

# A study on orthodontic retention practices in Nepal

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## ABSTRACT

**Introduction:** Retainers are used after all orthodontic treatment, to prevent or minimize relapse and recurrence. Among various retainers used, Hawley retainer and 'invisible' retainers are the most common. Most of the orthodontists favored permanent retention. It is obvious that the retention procedures are variable and depended largely on personal preferences, and there does not seem to be any consistent pattern in the application of retention methodologies. The purpose of this study was to survey the retention protocols among orthodontists in Nepal.

**Materials and Method:** The complete lists of the names and addresses of orthodontists in Nepal was obtained from the ODOAN. The questionnaire was sent to them which consisted of multiple-choice questions and short answer, related to background information of the individual orthodontist, retention use in general, the frequency of different types of bonded or removable retainers that are used, the retention protocol, the type of retainer used in specific situation. All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS), version 12.0.1 (SPSS Inc, Chicago, Illinois, USA)

**Result:** The survey questionnaires were completed by 90.42% of the 94 orthodontists of Nepal, 58.8% males and 41.2% females with a mean age of 36.7 years. Most of the orthodontists used a clear (vacuum) retainer (80%) in the maxilla and fixed bonded retainer in the mandible. Most of them prefer the use of retainer for a continuous 24 hours except during eating and brushing for 6 months to 1 year (56.5%) and if possible, for 1 to 2 years (28.2%).

**Conclusion:** Majority of Nepalese orthodontists provide vacuum formed retainer on maxillary arch and bonded retainer in mandibular arch. There is no specific consensus on other type of retainers, duration of wear and follow up visits which is affected by various other factors.

**KEYWORDS:** Nepal, Orthodontics, Retainer, Survey

## INTRODUCTION

After all orthodontic treatment, retainers are used to prevent or minimize relapse and recurrences. Two surveys on the type of retainer used by orthodontists have been published previously.<sup>1,2</sup> The survey by Keim et al. among orthodontists in the USA showed that, the Hawley retainer remained the most commonly used retainer, at the same time use of 'invisible' retainers is also gaining popularity. The use of bonded retainers is also increasing in the mandibular arch. In the same survey Keim et al. found that as compared to two prior surveys, conducted in 1990 and 1996, the respondents

favoured more permanent retention, 27% in 2002 compared to 15% in 1990 and 23% in 1996.<sup>1</sup> But, as the rate of respondents was only 9% the results could not be conclusive. Another survey conducted in New Zealand and Australia by Wong et al. showed that the most commonly used retainer was clear retainers for upper and canine-to-canine bonded retainers for lower arch.<sup>2</sup> In the survey almost half of the orthodontists used the retainers for a median period of 2 years. The study concluded that the retention procedures were variable and depended largely on personal preferences, and there does not seem to be any consistent pattern

in the application of retention methodologies. Thus, the purpose of this study was to survey the retention protocols among orthodontists in Nepal.

**MATERIALS AND METHOD**

The complete lists of the names and addresses of orthodontists in Nepal was obtained from the ODOAN (Orthodontic and Dentofacial Orthopedic Association of Nepal). The questionnaire was sent to them from 1<sup>st</sup>-5<sup>th</sup> December 2020. Ten days later a reminder was sent to those orthodontists who did not completed the questionnaire. The non-responding orthodontists was contacted by telephone by end of December 2020. Another copy of the questionnaire was sent to them if they requested. All the orthodontist who failed to return the questionnaire or not willing to do so, was inquired for the reason and was recorded.

The survey questionnaire consisted of 2 categories, mainly containing of multiple-choice questions and short answer. First a pilot study was done among 4 orthodontists and then the questionnaires were modified as required. The first category of questionnaire consisted of questions related to background information of the individual orthodontist. It consisted of questions concerning the type of practice in which the orthodontist is working. The second category of questionnaire consisted of questions on retention use in general, the frequency of different types of bonded or removable retainers that are used, the retention protocol, the size and type of the wire that are used for bonded retainers, the type of retainer used in specific situation and the opinions of the orthodontists so as to form the need for a clinical practice guideline (CPG) for retention after active orthodontic treatment.

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS), version 12.0.1 (SPSS Inc, Chicago, Illinois, USA). Background information on the individual orthodontist was described in frequencies and the other results in percentages. Chi-square test was used to test for the relationship between two variables. Out of 94 orthodontists 85 responded the survey. For two-by-two cross-tables, Fisher's exact test was used. P value was kept 0.05 for the level of significance.

**RESULT**

The survey questionnaires were completed by 85 (90.42%) of the 94 orthodontists of Nepal. Out of the

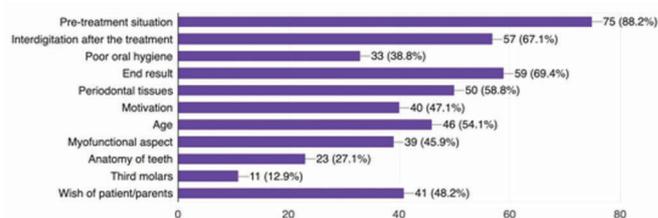
85 orthodontists, majority of them were either working only in private clinics (65.9%) or in a dental or medical college (50.6%). There were 50 (58.8%) males and 35 (41.2%) females with a mean age of 36.7 (29-68 years) (Table1).

Table1: Demographics of 85 Orthodontists.

Variables		
Age in years	<30	8 (8.5%)
	30-40	56 (59.3%)
	40-50	16 (23.7%)
	>50	5 (8.5%)
Gender	Male	50 (58.8%)
	Female	35 (41.2%)
Years of practice	<5	42 (49.4%)
	5-10	29 (34.1%)
	>10	14 (16.5%)
Country of Graduation	Nepal	30 (35.3%)
	China	28 (33%)
	Philippines	21 (24.7%)
	India	3 (3.5%)
	Others	3 (3.5%)
Place of work	Private Clinic	56 (65.9%)
	Dental College	24 (28.2%)
	Medical College	19 (22.4%)
	Government Hospital	11 (12.9%)
	Retired	2 (2.4%)

All orthodontists in Nepal used retainer for all their patients, independent of the situation prior to active orthodontic treatment. Among the various factors determining the choice for a certain type of retainer pre-treatment patient's situation was the determining factor. Other less common included interdigation after the treatment, poor oral hygiene etc ( Fig. 1)

Fig. 1: Factors determining the choice of type of Retainers



For most of the orthodontists, the retainer was either fabricated in their office (47.17%) or by a commercial laboratory (45.9%). The choice of a specific retainer was also influenced by the pre-treatment situation. Given a specific situation in maxilla, most of the orthodontists used a clear (vacuum) retainer (80%) followed by the Hawley's retainer (42.4%). However, in the mandible most of the orthodontists used a fixed bonded retainer (77.6%) followed by the clear (vacuum) retainer (44.7%) (Fig 2).

Fig. 2 A: Types of retainers used in maxilla

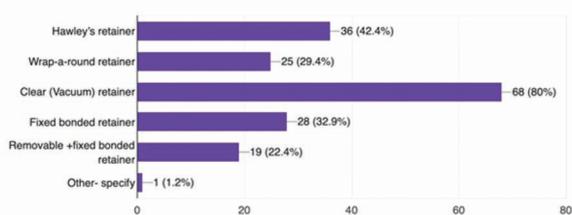
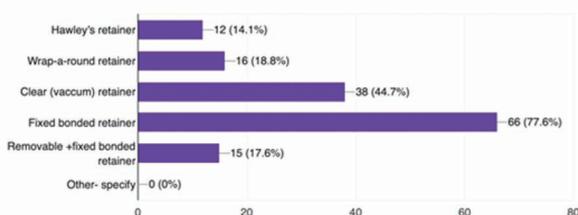
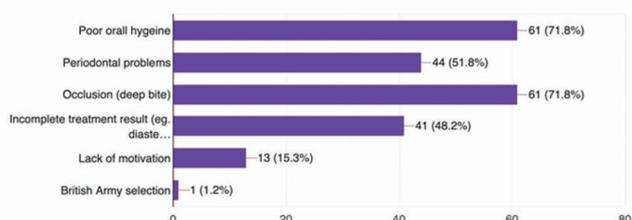


Fig. 2 B: Types of retainers used in mandible



When fixed bonded retainer was used it varied from case to case for most of the orthodontists (57.61% maxilla and 58.2% mandible), and it extended from canine to canine in 30.6% in maxilla and 41.2% in mandible. When fixed bonded retainers were used the most commonly used wire was 6 stranded coaxial round wire (54.1%) followed second by 0.0195" stainless steel (25.9%). Fig. 3 tabulates the contraindications for the placement of fixed bonded retainers.

Fig. 3: Contraindications for fixed bonded retainers.



Period of retainer use and follow-ups

When inquired regarding the duration of the use of a removable retainer, most of them prefer the use of retainer for a continuous 24 hours except during eating and brushing (35.3%) or at least for 9-16 hours (31.8%). Majority of them prefer that the patient wear

the removable retainer for 6 months to 1 year (56.5%) and if possible, for 1 to 2 years (28.2%).

The total duration of use of a permanent retainer mostly depend on case to case (45.9%) but other orthodontists preferred to keep it for less than 2 years (8.2%), 2-5 years (28.2%), more than 5 years (10.6%) and lifelong in 7.1%. When removable retainer was used, the orthodontists followed up their patients for at least 2 to 4 times in 90.6% cases.

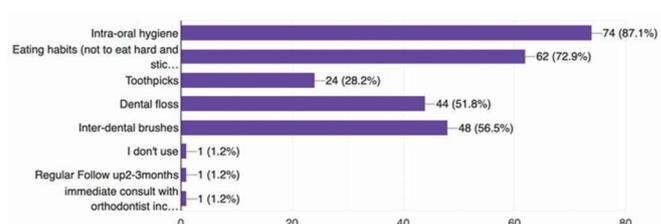
Patients with bonded retainers had fewer check-ups compared to those with removable retainers (P<0.001) Table 2. Orthodontists who undertook fewer removable retainer check-ups during the first year also tended to carry out fewer fixed retainer check-ups, and vice versa; orthodontists who undertook more removable retainer check-ups carried out more fixed retainer check-ups as well (P<0.001).

Table 2: Follow up on retention phase

Number of check-ups during first year	Removable (% orthodontists)	Bonded (% orthodontists)
0	2	3
1	5.5	12
2	24.3	30.8
3	33.7	26.4
4	26.5	21.2
>4	8	6.6

After placement of a removable or bonded retainer, all orthodontists gave written information to their patients concerning the retainer. The list of the instructions given by the orthodontists after the use of the retainer is illustrated in Fig 4. It shows that most of the orthodontists emphasized on intraoral hygiene and eating habits.

Fig. 4: Instructions after the placement of fixed bonded retainers.



## DISCUSSION

Orthodontic retention phase is considered one of the important and crucial phase of orthodontic therapy. As compared to many other studies the percentage of orthodontists who participated in our survey was very high (90.42 %) which was comparable to some other studies 91%<sup>3</sup> and 90%<sup>4</sup>. The number of orthodontists who did not participate in this study was less and possibly did not bias the outcome of this study. The pilot testing of the questionnaire that was done prior to study improved the strength of this study and to ensure its validity, reliability and acceptability. As compared to 2 previous surveys conducted in the Netherland (25%)<sup>3</sup> and Iraq (15%)<sup>4</sup> the percent of the orthodontists who had their orthodontic training abroad was higher in our study (64.7%). With more orthodontic training facility in our country recently, hopefully the percentage of training abroad will continue to fall in the future.

As compared to both the previous surveys by Keim and Wong, where removable retainers were mostly used for the maxilla, in our study most orthodontists preferred to use clear/vacuum retainer (80%). However, there were some orthodontists who used Hawley's retainers as well. Most of the orthodontists preferred to used removable retainers most of the time of the day. In contrast to the maxilla, most orthodontists preferred the use of fixed bonded retainers in the mandible (77.6%). A minority of the orthodontists (2%) never used bonded retainers for the reason that bonded retainers in due time often become loose or breaks.

In the literature, the failure rates vary widely. The overall failure rates in the study by Bearn<sup>5</sup> for bonded retainers in the lower and upper arch varied from 47.0 to 10.3 percent. In a study of 3 years by Rogers and Andrews<sup>6</sup>, the reported failure rate in the mandible was less than 0.1 percent. The reason given for the low failure rate was probably because the retainer was bonded only to the mandibular canines. However, in the study by Störmann and Ehmer<sup>7</sup>, the detachment rate was 18% when the retainers were bonded in the mandible canines only. It is difficult to compare these different failure rates, since different wire materials, bonding procedures, and follow-up periods were used in these studies.

There are very few prospective studies to evaluate the effectiveness of retention. Littlewood<sup>8</sup> included 3 pseudorandomized and 2 randomized clinical trials in a Cochrane review, which evaluated the effectiveness of different retention strategies used to stabilize tooth position after orthodontic treatment and suggested no reliable evidence on which to base clinical practice of retention.

Some orthodontists assume that bonded retainers

can cause calculus, plaque accumulation and caries, but this assumption is not supported by evidence available in the literature. In a study by Gorelick et al<sup>9</sup>, they did not find white spots on the lingual surfaces of mandibular canines and incisors even after prolonged use of a canine-to-canine bonded retainers. Heier et al<sup>10</sup> founded that bonded retainers are associated with plaque accumulation, however it has no influence on gingival inflammation. Pandis et al<sup>11</sup> found higher rate of marginal recessions and calculus accumulation, but no difference in gingival and plaque indices and bone level in a group of patients with mandibular retention for prolong period of time compared to those patients retained for a period between 3 to 6 months. Nonetheless, poor oral hygiene, which may lead to caries, and the need for restorations, was reported as a contraindication for placing a bonded retainer by 71.8 % of the orthodontists in our study. Periodontal problems (51.8%), deep bites (71.8%), and incomplete treatments (48.2%) were other common contraindications of use of retainers in the present study.

The study by Reitan<sup>12</sup> in 1967 has shown that it takes on average of 232 days for fibres around the teeth to remodel to the new tooth position. Other authors<sup>13-15</sup> found a half-life of collagen fibres around rat teeth varying from 1 to 12 days in the periodontal ligament and 2 to 152 days for dento-gingival fibres. In addition, even if the teeth are held in position during this period, studies<sup>16-17</sup> have shown that, some relapse will take place in the long term. In the study conducted in the Netherlands, the retention period with removable retainers of more than 1 year was employed by 80% of the orthodontists.<sup>3</sup> Wong and Freer<sup>2</sup> found that a regular retention period of more than 2 years was preferred, but they did not distinguish between removable and fixed retainers. The orthodontists in the present study used a longer period of retention when bonded retainers were used. 77.6 % of the orthodontists had a preference for permanent retention which was comparable to the study by Renkema<sup>3</sup> where 80% of orthodontists used the permanent retainer. However, this is a very high percentage as compared to the study by Keim<sup>1</sup> where only 27 % of the orthodontists used permanent retention. The long-term consequences of permanent retention with bonded retainers have not been well documented.<sup>18</sup>

After placement of a removable or a fixed retainer most of the orthodontists (90.6%) prefer to have their patients follow up to their clinic either 2 to 4 times, which seems to be appropriate. With more than 4 checkups, the question arises whether this is really necessary, as it certainly is time consuming and increases the cost. Information and instruction on prolonged or

permanent retention with a bonded retainer requires regular follow-ups, at least once a year. Unexpected complications as described by Katsaros et al<sup>19</sup>, with bonded retainers are reasons to perform regular follow-ups. For the orthodontists, it is impossible to supervise every patient with bonded retainers for prolong period of years. It is also the responsibility of both the patient and the patient's general dentist for regular follow-ups. The orthodontist when delivering the responsibility to the patient or other dentist, it is necessary to inform them about the problems that might arise when the retainer is in place and the importance of the follow-ups. Over the past many years, quality of care and Clinical Practice Guidelines (CPGs) have gained increased interest in many areas of health care. The development of evidence-based CPGs appears to be one of the most

promising and effective tools for improving the quality of care.<sup>20</sup> Van der Sanden<sup>21</sup> evaluated the view on CPGs among the Dutch general practitioners and found only half of them were in favor of the development and implementation of CPGs.

## CONCLUSION

Our survey provided us with an insight into the retention procedure practices among orthodontists in Nepal. Majority of Nepalese orthodontists provide vacuum formed retainer on maxillary arch and bonded retainer in mandibular arch. There is no specific consensus on other type of retainers, duration of wear and follow up visits which is affected by various other factors.



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