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ORIGINAL ARTICLE **OPEN ACCESS**

Retention and Relapse Protocols Followed by Orthodontists in Gujarat: An Observational Survey

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ABSTRACT
The survey has been done to observe the retention and relapse protocols in Gujarat, a state of India.A questionnaire consisting of 11 multiple-choice questions was used in the study amongst 156 orthodontists from Gujarat, registered with the Indian Orthodontic Society. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) software to derive the descriptive statistics. Orthodontists (74%) preferred fixed (44%) as well as both (44%) removable and fixed types of retainers for retention in their clinical practice. The retainers are more likely to be broken in the mandible (48%) and most orthodontists (72%) modify the retainer at the same time if found loose. Disturbance in occlusion generally causes all of the symptoms which sums up to 46% of the responses like pain of teeth, improper retention, broken retainer, interference in speech, ulceration. Maximum (88%) patients prefer clear retainers. There are 86% possibilities of relapse even after giving retainers. Regarding the oral hygiene instructions, 64% orthodontists recommended daily flossing and use of orthodontic brush. The major type of relapse after termination of orthodontic treatment is due to causes (38%) like lower anterior crowding, rotations, diastemas, space reopening in extraction sites, overbite & overjet. Maximum responses (62%) suggested that 10-25% patients return for follow up after termination of orthodontic treatment. If relapse occurs, Orthodontists (78%) prefer to modify the retainer.Fixed retainer as well as both fixed with removable retainers are most often used in retention protocol. So evidence based guidelines are required for a common retention protocol.
KEYWORDS: *Retention; Relapse; Removable Retainers; Fixed Retainers*

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INTRODUCTION

The concept of Retention after orthodontic treatment has been defined by Moyers [1] as "the holding of teeth following orthodontic treatment in the treated position for the period of time necessary for the maintenance of the result." Orthodontic relapse is the tendency of teeth to return to their pretreatment positions. It is most commonly caused by supragingival and transseptal fibers, while occlusal factors, soft tissue pressure and further growth are also some influencing factors [2,3] have a tendency to move in the original position after active orthodontic treatment and relapse can occur at any age.

Johnston et al [4] defined retention as the phase of orthodontic treatment that maintains teeth in their orthodontically corrected positions following the cessation of active orthodontic tooth movement. To minimize or prevent a relapse, almost every patient is given some type of retainer. The goal of orthodontic retention is to increase the stability of the dentition after orthodontic treatment. [5] There are a large number of options for retention strategies and different materials for retainers. But, discrete patient factors, the cause of malocclusion & growth pattern also lead to onerous choice of retention protocols and type of retainers.

A survey among specialized practitioners in the United States of America has shown that the Hawley retainer remained the most commonly used retainer, while invisible retainers continued to gain popularity. In addition, the use of bonded retainers had increased with nearly one-third of the clinicians using them routinely in the mandibular arch [6].

From past studies, it can be concluded that there does not seem to be any consistent pattern in the application of retention methodologies. The purpose of the present investigation is to survey retention and relapse protocols used in orthodontic practices in India specifically in Gujarat.

MATERIAL AND METHODS

The study was conducted via a questionnaire consisting of 11 multiple-choice questions. The questionnaire is given in Figure 1.

1. WorkExperience
Mark only 1 oval
- 0-5
- 5-10
- 10-15
- >15

2)Which type of retainer do you prefer?
Mark only 1 oval
- Fixed
- Removable
- Both

3)In Which Jaw broken retainers are expected mostly?
Mark only 1 oval
- Maxilla
- Mandible
- Both

4) What do you prefer to do after detection of loose retainers?
Mark only 1 oval
- modify the retainer on the same appontment
- change the retainer
- change the type of retainer

5) Interference in occlusion generally cause
Mark only 1 oval
- pain in the teeth
- improper retention
- broken retainer
- interference in speech
- uncertain
- all of the above

6) Which type of retaners do patient prefer?
Mark only 1 oval
- Esthetic(clear material)
- conventional

7)Are there possibilities of relapse even after giving retainer?
Mark only 1 oval
- yes
- No

8)What are the oral hygiene instructions given by you to the patient with bonded retainers?
Mark only 1 oval
- Daily flushing orthodontic brush
- Prevent sticky food
- don't chew hard food items

9) Major type of relapse after termination of orthodontic treatment?
Mark only 1 oval
- Lower anterior crowding
- Rotations
- Diastemas
- Space reopening in extraction sites
- overbite
- overjet
- All of the above

10) How much percentage of patients returns for follow-ups after termination of orthodontic treatment?
Mark only 1 oval
- 10-25%
- 25-50%
- 50-75%
- 75-100%

11) If Relapse occur, what do you prefer?
Mark only 1 oval
- Continuation of already given retainer
- modify the retainer
- Retreatment

Fig.1 MULTIPLE CHOICE QUESTIONS ASKED IN SURVEY

The list of the names and addresses of orthodontists was obtained from the Indian Orthodontic Society's database. In order to calculate the required sample size and power of the study, a formula based on a study by Kish[7] was used (sample size calculation = n / [1 − (n / population)]. Therefore, to obtain a sample of n = 102 responses with 99% confidence and accounting for a 66% response rate, 156 samples were required for this survey. A simple random sampling method was used by drawing the names of the registered members. A total of 156 registered orthodontists were included in this study. The study participants were orthodontists from Gujarat registered with the Indian Orthodontic Society. The questionnaire was sent to the orthodontists by mail. The survey was concluded 2 months after mailing, and no response after that period was incorporated. Confidentiality of the information provided was secured and participation was voluntary. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) software to derive descriptive statistics. The items were described in percentages.

RESULTS

74% of orthodontists who participated in the survey had a work experience of 10-15 years, 16% had an experience of 5-10 years, 6% had an experience of more than 15 years, while the least percentage of orthodontists had the experience of 0-5 years [Figure 2].

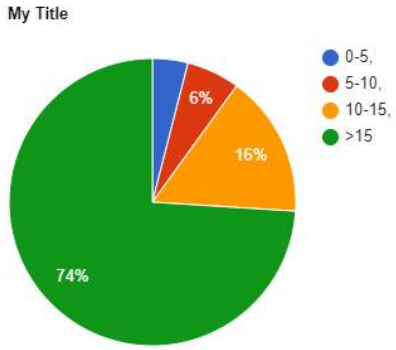

Fig.2 RESULTS SHOWING WORK EXPERIENCE

The highest number of orthodontists preferred fixed (44%) as well as both (44%) removable and fixed types of retainers for retention in their clinical practice. Only 12% preferred removable type of retainer [Figure 3]

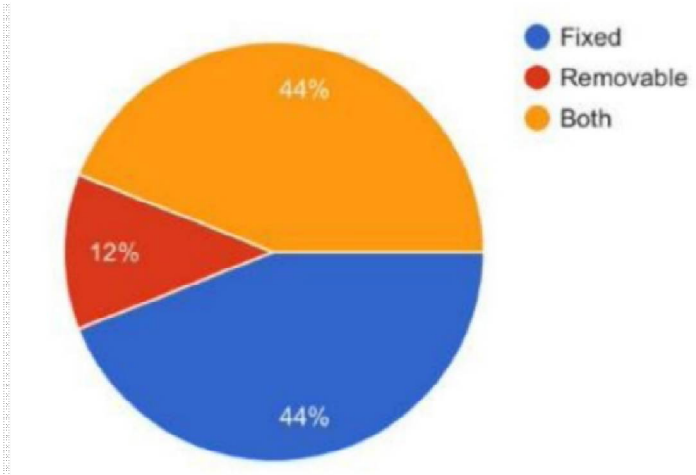

Fig.3 RESULTS SHOWING THE PREFERENCE OF TYPE OF RETAINER

The retainers are expected most often broken in the mandibular jaw (48%), with retainers in the maxillary jaw being second (32%) while broken retainers found in both jaws were expected to be least (20%) [Figure 4].

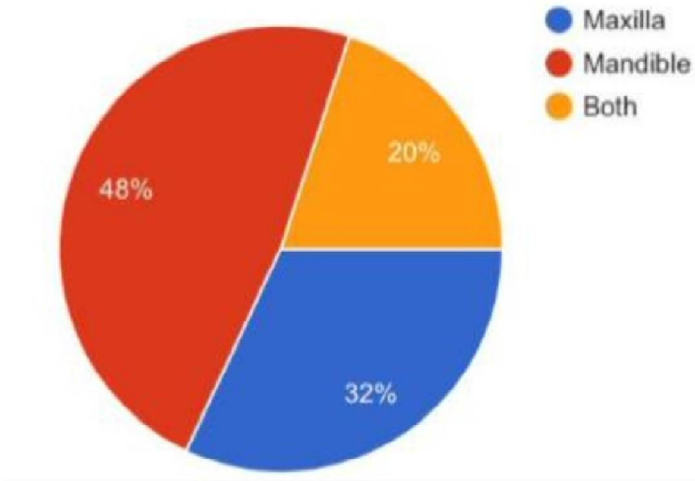

Fig.4 RESULTS SHOWING EXPECTATION OF BROKEN RETAINERS IN EACH JAW

Most orthodontists (72%) modify the retainer at the same time if found loose, while 28% of orthodontists used to change the retainer. No one used to change the type of retainer in the data [Figure 5].

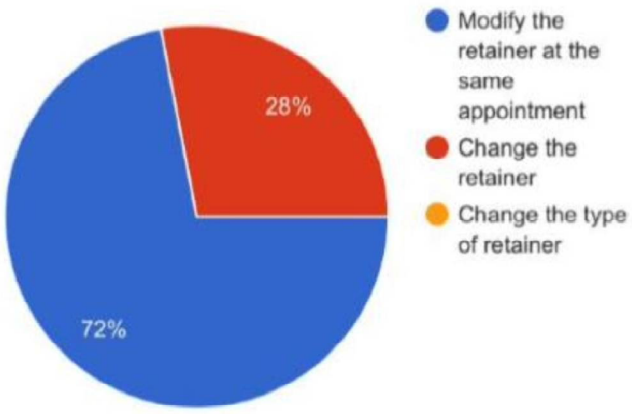

Fig.5 RESULTS SHOWING PREFERENCE OF AN ORTHODONTIST AFTER DETECTION OF LOOSE RETAINER

Interference in occlusion generally causes all of the symptoms according to 46% of the responses like pain in the teeth, improper retention, broken retainer, interference in speech, ulceration while 34% of responses suggested pain in the teeth, 10% for the broken retainer, 6% for improper retention, with interference in speech and ulceration the least of all [Figure 6].

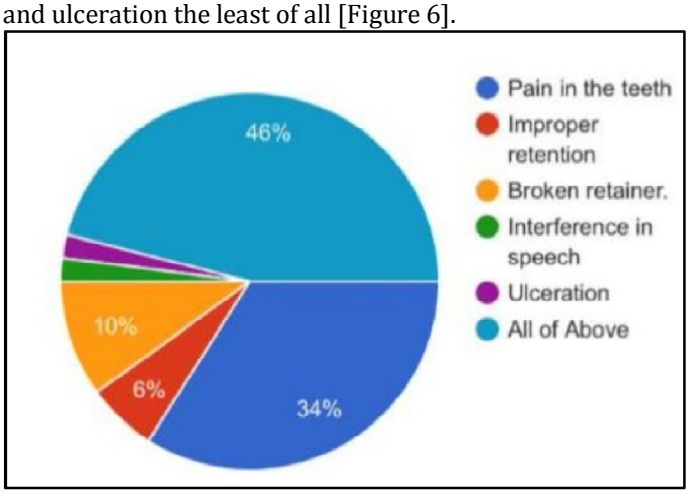

Fig.6 RESULTS SHOWING GENERAL CAUSES OF INFERENCE IN OCCLUSION

The results suggested 88% of patients prefer esthetic (clear retainers) while the remaining 12% prefer conventional retainers [Figure 7].

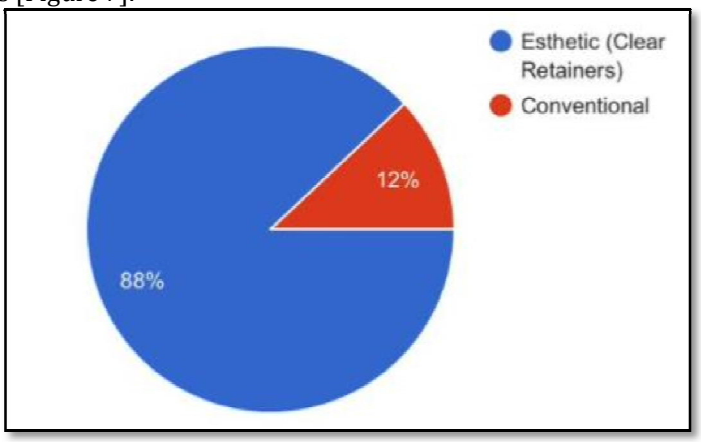

Fig.7 RESULTS SHOWING PREFERENCE OF RETAINER BY PATIENTS

There are 86% possibilities of relapse even after giving retainers, while 14% denied the possibility of having relapse [Figure 8].

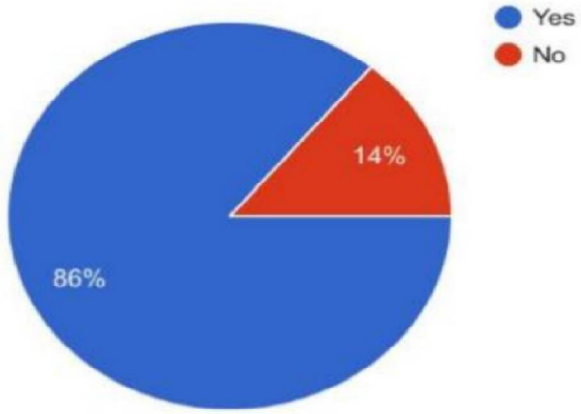

Fig.8 RESULTS SHOWING POSSIBILITIES OF RELAPSE EVEN AFTER GIVING RETAINER

Regarding the oral hygiene instructions, 64% of orthodontists recommended daily use of orthodontic brush, while 28% suggested not to chew hard food items, and the remaining 8% suggested preventing sticky food [Figure 9].

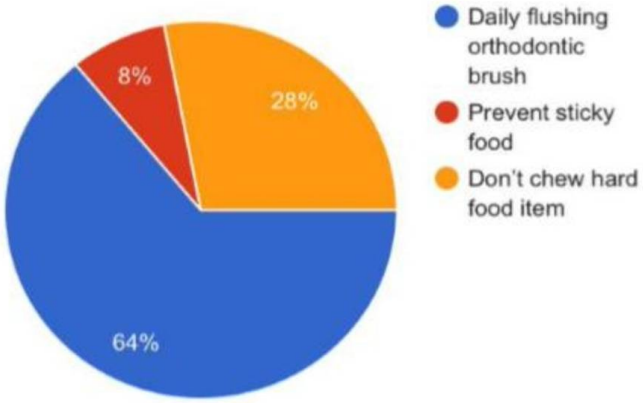

Fig.9 RESULTS SHOWING ORAL HYGIENE INSTRUCTIONS GIVEN BY AN ORTHODONTIST TO PATIENT WITH BONDED RETAINERS

38% of relapse after the termination of orthodontic treatment are due to lower anterior crowding, rotations, diastemas, space reopening in extraction sites, overbite, and overjet. 36% agreed that the relapse is due to diastema, 14% agreed that it is due to lower anterior crowding, 8% were with space reopening in extraction sites and rotations constituting the least type. None of them agreed with the overbite and overjet as the type of relapse after orthodontic treatment [Figure 10].

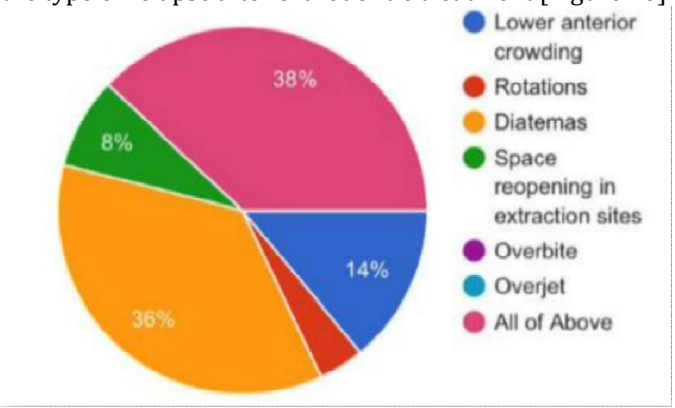

Fig.10 RESULTS SHOWING OCCURRENCE OF MAJOR TYPE OF RELAPSE AFTER TERMINATION OF ORTHODONTIC TREATMENT

The outcome of the survey insinuated that 62% of orthodontists opted for 10-25% patients, 22% opted for 25-50% patients, 16% for 50-75% patients returned for follow-up after the termination of orthodontic treatment [Figure 11].

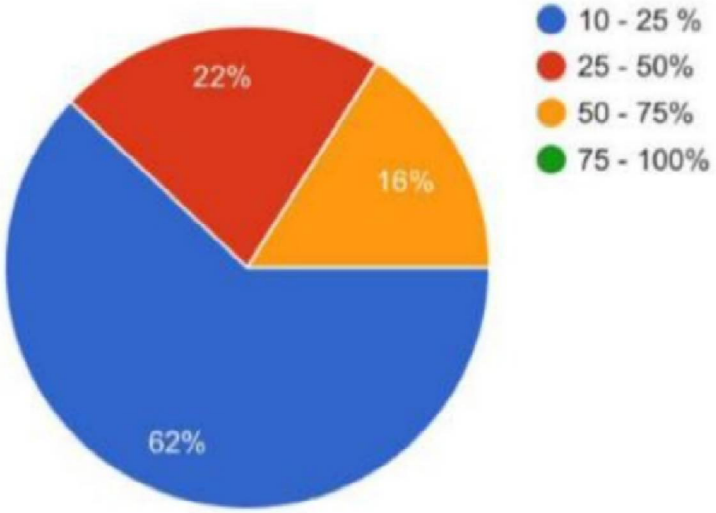

Fig.11 RESULTS SHOWING PERCENTAGE OF PATIENTS RETURNING FOR FOLLOW UP AFTER TERMINATION OF ORTHODONTIC TREATMENT

If relapse occurs, maximum (78%) orthodontists prefer amending the retainer while 22% prefer for re-treatment of the patients. None of them agreed with the continuation of the previously given retainer [Figure 12].

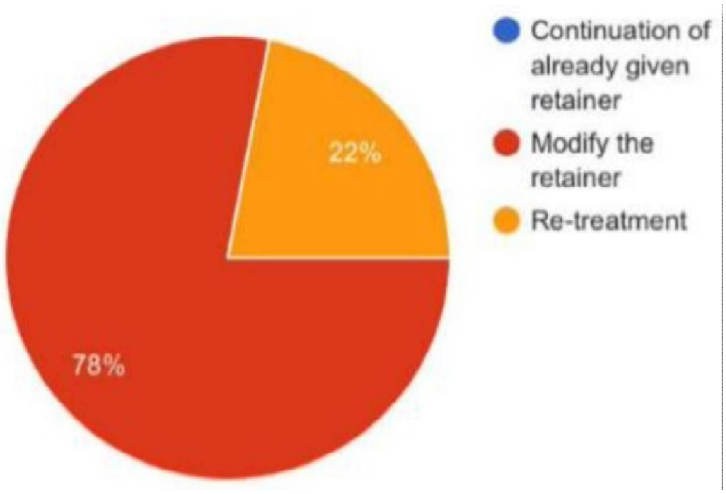

Fig.12 RESULTS SHOWING PREFERENCE OF AN ORTHODONTIST AFTER RELAPSE

DISCUSSION

The survey was conducted amongst the Orthodontists in Gujarat. The maximum number of orthodontists participating in the survey had a work experience of 10-15 years while very few had experience below 5 years suggesting more participation of experienced orthodontists in the survey. It can be predicted that specialists with less than 10 years of experience can use a retention protocol based on the skills learned during the postgraduate studies while orthodontists with more than 10 years of experience use a retention protocol based on the orthodontic work practice as concluded in a survey done by Andriekute et al in 2017 [8]There are currently different types of removable and fixed retainers, and it is ambiguous which retainers are the best and how long they should be used. [9] A survey was done by Keimet al.[10]inthe United States of America which summed up that the Hawley retainer is still the most commonly used retainer. Bonded retainers on the maxillary and mandibular arches are preferred by orthodontists in the Netherlands[11], while in Australia and New Zealand, an upper clear retainer and lower bonded retainer are commonly used [12]. In the present study, maximum orthodontists preferred fixed as well as both removable and fixed types of retainers as a retention protocol in their clinical practice. A fixed retainer is most commonly used because of its minimal need for patient compliance and aesthetic advantages. Norwegian orthodontists preferred to use a combination of both fixed and removable retainers for the maxillary arch and fixed retainers for the mandibular arch during the retention phase.

The removable type of retainer was less preferred by orthodontists due to patient compliance issues and the risk of getting lost by the patients. Depending on the type of retainer, whether removable or fixed, failures can range from breakage of the removable appliance to fracture of the wire bonded to the teeth. The broken retainers in the survey are often seen in mandibles as mandibular removable retainers have less tissue coverage as compared to maxillary removable retainers, thus aiding small amounts of retention from tissues.

Most orthodontists modify the retainer at the same time if found loose which would minimize the chances of relapse while waiting for the new retainer, while some orthodontists used to change the retainer. No one used to change the type of retainer as suggested by our results in the survey. Achievement of ideal occlusion as stated by Angle in his six keys of occlusion, the finished orthodontic occlusion should be stable. Inference in occlusion generally causes all of the symptoms according to 46% of the responses like pain in the teeth, improper retention, broken retainer, inference in speech, ulceration while 34% of responses suggested only pain in the teeth, 10% responded for the broken retainer and only 6% suggested for improper retention, with interference in speech and ulceration the least of all. In a study conducted by Hichens et al in 2007 [13] they compared vacuum-formed retainers with Hawley retainer and concluded that vacuum-formed retainers were more cost-effective than Hawley retainer in all perspectives. The majority of patients prefer esthetic (clear retainers) to conventional retainers. However, Mollov et al [14] in 2010 surveyed patients after orthodontic treatment. They found that the patients who used an invisible retainer were significantly more likely to be compliant with proper retainer wear than those who used a Hawley retainer.

Relapse can occur due to forces from the periodontal fibers around the teeth which tend to pull the teeth back towards their original positions, and also from deflecting occlusal contacts if the final occlusion is not ideal. Age changes, in the form of ongoing dentofacial growth, as well as changes in the surrounding soft tissues, can also affect the stability of the orthodontic outcome. It is therefore essential that orthodontists, patients, and their general dental practitioners understand the importance of wearing retainers after orthodontic treatment. In a study done by Steinnes et al in 2017, it was seen that occlusal relapse can be expected after active orthodontic treatment irrespective of long-term use of fixed retainers[15] .

A maximum number of orthodontists agreed upon the possibility of relapse even after giving retainers, while only a few refused.There are controversial studies in the literature, but it is evident that bonded fixed retainers complicate maintaining oral hygiene. Nevertheless, fixed retainers can cause difficulties for patients reaching areas with a toothbrush or dental floss, increasing plaque accumulation, and influencing periodontal health[16]. So regarding the oral hygiene instructions, in the present study maximum orthodontists have recommended daily flushing orthodontic brush, while remaining suggested not to chew hard food items and very few suggested to prevent sticky food. However, another study showed that fixed retainers allow patients to maintain good hygiene and periodontal status[17] .Relapse is a tendency of teeth to return to their pre-treatment positions. There is no doubt that teeth after an active orthodontic treatment have a tendency to move into the previous position, and a relapse can occur at any age [18] Orthodontists in the present survey considered any type of malocclusion tends to relapse. The majority responded (38%) that relapse after the termination of orthodontic treatment is due to all of the causes like lower anterior crowding, rotations,diastemas, space reopening in extraction sites, rotations, overbite, and overjet. Fixed retention is cited as the only satisfactory method to promote stability at the closure of the previous diastema. So the 36% agreed the relapse is due to diastemas, 14% agreed that the mandibular anterior teeth are highly susceptible to relapse which was also suggested in a study by Bondemark et al in 2007[19], 8% with space reopening in extraction sites and rotations constituting the least preferred type. None agreed with the overbite and overjet as a type of relapse after orthodontic treatment.Based on our results, it was concluded that only 10-25% of patients return for follow-up after the termination of orthodontic treatment and so the stability of results achieved after orthodontic treatment on a long-term period remains questionable. And 22% responded that 25-50% of patients return for follow-up after the termination of treatment.Minor relapse in the form of lower anterior crowding or due to reopening of preexisting spaces usually occurs due to stretching of surrounding fibers. In these circumstances, how well the orthodontist uses his/her skill is quite adept. A maximum number of orthodontists prefer modifying the retainer if relapse occurs while only a few prefer doing re-treatment. No one responded to continue with the already given retainer to the patient if the stability of the achieved result is in doubt.

CONCLUSION

- **A** greater number of orthodontists used fixed retainers and both fixed with removable retainers as a retention protocol while patients prefer clear retainers.

- Maximum orthodontists acknowledge the possibility of relapse even after using retainers and have pitched rotations, diastemas, and reopening of extraction spaces as a stimulus of relapse.
- Orthodontists prefer modifying the retainers as soon as the relapse occurs or loose-fitting of a given retainer.
- Due to these limitations, it is necessary to have evidence-based guidelines for the retention protocol.

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