



## Comparison of the Patient's Satisfaction, Aesthetic, Cost Effectiveness and Speech Problem in Hawley's Retainer and Invisible (Clear) Retainer Question Based Study in Ahmadabad

Authors

Parmar DM<sup>1</sup>, Prajapti D<sup>2</sup>, Patel NK<sup>3</sup>, Brahmhatt D<sup>4</sup>, Shah MD<sup>5</sup>, Shah HG<sup>6</sup>

### Abstract

**Aim:** To compare simple retainer (Hawley's) and invisible (clear) retainer in people of Ahmadabad city.

**Material & Methodology:** The present cross-sectional questioner study was conducted in Ahmadabad city. The study sample includes 80 orthodontically treated subject, Ahmadabad. The survey was schedule to spread over a period of 3 Months. Data was collected by using self questionnaire (Annexure C). Questionary was administrated by investigator himself to each participant on schedule day and collecting the data. The data was collected using questioner the collected data was coded, compiled, tabulated. The data was analyzed by applying descriptive & inferential statistical analysis. Analysis was carried out using SPSS packaged version 17.

**Result:** It was found that with invisible retainer, patients were more satisfied compared to hawley's retainer. And patients compliance is grater with hawley's retainer in speech and aesthetic appearance than invisible retainer. There is also conclusion that the invisible retainer is more cost effective than the hawley's retainer.

**Conclusion:** It was found that the invisible retainer showed a combination of removable aesthetic, comfortable cost effective, hygienic and durable least effect on speech. It will be more favorable clinical performance appliance to the patients which are more censer with appearance of retainer.

**Keywords:** Orthodontically treated, Hawley retainer, Invisible retainer (clear).

### Introduction

Treatment success in orthodontics is determined by facial esthetics, occlusion and stability<sup>1,2</sup>. Orthodontic retention is defined as the phase of treatment that attempts to maintain teeth in their corrected positions after active orthodontic treatment<sup>2,3</sup>. Retention after orthodontic treatment has traditionally involved a Hawley-type acrylic plate, with a labial bow across the permanent incisors, or fixed lingual bonded retainer or invisible (clear) retainer. To date, several retention devices have been used after orthodontic treatment

in order to maintain arch form and minimize the possibility of relapse. But both fix and removable type of retainer have its advantages and disadvantages. Even though the increasing popularity of lingual retainers, the advantages of removable appliances for both the patient and the orthodontist have ensured the continuing relevance of these appliances. The Hawley retainer, which was designed in 1919 by Charles Hawley<sup>2</sup> and has been used for nearly a century since, is the most popular removable retention appliance.

Now a day Adult patients seeking orthodontic treatment are increasingly motivated by esthetic considerations. The majority of these patients reject wearing labial fixed/removable appliances and are looking instead to more esthetic treatment options, including lingual orthodontics and invisible (clear) retainer. The transparency of the Invisible retainer enhances its esthetic appeal for those adult patients who are averse to wearing conventional labial fixed/ removable orthodontic appliances. The most versatile of all retainers used in our practices the invisible retainer, often termed “invisible (clear) retainer.”

This type of thin acrylic retainer was developed originally by Henry Nahoum in the late 1950s, and an article on this subject (unknown to us until very recently) was published in the *New York State Dental Journal* in 1964. The invisible retainer, as we use them, was developed by Robert Ponitz of Ann Arbor, Michigan. Since Align Technology introduced the Invisalign appliance in 1999 in an extensive public campaign, the appliance has gained tremendous attention from adult patients and dental professionals. Typically this retainer is formed from a sheet of thin Biocryl™ or other similar material that is heated and forced by suction<sup>1,2</sup> or pressure<sup>3</sup> on to a work model of the dentition.

This type of retainer has many uses in routine orthodontic practice, not only as a finishing and retention appliance, but also as an active treatment adjunct. The invisible retainer can be used for three purposes:

1. minor tooth movement,
2. long-term retention,
- and 3. as a transitional retainer.

After completing the treatment retention phase is important if this phase is not maintained well there is chances for relapse in treatment. To retain teeth in its position retentive devices are available, proper selection of retainer for patient is very important. While selecting the retainer many things taken in mind like patients comfort, speech, aesthetics, oral hygiene, age, mental status.

In present study there is comparison of two removable retainer in which one is Hawley's

retainer and invisible retainer is given for patients comfort, esthetics and cost effectiveness.

### Hawley's retainer

The classic Hawley's retainer consists of clasps on the molars and a short labial bow extending from canine to canine having adjustment loops<sup>4</sup>. This simple design can be modified in several ways to suit specific requirement<sup>4</sup>.



Indications for Hawley retainers include: deep bite cases (anterior bite plate addition), minor movement of the anterior teeth (adjustment of the labial bow), holding transverse expansions and bitesetting<sup>2,5,6,7</sup>. Advantages of Hawley's retainer are easy to fabrications due to simple design. Disadvantages are it is manually fabricated so there is chances for inaccuracy, due to there is acrylic chances of allergy, irritation in palate is more.

### Invisible Retainer

Invisible retainer is made from vacuum formed plastic material. It is made of 1-2 mm thin sheets of VFM. Indications for the use of Invisible retainers are: to hold rotations especially in the posterior, retention in patients concerned about aesthetics, open bite cases and cases requiring minor tooth movement<sup>2,6,8,9</sup>. Advantages are the retainers are easy to fabricate and are fairly inexpensive easy to maintain oral hygiene.



### Review of Literature

**Lisa H, Heidi R (2007)**, has conducted a study to evaluate the comparison between retainers. They stated that in the United Kingdom (UK) over the last 10 years, there has been a significant increase in the use of vacuum-formed retainers (VFRs) rather than conventional Hawley retainers. There are currently no data to compare the cost-effectiveness of this change in practice. The two aims of this study were to compare (1) the cost-effectiveness of VFRs and Hawley retainers over 6 months, from the perspective of the National Health Service, orthodontic practice, and the patient and (2) patient satisfaction in the two retainer groups. A randomized controlled trial (RCT) was carried out in a specialist orthodontic practice. Three hundred and ninety-seven eligible patients were randomized to one of two retainer groups, and followed up for 6 months. All subjects were invited to complete patient satisfaction questionnaires. Additional data were collected for the cost analysis from the patient records and national databases. Descriptive and bivariate analyses were used to compare patient satisfaction between retainer groups. In all, 196 subjects were randomized to the Hawley group (mean age 14 years 8 months, 63 per cent female, 37 per cent male) and 201 to the VFR group (mean age 15 years, 59 per cent female, 41 per cent male). VFRs were more cost-effective than Hawley retainers from all perspectives. The majority of subjects showed a preference for VFRs compared with Hawley retainers. There were also fewer breakages than in the Hawley group.

**Mustafa M. Al-Khatieeb (2012)** twenty finished fixed orthodontic patients starting the retention phase were divided into four groups. Each group consisted of five patients (3 females and 2 males), mean age ranged 18-30 years old. Members of the first group were given the new thermo-vacuum formed invisible Clear Advantage Series II durable retainer material (CII), While the second, third, and fourth groups were given standard thermo-vacuum formed invisible Clear Advantage Series I retainer material (CI), Hawley retainer (HR), and fixed lingual bonded retainers "cuspidtocuspid"(FR), respectively. Ten variables were applied on the twenty patients to evaluate the clinical performance of the four retainers' types, the ten variables were evaluated and judged by the operator with the patient as three nonparametric categorical descriptions: superior (+), acceptable ( $\pm$ ), and inferior (-) properties. It was found that patients were compliant with all types of retainers initially, and the compliance decreased at a much faster rate with both types of thermo-vacuum formed retainers (CII and CI) than with HR and FR retainers, and patient's compliance is greater with HR and FR retainers than with CII and CI retainers. A comparison of the total variables of the clinical performance at total time intervals using chi-square showed that there was a significant difference ( $P < 0.05$ ) in the acceptable categorical description between CII and CI retainers and very high significant difference ( $P < 0.001$ ) between CII, HR, and FR retainers. It was found that the new thermo-vacuum formed Clear Advantage Series II durable retainer showed a combination of removable, comfortable, aesthetic, better speech, superior retention, relatively not producing bad taste and odor, hygienic, least soft tissue irritability, superior construction and chair-side time, and durable, it will be more favorable clinical performance appliance to both the patient and the orthodontist.

**Bhavana S (2013)** A 149 question survey was created with advanced skip and branching logic. The survey was administered to orthodontic

patients at either the one or two year regularly scheduled retention appointment and the overall response rate was 99% (n=131). Data collection included queries on demographics, treatment satisfaction, stability and relapse, retention protocols, compliance, and satisfaction with prescribed retainers in relation to: appearance, speech, oral hygiene, retainer hygiene, the need for replacement and preferred retainers. Statistical analysis was done using Chi Square and Fishers' Exact tests to detect significant associations between variables. In the population surveyed, Essix retainers in the maxilla (50%) and bonded retainers in the mandible (46%) were most frequently prescribed. Satisfaction with dental alignment post-treatment and post retention was high (~90%). Retainers prescribed depicted no associations with relapse. Self-reported compliance with prescribed retainer wear ranged between 75-85%, regardless of the regimen or retainer types. Bonded retainers were rated as the most esthetic and Hawley retainers the least. Maxillary Hawley retainers affected speech most often and bonded retainers the least. Patients with bonded retainers found it most difficult to maintain oral hygiene and keep their retainers clean, while patients with Essix found it the easiest. Bonded and Essix retainers required replacement most frequently in the maxilla and mandible, respectively. Even though the majority of patients (77% maxilla, 86% mandible) were satisfied with their prescribed retainer, maxillary Essix and mandibular bonded retainers were preferred most often if replacement was an option.

## Materials & Method

The present cross sectional questionnaire study was conducted in Ahmedabad city.

### *Brief profile of the study area*

Ahmedabad is the largest city and former capital of Gujarat. Ahmedabad is located on the banks of river Sabarmti, 32 km from the state capital Gandhinagar.

## A. Source of Data

The study sample are taken form Dental clinic of Ahmedabad city.

## B. Method of collection of Data

A list of study subjects was obtained from Privet Dental clinic of Ahmedabad city.

## **Design of survey:**

### **Sample size determination and sample selection:**

All the subjects were included form dental clinic and total number of subject were 80. In the present study the subjects consisted of patients who had undergone comprehensive orthodontic treatment involving the extraction of first premolars in the private orthodontic clinic of the authors and had completed their treatment. A total of 80 patients were included in the study after obtaining informed consent Photograph 3. The patients were matched in relation to age, gender, the type of malocclusion and the severity of crowding.

## **Inclusion criteria:**

1. Subject registered in Privet Dental clinic, Ahmedabad City.
2. Achievement of optimal occlusion to remove the fixed appliances.

## **Exclusion criteria:**

1. Study Subject not willing for participation.
3. Subject that are non co-operative.
4. Failure to show up for follow-up,
5. A report indicating not using the retainer.

## C. **Organizing the survey**

### **1. Ethical Clearance:**

The study protocol was reviewed and approved by the reasech cell of Ahmedabad dental College and Hospital and ethical approval was obtained from the Gujarat University.

### **i. Scheduling:**

The survey was scheduled to spread over a period of 3 month. A detailed weekly schedule was prepared well in advance. Although a detailed schedule was prepared meticulously, few



adjustments and changes were done due to logistic reasons. Six days in a week were allotted for conducting the study. A questionnaire related to history was given to each participant and the response sheets were collated.

**ii. Personnel and organization:**

The data was collected by principal Investigator.

**iii. Pilot study:**

A pilot study was conducted on 20% of the total sample size to check the feasibility of the study and to validate the questionnaire.

Prior to study a Proforma was pre-tested and validated. The proforma was validated for construct and content validity, reliability and ease of use. Content and construct validity shows no significant changes. Proforma showed high degree (0.89) of agreement during test-retest.

Those individuals who participated in the pilot study were not considered for the main study to prevent possible bias.

**A. Implementing The Survey**

**i. Informed consent:**

The purpose and procedure of the study was informed to each participant and also participant information sheet (Annexure A) was provided to each participant, which explains all aspects of the study. It was explained to them that they had no obligation to complete the questionnaire and could abandon it at any point without stating a reason.

**ii. Data Collection:**

Data was collected by using pre-tested self designed proforma (Annexure C). The proforma was developed in English only because it was expected that all patients were able to comprehend English. Each participants was given a separate copy of the proforma personally by investigator and requested to fill it up within given time.

**iii. Statistical Analysis**

Collected data was coded, compiled and tabulated. The data was analyzed by applying descriptive and inferential statistical analysis. Analysis was carried out using SPSS package version 17.

**Observation & Result**

Figure 1 Indicates the Age of Subject which were participated in the study, age distribution is divided in two (I) age grope of 1to 25 year and (II) age grope 26 to 45 year. Grope (I) was 76% participated in the study and Grope (II) wae24% participated in the study.

Figure 2 shows the distribution of subject by gender (I) male (II) female. In the study male were 56% participated and 44% female were participated.

Figure 3 Describes the period of time that patient had worn the retainer. In the Figure first part shows time period for simple retainer and second part shows time period for invisible retainer.

In that first part two patients which were wear simple retainer for three months, twenty one patients were wear retainer for six months and seventeen patients were wear retainer for nine month. In that second part three subject were wear invisible retainer for three months, twenty four patients were wear retainer for six months and thirteen patients were wear retainer for nine months.

Table 1 shows number of subject comfortable with invisible and simple retainer, 35 (87.5%) were comfortable with invisible retainer and 05(12.5%) were not comfortable with invisible retainer. 31(77.5%) were comfortable with simple retainer and 09(22.5%) were not comfortable with simple retainer.

Table 2 shows number of subject difficulty in speaking while wearing retainer, 31(77.5%) subject have no difficulty in speaking while wearing invisible retainer. 09(12.5%) subject have difficulty in speaking while wearing invisible retainer. 19(47.5%) subject have no difficulty in speaking while wearing simple retainer, 21(52.5%) subject have difficulty in speaking while wearing invisible retainer.

Table 3 shows number of subject compromise in esthetic while wearing retainer, 38(95%) subject feel no compromise in esthetic while wearing Invisible e retainer and 2(5%) subject feel compromise in esthetic while wearing Invisible e

retainer. 15(37.5%) subject feel no compromise in esthetic while wearing simple retainer and 25(62.5%)subject feel compromise in esthetic while wearing simple retainer.

Table 4 shows number of subject distortion in retainer, 30(75%) subject have no distortion in Invisible retainer and 10(25%) subject have distortion in Invisible retainer. 31(77.5%)subject have no distortion in simple retainer and 09(22.5%) subject have distortion in simple retainer.

Table 5 shows number of subject cost effectiveness, 20(50%) subject have no cost effectiveness with Invisible retainer and, 20(50%) have cost effectiveness with Invisible retainer. 33(82.5%)subject have no cost effectiveness with simple retainer , 07(17.5%) have cost effectiveness with simple retainer.

Table 6 shows number of subject have difficulty to clean retainer, 37(92.5%) have no difficulty to

clean Invisible retainer and 03(7.5%) have difficulty to clean Invisible retainer.33(82.5%) have no difficulty to clean simple retainer and 07(17.5%) have difficulty to clean simple retainer.

Table 7 shows number of subject have difficulty in wearing and removing retainer, 07(17.5%) have difficulty in wearing and removing Invisible retainer and 33(82.5%) have no difficulty in wearing and removing Invisible retainer. 12(30%) have difficulty in wearing and removing simple retainer and 28 (70%)have no difficulty in wearing and removing simple retainer.

Table 8 shows number of subject have relapse after wearing retainer, 37(92.5%) have no relapse after wearing Invisible retainer and 03(7.5%) have relapse after wearing Invisible retainer. 27(67.5%)have no relapse after wearing simple retainer and 13(32.5%) have relapse after wearing simple retainer.

Figure 1:

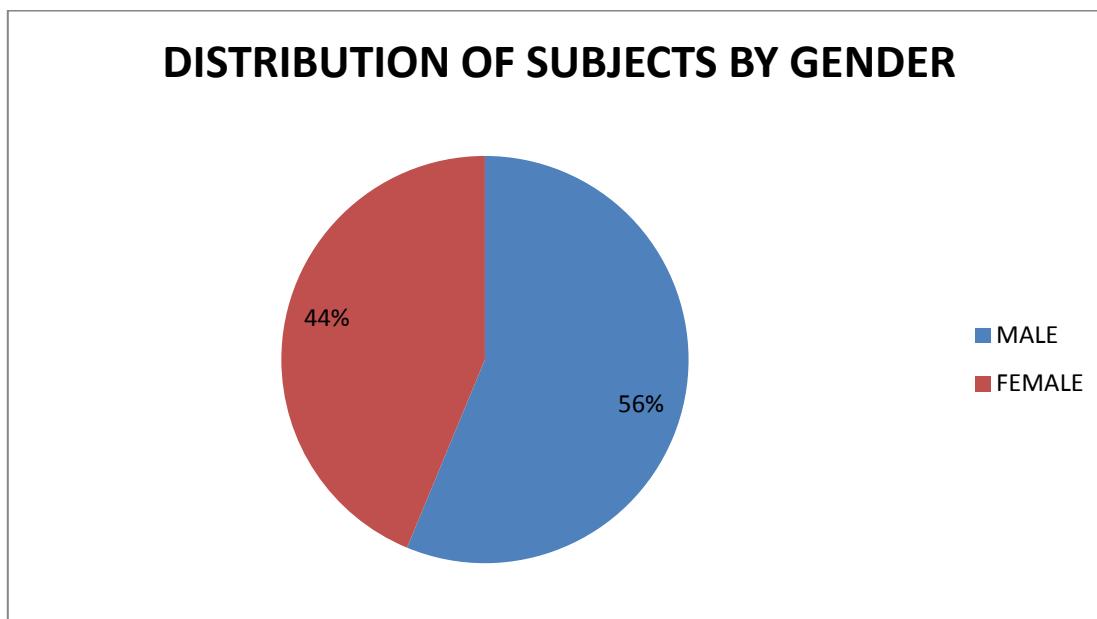


Table 1. Is retainer comfortable?

Type of retainer	Comfortable (%)	not comfortable (%)
Invisible e retainer	35 (87.5)	05(12.5)
Simple retainer	31(77.5)	09(22.5)

Table 2. Is there any difficulty in speaking while wearing retainer?

Type of retainer	Difficulty in speech (%)	No difficulty in speech (%)
Invisible e retainer	09(12.5)	31(77.5)
Simple retainer	21(52.5)	19(47.5)

**Table 3.** Do you feel any compromise in esthetic while wearing retainer

Type of retainer	Compromised esthetic (%)	Not compromised esthetic (%)
Invisible e retainer	2(5)	38(95)
Simple retainer	25(62.5)	15(37.5)

**Table 4.** Is there any distortion in your retainer?

Type of retainer	Distortion (%)	No distortion (%)
Invisible e retainer	10(25)	30(75)
Simple retainer	09(22.5)	31(77.5)

**Table 5.** Do you feel your retainer is cost effective?

Type of retainer	Cost effective (%)	Not cost effective (%)
Invisible e retainer	20(50)	20(50)
Simple retainer	07(17.5)	33(82.5)

**Table 6.** Do you feel it is easy to clean retainer?

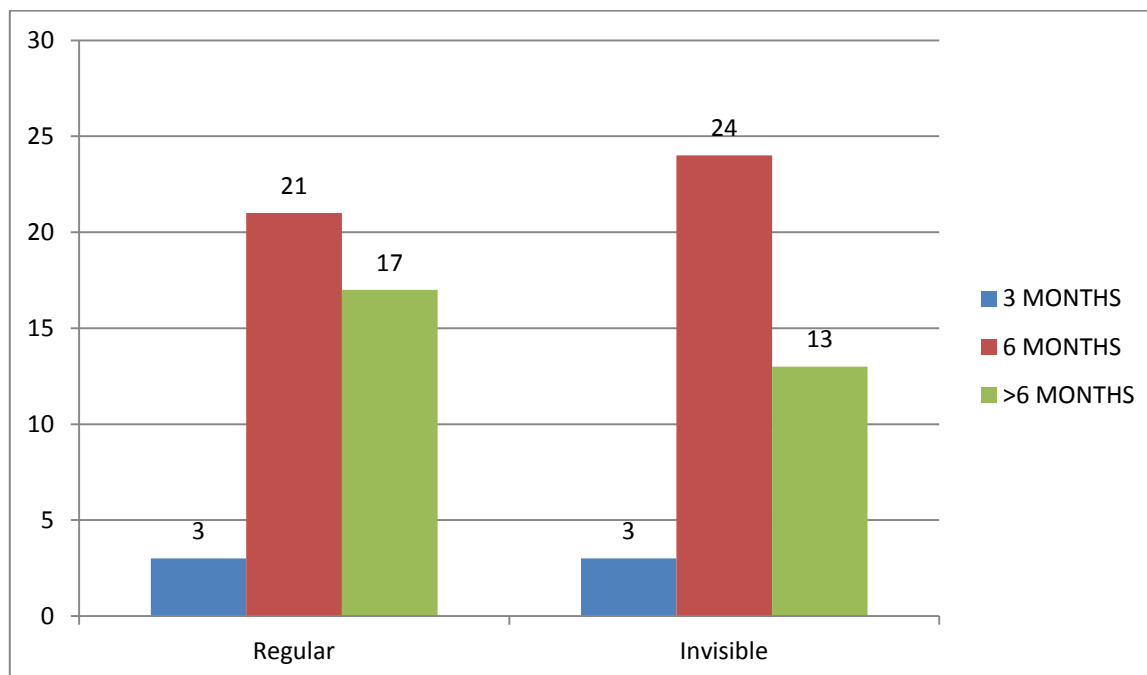
Type of retainer	Hygiene maintain easy (%)	Difficult (%)
Invisible e retainer	37(92.5)	03(7.5)
Simple retainer	33(82.5)	07(17.5)

**Table 7.** Do you feel any difficulty in wearing and removing your retainer

Type of retainer	Retainer wear and removal easy (%)	Difficult (%)
Invisible e retainer	33(82.5)	07(17.5)
Simple retainer	28(70)	12(30)

**Table .8.**is there any relapse after wearing retainer?

Type of retainer	Relapse yes (%)	No (%)
Invisible e retainer	03(7.5)	37(92.5)
Simple retainer	13(32.5)	27(67.5)



**Figure 02**

### Discussion

Because of the lack of scientific evidence on retention protocols it appears that previous recommendations are based largely on personal preference and non-scientific criteria<sup>10,11,12</sup>. Selection of retainer for retention is vital area of orthodontic research and it should be given priority on our concern.

In 2012 Mustafa M. Al-khatieeb conducted a clinical trial comparing clear advantage series II durable retainer with different retainers' types. In that study they found that patients were compliant with all types of retainers initially, and the complaint decreased at much fast rate with both types of thermo-vacuum formed retainers (c.II and c.I, clear or invisible retainer) than with Hawley and fixed retainer and patient's compliance is greater with HR an FR retainers than c.II and c.I.

In 2013 Sawney Bavana had conducted survey of patient compliance and satisfaction with orthodontic Retainers. In this study there is a conclusion that patients with invisible retainer are more satisfied compared to Hawley's retainer.

In 2007 Lisa Hichens et al. conducted anon randomised controlled (RCT) for cost-effectiveness and patient satisfaction: Hawley and vacuum formed retainers. In their study majority of subject appear to prefer VFR (invisible retainer) because it cause less embarrassment and they are less likely to broken than the Hawley's retainer.

With the above results of studies support the hypotheses that invisible retainer are more satisfactory than Hawley's retainer this may because that there is no any wire component in invisible retainer and due to this there is no chance to impinge to the soft tissue or there is on any wire component that appear on the facial surface of the teeth and the retainer retainer is absolutely clear so there is no compromising aesthetic of the appearance of patients.

### Aesthetics

In 2007 Lisa Hichens et al conducted RCT for cost-effectiveness and patient satisfaction: Hawley and vacuum formed retainers. In their study concluded that the patients showed preference for invisible retainer because wearing causes less embracement to patients in speech and appearance due to invisible retainer retainer are completely clear and there is no any visible component in retainer.

In 2012 Mustafa M. Al-khatieeb conducted a clinical trial comparing clear advantage series II durable retainer with different retainers' types. In this study 100% patients were satisfied with the aesthetic appearance of invisible retainer in comparison to the Hawley's retainer only 40% patients were satisfied with aesthetic appearance of Hawley's retainer.

In 2013 Sawney Bavana had conducted survey of patient compliance and satisfaction with orthodontic Retainers. In this study 74.5% patients were satisfied with the appearance of invisible retainer and only 52.2% patients were satisfied with the appearance of Hawley's retainer in maxillary arch.

In our study 95% of patients were satisfied with the aesthetic appearance of invisible retainer compared to the Hawley's retainer. With the Hawley's only 37.5%weresatisfied in aesthetic appearance. This is because in Hawley's retainer there is wire component in the facial surface of the teeth this wire component will seen every time when patient speak or smile this may lead to loss of self confidence in patient and this wire always remained to patient that he has wear the retainer and his treatment is till continue. In invisible retainer there is no wire component so patient get positive mined that his treatment is over and now he can enjoy full aesthetic smile.

### Cost effectiveness

In 2007 Lisa Hichens et al conducted RCT for cost-effectiveness and patient satisfaction: Hawley and vacuum formed retainers. In the study conclusion was that the mean cost to the NHS per



subject was € 152.42 for the Hawley group and € 121.08 for the VFR group. The difference in bootstrapped mean cost to the NHS per subject between retainer groups was € 31.35 with a 95 per cent CI of € 28.06 – € 34.68.

In our study 50% of patients were felt that invisible retainer is more cost effective than Hawley's retainer. And only 17.5% were felt that hawley's retainer is cost effective.

In 2007 Lisa Hichens et al conducted RCT for cost-effectiveness and patient satisfaction: In their observation patients had more difficulty in speech with hawley's retainer compared to invisible retainer.

There are on published studies to date which have investigated the effect of hawley's retainer with compared with invisible retainer with regard to speech.

There is some evidence to support the suggestion that the gerater the amount of palatal coverage of removable retainers the grater the effect on speech (Stratton and burkland; 1993).This may explain why more subjects in the hawley's group complained of speech problems compared with the subjects in the invisible retainer grup.

In 2012 Mustafa M. Al-khatieeb conducted a clinical trial comparing clear advantage series II durable retainer with different retainers' types. In this study they concluded that 60% patient with invisible retainer had no difficulty and 40% of patient had no difficulty in speech ater wearing retainer for 3 months and 100% were no difficulty in speech after 6 months. but with hawley's retainer after 6 months 20% patients had difficulty in speech.

In 2013 Sawney Bavana had conducted survey of patient compliance and satisfaction with orthodontic Retainers. In their study patients with invisible 65.9% were affected in speech and 81% patient were affected in speech initially.

In our study 77.5% patients had no difficulty in speech with invisible retainer and 47.5% patients had no difficulty with hawley's retainer. This may because there is no more palatel coverage in invisible retainer.

## Result

It was found that with invisible retainer, patients were more satisfied compared to hawley's retainer .And patients compliance is grater with hawley's retainer in speech and aesthetic appearance than invisible retainer. There is also conclusion that the invisible retainer is more cost effective than the hawley's retainer.

## Conclusion

It was found that the invisible retainer showed a combination of removable aesthetic, comfortable cost effective, hygienic and durable least effect on speech. It will be more favorable clinical performance appliance to the patients which are more censer with appearance of retainer.

## References

1. ProffitWR.Contemporary orthodontics. 5th ed. St. Louis, Mo.: Elsevier/Mosby; 2013:754.
2. Sawhney, Bhavana, "Orthodontic Retainers: A Survey of Patient Compliance and Satisfaction" (2013). Electronic Thesis and Dissertation Repository. Paper 1917.
3. Littlewood SJ, Millett DT, Doubleday B, Bearn DR, Worthington HV. Orthodontic retention: A systematic review. *J Orthod.* 2006;33(3):205-212.
4. 4 .IyyerBhalajhiSundaresa. Orthodontics The art and Science.4<sup>th</sup> ed. New Delhi, Mo.: Arya(medi) Publeshingouse.
5. Rowland H, Hichens L, Williams A, et al. The effectiveness of hawley and vacuum-formed retainers: A singlecenter randomized controlled trial. *Am J OrthodDentofacialOrthop.* 2007;132(6):730-737.
6. Rinchuse DJ, Miles PG, Sheridan JJ. Orthodontic retention and stability: A clinical perspective. *J ClinOrthod.* 2007;41(3):125-132.
7. Kumar AG, Bansal A. Effectiveness and acceptability of essix and begg retainers: A

- prospective study. Aust Orthod J. 2011;27(1):52-56.
8. Sheridan JJ, LeDoux W, McMinn R. Essix retainers: Fabrication and supervision for permanent retention. J Clin Orthod. 1993;27(1):37-45.
  9. Millett DT, McDermott P, Field D. Dental and periodontal health with bonded and vacuum-formed retainers. . 2008.
  10. Mustafa M. Al-Khatieb. Clinical performance comparison of a clear advantage series II durable retainer with different retainers' types. J BaghColl Dentistry 2012;24(2):127-136.
  11. Thickett E, Power S. Clinical trial of thermoplasticretainer wear. Europ. J. Orthod. 2010; 32:1-5.
  12. George K, James K, David F, David A, Pratt M.Evaluation of retention protocols among members ofthe American Association of Orthodontists in the United States. Am. J. Orthod. Dentofac. Orthop. 2011;140(4):520-526.