dentistry/University of Baghdad in partial fulfilment of the graduation requirements for the Bachelor Degree in Dentistry.

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Date :

# **Dedication**

To My Family.

*Jeba Raed Zwain*

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First of all, I thank **My God**, who has blessed me with wisdom, patience, and willpower to reach this level in my life.

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## List of Abbreviations:

HRs	Hawley Retainers
VFRs	Vacuum-Formed Retainers

## **Introduction**

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Retention is the phase, following active orthodontic treatment, that attempts to maintain teeth in their corrected positions by types of appliances that are removable, fixed or both (**Littlewood et al., 2017**).

The onus of retention responsibility lies on both the orthodontist and the patient. On the one hand, it is the job of the orthodontist to provide with well-fitting, comfortable retainers with proper instructions and motivation for the patient to wear it regularly. On the other hand, the patient is incumbent to wear the retainer as directed by the orthodontist. But, easy said than done, the retention stage remains the most difficult part of the orthodontic treatment (**Case, 2003**).

An experimental study has shown significant deterioration in corrected tooth rotations, lower incisor alignment and overjet in only four weeks when retention appliances were not used following orthodontic movement (**Iyotard, 2010**). So the long-term use is advisable. As such, retainer wear could be considered an essential part of an orthodontically treated patient's regular dental behaviour, in addition to brushing, flossing and attending for regular dental check-ups (**Doğramacı et al., 2020**).

A number of factors can be cited as influencing long-term results, including gender, post treatment growth, type of malocclusion, magnitude of the pre-treatment irregularity, and quality of the orthodontic treatment (**Tynlius, 2015**). And stability can only be achieved if the forces derived from the periodontal and gingival tissues, the orofacial soft tissues, the occlusal forces and post treatment facial growth are in equilibrium (**Littlewood et al., 2006**).

Even if the teeth are in a position that should be stable and there is no further growth, retention still is vitally important until gingival and periodontal reorganization is completed. If the teeth are unstable, as often is the case following significant arch expansion, gradual withdrawal of orthodontic

appliances is of no value. The only possibilities are accepting relapse or using permanent retention. Finally, whatever the situation, retention cannot be abandoned until growth is essentially completed  
**(Zachrisson, 2007 )**.

## **Aims of the Study**

The aim of this study is to evaluate dental student's perception of retention importance, duration and it's effectiveness.

# Chapter One

## Review of Literature

### **1:1 Aetiology of Relapse:**

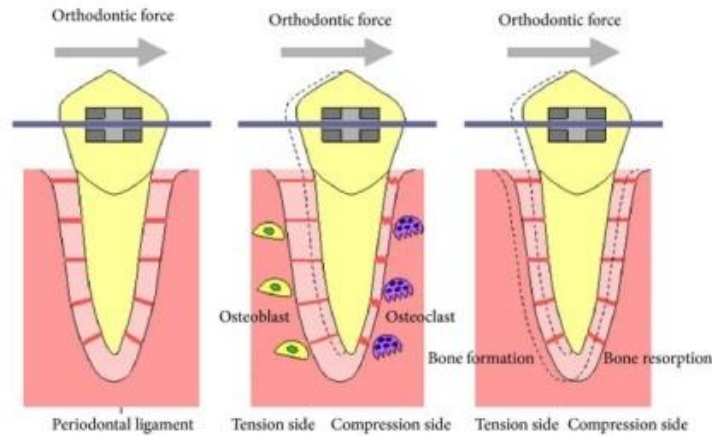
Relapse after orthodontic treatment can be defined as the loss of any correction achieved by orthodontics treatment, it can be a result of orthodontic factors and normal age changes( **Littlewood et al., 2009** ).

These orthodontic factors include periodontal and gingival factors, occlusal factors and factors related to soft tissue pressures and limits of the dentition (**Melrose and Millet, 1998** ).

### **1:1:1 Reorganization of the Periodontal and Gingival Tissue**

Orthodontic tooth movement disturbs the supporting periodontal and gingival tissues as well as the investing alveolar bone so all of which require time to reorganise following treatment (**Maltha et al., 2017**).

Due to the tension in the stretched periodontal fibres exerts a propensity to revert to pre-treatment positions (**Papagiannis et al., 2021**). If orthodontic appliances are removed immediately and no retention used, the fibres will tend to pull the tooth back towards its initial position. The collagen fibres within the periodontal ligament will take 3 – 4 months to remodel, but the elastic fibres particularly those around the neck of the tooth, can take 8 months or more to remodel. This is particularly a problem with rotated teeth, In rotated teeth the troublesome fibres around the neck of the teeth, the dentogingival and transseptal fibres, can be deliberately cut using a technique called ‘ pericision ’ (**Naini et al, 2011** ).



**Figure1:1** Orthodontic tooth movement. Mechanical force on the tooth causes compression of the periodontal ligament on one side and tension on the other side. The compression side is associated with aseptic injury and bone resorption and the tension side with bone formation. (Kitaura et al., 2014).

### 1:1:2 Growth Factors

Most facial growth has occurred during adolescence. Growth continues, resembling adolescent growth but at a reduced rate throughout adulthood (Pecora et al., 2008 ).

Subtle changes in the relative positions of the maxilla and the mandible due to continuous growth after treatment mean that the oral environment and therefore the pressures on the dentition are constantly changing. If the pressures on the teeth are always changing, then it is perhaps not surprising that there is a risk of relapse of the teeth as the patient gets older (Littlewood and Mitchell, 2019).

The studies have shown that the original growth pattern dominates. And when the orthodontic treatment is completed prior to the completion of growth, prolonged retention is indicated until active growth is completed (Phulari, 2011).

### **1:1:3 Soft Tissue Factors**

The teeth lie in a zone of balance between the tongue lingually and the lips and cheeks buccally. Although the pressure from the tongue outweighs the pressure from the lips and cheeks, the teeth are maintained in a balance of equilibrium by the active metabolism of a healthy periodontal ligament. This equilibrium can be disturbed either by the teeth being moved out of this zone of stability, or by changes in the soft tissue pressures on the teeth. It is possible that with age the soft tissue pressures may change, which may lead to relapse (Naini et al, 2011 ).

### **1:1:4 Bone Adaptation**

Teeth that have been moved recently are surrounded by lightly calcified osteoid bone. Thus, the teeth are not adequately stabilized and have a tendency to move to their original position. The bony trabeculae are normally arranged perpendicular to the long axis of the teeth. However, during orthodontic treatment, they get aligned parallel to the direction of force. During the retention phase, they revert back to their normal arrangement (Phulari, 2011 ).

### **1:1:5 Third Molars**

The most controversial role of the third molars is whether they can contribute to the development of malocclusion or relapse after orthodontic treatment, particularly in the anterior segment of the dental arch, it is an issue that remains unresolved. It has been hypothesized that, while erupting, the tooth could transmit an anterior component of force down the dental arch concentrating in the areas of canines and incisors, which results in tooth rotation and misplacement (Tüfekçi et al., 2009).

## **1:2 Basic Theorems of Retention (Phulari., 2011 ):**

### **Theorem 1:**

"Teeth that have been moved tend to return to their former position".

### **Theorem 2:**

"Elimination of the cause of malocclusion will prevent recurrence".

### **Theorem 3:**

"Malocclusion should be overcorrected as a safety factor".

### **Theorem 4:**

"Proper occlusion is a potent factor in holding teeth in their corrected positions".

### **Theorem 5:**

"Bone and adjacent tissues must be allowed to reorganize around newly positioned teeth".

### **Theorem 6:**

"If the lower incisors are placed upright over basal bone, they are more likely to remain in good alignment".

### **Theorem 7:**

"Corrections carried out during periods of growth are less likely to relapse".

### **Theorem 8:**

"The further teeth have been moved, the less likelihood of relapse".

### **Theorem 9:**

"Arch form, particularly in the mandibular arch, cannot be permanently altered by appliance therapy".

### **Theorem 10:**

"Many treated malocclusions require permanent retaining devices".



### **1:3 Duration of Retention (Proffit et al., 2000):**

1. Cases requiring minimum or no retaining appliance.
2. Cases requiring indefinite retention.
3. Cases that require operative procedures with indefinite retention.

**Table 1:1 Cases Requiring Minimum or no Retaining Appliance**

1. Blocked out canines in class I extraction cases without incisor crowding.
2. Class I anterior crossbite with sufficient degree of overbite.
3. Posterior crossbites with very steep cusps and no anterior crowding.
4. Class II cases slightly over treated with headgear to restrict maxillary growth with sufficient arch length indicated by mandibular anterior spacing and absolutely no mandibular incisor rotations.

**Table1:2 Cases Requiring Indefinite Retention**

1. Class II division 2 deepbite cases.
2. Severe rotations with poor periodontal health.
3. Undue arch expansion treatment for aesthetic demands.
4. Patients with tongue thrust or uncontrolled muscular habits.

**Table1:3 Cases that Require Operative Procedures With Indefinite Retention**

1. Tooth size discrepancies such as larger maxillary teeth may result in increased overbite.
2. Conversely, large mandibular teeth will result in end-to-end incisor relationships, maxillary spacing, or buccal end -on occlusion.
3. A vertical incisal relationship, will lead to deeping overbite and should be retained.
4. Proximal recountouring of the mandibular incisor may resolve the Bolton Discrepancy if mandibular anterior tooth material is in excess or vice- versa for the maxillary teeth.
5. Microdontia tooth may require aesthetic build ups with tooth coloured restorative or laminates to resolve this problem.
6. Severe rotations would need circumferential supracrestal fiberotomy(CSG) procedures.
7. Frenectomy may be needed to prevent relapse of the midline diastema.

## 1:4 Types of Retainers:

Retainers can be broadly classified as either fixed or removable. As their name suggests, removable retainers can be removed by patients allowing them to clean fully around the teeth and to wear them on a part time basis if indicated (Mollov et al., 2010 ). Also there are some situations when retainers are required 24 hours a day every day to reduce the chances of relapse and in these situations a fixed retainer is usually required.

### 1:4:1 Removable Retainers

#### 1:4:1:1 Hawley's Retainer

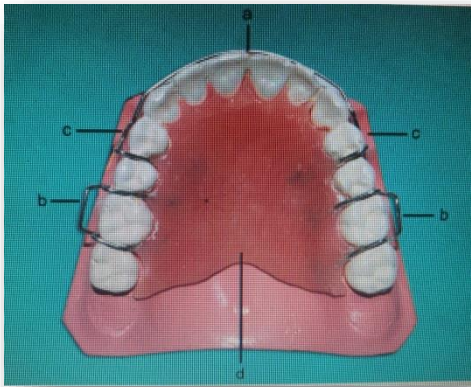
Designed by Hawley in 1920, The Hawley appliance is the most popular removable retainer, fabricated of acrylic resin and wire. It consists of a labial archwire, clasps, and a palatal or lingual acrylic base (Vaida et al., 2020 ).



Figure 1:2 Hawley retainer ( Needham et al., 2015 ).

✚ **Fabrication:** Hawley retainer is fabricated with acrylic resin that covers the palate, a stainless-steel bow contouring the labial aspect of maxillary anterior teeth, with U loops extending from distal surface of canines, and palatally embedding in the acrylic resin as in ( **Figure 1:3**).

( Assumpção et al., 2012 ) .



**Figure 1:3** Parts of Hawley's Retainer:  
 (a) Passive labial bow  
 (b) Adam's clasp  
 (c) U loop of the passive labial bow  
 (d) Acrylic base material  
 (Phulari, 2011).

The wire component includes stainless steel wire of **0.7 mm** for Adams clasp, **0.9 mm** for circumferential clasp or ball end clasp and **0.7 mm** for labial bow. The U loop is fabricated **2-3 mm** above the gingival margin of canine and free from gingival contact to avoid injury or pressure effect in gingiva. The labial bow is kept passive and in gentle contacts with labial surface of the teeth ( Kharbanda, 2019 ).

**+ Advantages of Hawley Retainers (phulari, 2011):**

- 1) Easy to fabricate because of its simple design.
- 2) Offers good patient compliance due to its reduced bulk.
- 3) A Hawley's retainer can be used for the maxillary or mandibular arches.
- 4) Its acrylic component provides a potential bite plane to control overbite.

**+ Disadvantages of Hawley Retainers (phulari, 2011):**

- 1) It is susceptible to fracture or loss.
- 2) Hawley's retainer constructed on mandibular arch is sometimes fragile and may be difficult to insert because of undercut in premolar and molar region.

## 1:4:1:2 Clear (Vacuum-Formed) Retainers

In 1971, Ponitz (**Ponitz, 1971**) introduced the Thermoplastic Stabilization Splint as an alternative to the existing ordinary removable device (**Figure 1:4**). A thermoplastic sheet (polyethylene terephthalate glycol copolymer, 0.04000 in thickness) is heated and compressed inside a vacuum apparatus against the patient's mold, according to the manufacturer's instructions, to then be trimmed into a horseshoe shape (**Vaida et al., 2020**). The thickness of the thermoplastic should be properly selected for reasons of patient comfort and increased durability.



**Figure1:4** Vacuum-Formed Retainers (**Lyros, 2023**).

### ✚ Advantage of Clear Retainers :

- 1) Esthetically pleasing, easy to clean with soap and water, and costs only a fraction of the conventional Hawley (**Gardner et al., 2003**).
- 2) Many clinicians find that it is more acceptable by patients due to its superior appearance and easiness of application (**Ashari et al., 2022**).
- 3) In addition, the retainers are quick and easy to fabricate in the dental lab or in-house, just a few materials are required (**McNamara et al., 1985**).
- 4) Only limited technical skill is necessary because wire bending does not apply (**Gardner et al., 2003**).
- 5) It usually requires no adjustment when fitted (**McNamara et al., 1985**).

✚ **Disadvantage of Clear Retainers** (Chaimongkol and Suntornlohanakul, 2017):

- 1) Demands good compliance
- 2) Nonsettling of occlusion due to occlusal surface coverage of clear retainer
- 3) Prone to wear and needs replacement at least annually
- 4) Easily lost due to transparency
- 5) Looseness of retainer in case of gingival inflammation or puffy gum.

**1:4:1:3 Clip-on Retainer/Spring Aligner**

This appliance is made of a wire frame work that pass labially over the incisors and then passes between the canine and premolar (**figure 1:5**), is reserved to lie over the lingual surface. Both the labial as well as lingual segments are embedded in a strip of clear acrylic. It brings about corrections of rotations commonly seen in lower anterior region (**Proffit et al., 2006**).

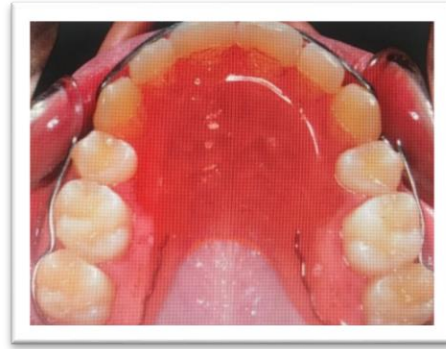


**Figure 1:5** A canine-to-canine clip-on active retainer  
(Proffit et al., 2018).

**1:4:1:4 Begg's Retainer**

Consists of a labial wire that extends till the last erupted molar and curves around it to get embedded in acrylic that spans the palate (**figure 1:6**).

**Advantage:** There is no cross over wire that extends between the canine and premolar thereby eliminating the risk of space opening (**Rinchuse et al., 2007**).



**Figure 1:6** Begg's retainer (Lyros et al., 2023).

### **1:4:1:5 Positioner**

It is a transmaxillary, removable appliance, considered one of the most effective retention devices ever invented. It is custom-made, fabricated in the lab from resilient translucent silicone (**Figure 1:7**). It has also been used to correct minor intra- and inter-arch irregularities in cases where active treatment needs to cease prematurely. It may cause minor, programmed tooth movement, while respecting the gingival tissues. However, long-term compliance is questionable because some patients consider it unaesthetic, bulky, and dysfunctional. However, it could allow for earlier completion of active treatment, promote small space closing, and minor rotation or buccolingual correction. It could even alleviate some occlusal discrepancies. It improves lip competence and facial muscular tone. It could be used to correct second molar crossbites, and to control overjet. However, it is not possible to achieve more than 1–2 mm of respective tooth tipping (**Park et al., 2008**).



**Figure1:7** Positioner (Lyros et al., 2023).

## **1:4:2 Fixed Retainers**

Fixed retainers are a type of invisible retainers which are either banded or bonded to the lingual surface of the teeth, hence it is not visible to the naked eye. It is indicated where prolonged retention is required and involves minimal or no patient cooperation. They are fixed to the teeth and hence cannot be removed by the patient (**Bearn, 1995** ), So they are more prone to plaque and calculus accumulation (**Millett et al., 2008**).

It is therefore vital that patients are provided with clear instructions on oral hygiene measures associated with their bonded retainers. The retainers also need to be checked regularly to ensure that they are still bonded in place ( **Shaughnessy et al., 2016** ).

### **1:4:2:1 Indications for a Fixed Retainers:**

**Table 1:4** Specific Indications for a Fixed Retainers (**Meade and Millett, 2015**).

<b>Pre-treatment Features</b>	<b>Post-treatment Features</b>
Median diastema	Space closure following lower incisor extraction
Generalized anterior spacing	Proclination of lower incisors
Severe rotations	Increase in intercanine width
Impacted canines and incisors	Residual overjet in the absence of lower lip support
Severely displaced teeth	Minimal or no overbite after incisor crossbite correction
Severe incisor crowding	Deep overbite correction
Loss of periodontal support	Correction of anterior open bite by orthodontic means
Cleft lip and palate	Teeth with no opposing tooth contact



## 1:4:2:2 Types of Fixed Retainers

### ❖ Banded Canine-to-Canine Retainer ( Phulari, 2011 ):

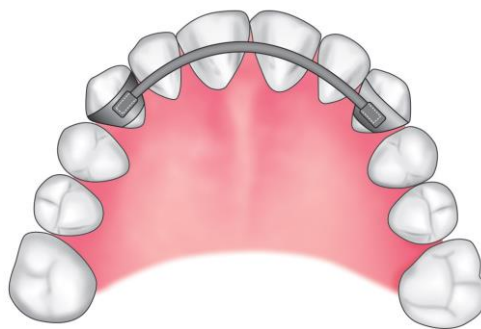
Banded canine-to-canine retainer is frequently used in mandibular anterior region.

#### **Design:**

The left and right canines are banded and a thick wire is contoured over the lingual aspect and soldered to the canine bands (**Figure 1:8**).

#### **Disadvantages:**

1. It is unesthetic because bands are visible.
2. Predisposes to poor oral hygiene because of the framework.



**Figure 1:8** Banded canine-to-canine retainer (Phulari., 2011 )

### ❖ Bonded Retainers

A fixed retainer may be bonded to all six anterior teeth (usually using a 0.0215- or 0.0195 in multi-stranded wire, described as canine-to-canine) or only two (often using a thick 0.030-0.032 in wire bonding to the canines only, described as canine-and-canine) (**Zachrisson, 2007**).

The canine-to-canine bonded retainers may be further extended to include premolars, particularly when premolars were initially ectopic or when the intention is to hold closed extraction spaces (**Joondeph et al., 2016**).

The canine-and-canine bonded retainers they are bonded on lingual aspects following anterior curvature. The ends are curved over the canines where it is bonded as in (**figure 1:9**) (**Bearn, 1995**).

Bonding retainers is technique sensitive, The tooth surface should be thoroughly cleaned before bonding, A dry field must be maintained, and the



wire held passively in position while bonding. Any active forces remaining in the wire can lead to unwanted tooth movement in the future and Bonded retainers can be worn without causing long - term dental health problems (Årtun et al., 1997 ).



Figure 1:9 Bonded Canine-and-canine (Lyros et al., 2023).

#### ✚ Design:

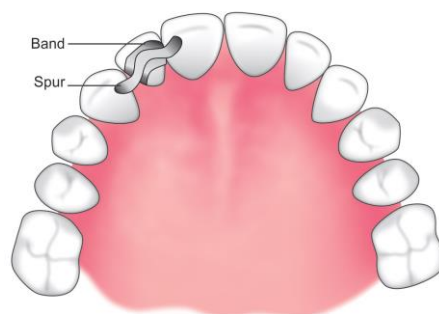
The bar of the retainer is made from a round **0.032** inch stainless steel wire or plain blue Elgiloy wire **or 0.030** inch gold-coated wire. The wire is adapted palatally for upper anteriors and lingually for lower anteriors to follow the curvature of anterior teeth. Each terminal end is curved over the canines where it is bonded with a chemical cure or light cure composite resin because such adhesives provides the strongest bonds and show comparatively little abrasion over extended periods (Phulari, 2011).

#### ✚ Indications of Bonded Retainers (Malandka et al., 2019):

- 1) In midline diastema cases.
- 2) Spaced anterior teeth.
- 3) Adult cases with potential post orthodontic tooth migration.
- 4) Accelerated loss of maxillary incisors, requiring the closure and retention of large anterior space.
- 5) Severely rotated tooth.

### ❖ **Band and Spur Retainer (Phulari, 2011 ).**

The tooth that has been rotated is banded using anterior band material and spurs are soldered onto bands so as to overlap the adjacent teeth (**Figure 1:10**). In derotation cases one spur is placed labially and the other lingually to prevent relapse. It's a choice of retainer in case of Angle's class I malocclusion with single tooth rotation treated. The Advantages It is very conventional in design and design permits good oral hygiene maintenance. But It is un-esthetic because metallic band and spur is visible.



**Figure1:10** Band and spur retainer  
(Phulari, 2011 )

### **1:4:2:3 Advantages of Fixed Retainers (Singh, 2015):**

- 1) Reduced need for patient cooperation.
- 2) Can be used when conventional retainers can not provide same degree of stability.
- 3) Bonded retainers are more esthetic.
- 4) There is no tissue irritation unlike what may be seen in tissue bearing areas of Hawley's retainer.
- 5) There is no jiggling of teeth, which are present when removable appliances are removed and reinserted.
- 6) Recall visits are reduced.
- 7) Can be used for permanent and semi-permanent retention.
- 8) Are better tolerated by the patient.
- 9) Do not affect speech, which is frequently affected when removable retainers with a base plate are worn.

#### **1:4:2:4 Disadvantages of Fixed Retainer (Singh, 2015):**

- 1) More cumbersome to insert.
- 2) Increased chair-side time.
- 3) More expensive.
- 4) Banded variety may interfere with oral hygiene maintenance.
- 5) Are more prone to breakages as compared to the removable retainers.

### **1:5 Complication of Orthodontics Retainers:**

#### **1:5:1 Speech Difficulties**

Orthodontic appliances can reduce intraoral space, can adversely affect tongue movement, and consequently result in the distortion of certain specific sounds (Haydar., 1996).

In this context, Wan et al (Wan et al., 2017 ) evaluated the effects of using removable retainers (Hawley and vacuum-formed retainers) on changes in speech articulation in adult patients between 19 and 29 years old after active orthodontic treatment. The patients exhibited distorted speech articulation, regardless of retainer type; however, speech articulation distortion was more apparent in patients using Hawley retainers.

#### **1:5:2 Periodontal Health Problems**

Each kind of retainers " Removable and fixed " has advantages and disadvantages. Fixed retainers are effective and do not need the patient's cooperation, but they have been criticized for their potential to compromise the periodontal status, due to the accumulation of plaque and calculus on the retainer( Littlewood et al., 2016 ).

"Removable appliance", it can be cleaned thoroughly by the patient. Comparison of these retainers with thermoplastic resins concluded that HRs were more hygienic with less accumulation of plaque in the teeth or retainer ( Zhang and Wang, 2003).

To reduce the risk of relapse, retainers must be worn for a long period. Different authors have recommended full-time (nearly 24 hours per day) or part-time use (night), or a combination of these (**Kaklamanos et al., 2017** ). The prolonged contact of the appliance with tooth surfaces, especially during the first 3 months, might promote plaque accumulation, enamel demineralization, and caries because of the decreased cleaning effects of saliva and tongue. This happens particularly at night, when there is a reduction in the activity of saliva, even if the device is properly cleaned (**Batoni et al., 2001** ). This risk is also related to the retainer design, the surface roughness, and the physical properties of the material (**Türköz et al., 2016** ).

Therefore, the choice of retainer is important because different designs or materials can cause accumulation of bacterial plaque on the device and make adverse effect on periodontal health .

### **1:5:3 Discomfort**

Removable retainers may rub the sulcus or gingivae, particularly following initial fitting. Most commonly for a lower Hawley this occurs in the lingual sulcus. Patients should be encouraged to continue wearing the retainer, but to return as soon as possible to have it eased. This provides the maximum chance of the operator being able to see the exact location of the problem, so trimming and easing can be carried out to greatest effect. Furthermore, continuing wear means that the risk of tooth movement is minimized. (**Luther and Nelson-Moon, 2012**).

### **1:5:4 Breakages of Retainers**

If the patient notices any retainer breakage, then they should report back to their clinician as soon as possible for a repair or re-make as needed. Clearly, if an appliance is broken, it cannot maintain the alignment of the teeth appropriately (**Luther and Nelson-Moon, 2012**).

## Chapter Two

### Materials and Methods

An electronic questionnaire in a Google Form (<https://forms.gle/Y1622NSCetagFb3X6>), consisting of fourteen questions was sent to dental students at the college of dentistry / Baghdad University and some other dentistry colleges. The data collection lasted for about one month, from February 2023 to March 2023, and one hundred and thirty-eight students were participated.

The survey consisted of several questions: demographic data, including gender, age, and grade, while the second part consisted of questions whether the student has experience with orthodontic treatment or has information about retention, duration of retention, types of retainer appliances, and which type of orthodontic retainer affects on speech, oral tissue and, oral health. Descriptive statistics in the form of percentages were performed for analyzing the data.

**Table2:1 Questionnaire Questions**

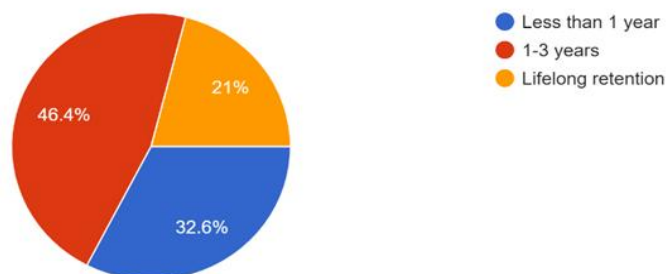
1	Gender	-Male -Female
2	Age	
3	Grade	
4	Are you an orthodontic patient or have previous orthodontic treatment	- I am an orthodontic patient now. - I had previous orthodontic treatment. - I am not
5	Previous experiences with orthodontics within close family?	- Yes - No
6	Are you aware that appliances are used for retention after orthodontic treatment? Hawley retainer, Clear plastic retainer or Fixed bonded retainer	- Yes - No

7	Which type of retention device would you favor?	<ul style="list-style-type: none"> <li>- Hawley retainer</li> <li>- Clear plastic retainer</li> <li>- Fixed bonded retainer</li> </ul>
8	At which interval do you believe is a recall necessary?	<ul style="list-style-type: none"> <li>- Every 3 M</li> <li>- Every 6 M</li> <li>- or yearly</li> </ul>
9	How long do you think should the retention phase be?	<ul style="list-style-type: none"> <li>- Less than 1 year</li> <li>- 1-3 year</li> <li>- lifelong retention</li> </ul>
10	Do you believe a perfect treatment result can guarantee stability?	<ul style="list-style-type: none"> <li>- Yes</li> <li>- No</li> </ul>
11	Who do you consider responsible for the stability after orthodontic treatment?	<ul style="list-style-type: none"> <li>- Orthodontist</li> <li>- Patient</li> <li>- Both of them</li> </ul>
12	Which type of retainer affects on periodontal health?	<ul style="list-style-type: none"> <li>- Hawley retainer</li> <li>- Clear plastic retainer</li> <li>- Fixed bonded retainer</li> </ul>
13	Which type of retainer cause oral ulceration?	<ul style="list-style-type: none"> <li>- Hawley retainer</li> <li>- Clear plastic retainer</li> <li>- Fixed bonded retainer</li> </ul>
14	Which type of retainer you think affects on speech?	<ul style="list-style-type: none"> <li>- Hawley retainer</li> <li>- Clear plastic retainer</li> <li>- Fixed bonded retainer</li> </ul>

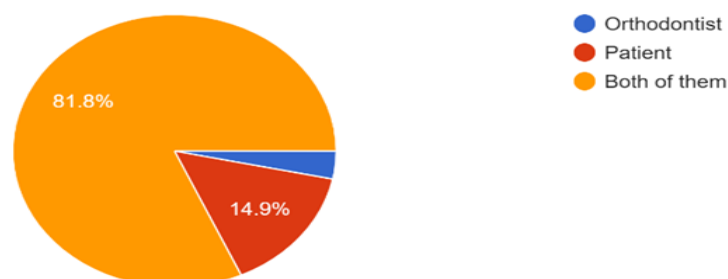
## Chapter Three Results

The students respond to our questioner were one hundred and thirty-eight students from college of dentistry/Baghdad university and some other dentistry colleges. Male represent 29% of the participants, while female represent 71% of them. Mostly from 5th grade (54.1%) and 4th grade (32.2%). 30.6% of them either on orthodontic treatment or had previous treatment, and 45.4% have experiences with orthodontics within close family. 70.9% of participants aware that appliances (Hawley retainer, Clear plastic retainer or Fixed bonded retainer) are used for retention after orthodontic treatment, and 61.8% of them preferred clear plastic retainer. 45.9% of the participants believed that the recall interval every 3 months is necessary, and 44.2% every 6 months. 67.4% of them believed a perfect treatment result can guarantee stability.

How long do you think should the retention phase be?  
181 responses



Who do you consider responsible for the stability after orthodontic treatment?  
181 responses



## Chapter Four

### Discussion

The questionnaire was circulated in the College of Dentistry, University of Baghdad, and private colleges of dentistry. The vast majority of the respondents were women. This explains that the percentage of females in the places where the questionnaire was circulated is more than males.

The majority were from the five and four stages, and a limited percentage from the lower stages, because the latter stages have sufficient and good information about the importance of retention and the types of retainers compared to their peers in the lower stages, and a very large percentage have knowledge of the importance of retention after completing the treatment because dentists were targeted in this questionnaire where they have information on the importance of maintaining treatment results and preventing relapse due to many factors.

As the largest percentage preferred the vacuum retainer because most people, especially women, care about the aesthetic aspect of their teeth, and because the vacuum has an invisible appearance, this is why they preferred it, unlike the Hawley retainer, as it has metallic wires that may be unacceptable to most people. In addition to difficulties in speech more with Hawley retainers, whereas, what I concluded from the questionnaire is that it is appropriate with **Hichens et al., 2007**. For most patients, the first few weeks of use of Hawley retainer is a demanding process with difficulties in speech articulations and chewing. According to a systematic review by Chen J et al., HRs had often caused speech distortion of /s/, /z/, /t/, /d/, /i/, /./, /./, and /./ sounds, and the impairment could last up to 3 months (**Chen et al., 2018**).

And there is an esthetic concern for the HRs appliance, due to the metallic display of wire, creating an unpleasant experience among patients. Being a removable appliance, it can be cleaned thoroughly by the patient. Comparison of



these retainers with thermoplastic resins concluded that HRs were more hygienic with less accumulation of plaque in the teeth or retainer than fixed retainer **(Zhang and wang., 2003)**.

Fixed retainers have been associated with a greater accumulation of dental plaque and calculus, and with minimally worse, albeit clinically unimportant, gingivitis in comparison with VFRs **(Forde et al., 2018)**. Moreover, patients using Hawley appliances may end up in an even better periodontal condition compared with those using VFRs **(Li et al., 2021)**. In addition, they observed that oral hygiene improves only after the debonding of the fixed appliances. as patients with orthodontic retainers have been found probably more vigilant with tooth cleaning

The majority determined the follow-up period to be every 3 or 6 months, and this may be much better than the follow-up periods that are every year. To follow the condition of the teeth after treatment and to make sure that no relapsing occurs due to many unexpected factors that may occur and lead to problems, the most important of which is the growth factor, so the wear of the retainers must continue until the growth is complete, and in addition to that, There is no specific period for wearing the retainers , as in some cases it may last for a lifetime, and in other cases we may need a short period of time to wear it, and this depends on the condition that has been treated.

Thus, the retention protocol is largely determined by orthodontist's experience, patient's expectations, and clinical circumstances.

## **Chapter Five**

### **Conclusion and Suggestion**

1. Retention of the corrected malocclusion is important as the diagnosis and treatment plan.
2. The type of retention should be determined at the beginning of treatment as well as any procedures to help retain the final functional and esthetic occlusion.
3. Long-term age changes in skeletal and soft tissues surrounding the teeth mean that relapse after orthodontic treatment is unpredictable, but likely.
4. As it is difficult to predict which cases will relapse, every case should be treated on the basis that it has the potential to relapse and long-term or life-long retention may be required.
5. Removable retainers allow the patient to remove them to maintain oral hygiene, but their success depends on long-term compliance.
6. Due to accumulation of plaque more with fixed retainers so the patient must maintain excellent oral hygiene around the bonded retainers to reduce the dental problems.
7. In terms of patient satisfaction and speech articulation, VFRs are better than the Hawley retainer. Occlusal contacts are better achieved with Hawley retainers than VFRs.

#### **Suggestion**

1. informing patients that they will need to wear retainers after orthodontic treatment.
2. motivating patients to continue wearing their retainers during the retention period.
3. monitoring and if necessary replacing or repairing retainers.
4. liaising with the orthodontist as required.

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