

Original Article

# Oral Hygiene Awareness and Effect of Orthodontic Treatment on Periodontal Health among Medical Students

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## Abstract

**Background:** Orthodontic treatment helps in improving aesthetics, oral hygiene as well as functional occlusion. Also, importance of oral hygiene in orthodontic patients is always intensified to prevent any further periodontal disease. Regular oral hygiene maintenance is important for the maintenance of gingival health during and after orthodontic therapy as it helps in preservation of the health of gingiva as well as overall oral health.

**Objective:** To assess the extent of oral hygiene awareness and impact of orthodontic treatment on of periodontal health, among medical students.

**Method:** A cross sectional survey containing 19 questions was answered by 150 medical students who had undergone fixed Orthodontic treatment from various colleges in Mangalore, Karnataka.

**Results and Conclusion:** The results of this survey showed that medical students have adequate knowledge of oral hygiene practices. Majority of medical students who had undergone orthodontic treatment showed increased bleeding from gums, increased sensitivity and difficulty in brushing and flossing indicating that orthodontic treatment does have impact on maintenance of oral hygiene. Thus, a thorough assessment of the periodontal health is recommended prior to orthodontic treatment. Equal emphasis should also be laid on the necessity of good oral hygiene and regular periodontal maintenance for the best outcome.

## Introduction

Orthodontic treatment is widely recognized because of the effects it has on the dentofacial complex as it helps in improving aesthetics, establishing functional occlusion and improving the overall oral health. Any dental or facial anomaly has an effect on the oral health. Malocclusion or mal-alignment of teeth (crowding, rotation of teeth, cross bite, open bite, spacing, impacted teeth, and constricted arches) is a major predisposing factor to plaque accumulation. Fixed orthodontic appliances such as orthodontic braces and arch wires also increase retention sites for plaque accumulation. All these predisposing factors make self-cleaning and oral hygiene maintenance difficult. Therefore, the main principle of orthodontic therapy is to correct any dental or facial anomaly such as tooth and jaw position and thus indirectly improving the health of periodontium and durability of teeth<sup>(1)</sup>.

Orthodontic treatment can, both, improve and harm the periodontium. After initiation of orthodontic treatment maintenance of oral hygiene may be more difficult leading to plaque accumulation subsequently resulting in inflammation. For example orthodontic bands placed sub-gingival can affect the alveolar bone level. Soft- or hard-tissue defects may be present. Hence, orthodontic treatment can result in both favorable as well as unfavorable consequences. According to The American Association of Orthodontists, orthodontics improves periodontal health on the basis that dental alignment facilitates plaque removal and reduces trauma and is thus considered equally important.<sup>(2)</sup>

Efficient removal of dental plaque and following the instructions for adequate oral hygiene are very important parameters for both orthodontists and periodontists.

Positive effects of orthodontic treatment may be threatened if adequate and regular oral hygiene is not maintained.<sup>(3)</sup> For adequate oral hygiene maintenance regular tooth brushing, correct tooth brushing technique and good manual dexterity play a very important role during and after orthodontic treatment. Demonstration of correct brushing techniques, frequency, orthodontic brushes and auxiliary aids such as inter dental brushes and mouthwashes should be informed to patients. Individual preventive program should be implemented for patients undergoing orthodontic treatment which should include awareness on maintenance of oral hygiene awareness and regular dental check-ups. Apart from patient related factors, patient compliance in maintaining appointments and periodontal health is also important.

However, awareness of maintenance of gingival and periodontal health among orthodontic patients is not adequate. This may be due to improper education, inadequate knowledge and poor patient compliance. Thus, assessing the knowledge of orthodontic patients prior to treatment is important.<sup>(1)</sup>

#### Aims & Objectives

- To assess the extent of oral hygiene awareness among medical students who have undergone orthodontic treatment
- To assess the impact of orthodontic treatment of on periodontal health among medical students.

#### Materials and Methods

A questionnaire based survey, containing 19 questions, conducted in the month of August 2016 was used to assess medical students who had undergone orthodontic treatment from various colleges in Mangalore, Karnataka. Both male and female patients were included. A total of 150 medical students, selected by random sampling, participated in the survey.

To assess oral hygiene awareness, the questionnaire included questions on daily brushings habits, method of brushing and frequency of changing the toothbrush. Questions regarding the effect of incorrect brushing on the

gingiva, presence of sensitivity post orthodontic treatment and change in the position of the gums were asked to evaluate the effect that orthodontic treatment has on the periodontium. All the questions had multiple choice answers which were brief. *Inclusion criteria* – a) Only medical students with healthy periodontium at the initiation of orthodontic therapy. b) Orthodontic treatment comprised of straight wire MBT for a duration of approximately 1-1.5 years. A verbal consent was taken from all the individuals who were willing to participate. All answers were kept confidential, and no individual patients were identified.

#### SURVEY QUESTIONNAIRE

#### ORAL HYGIENE AWARENESS AND IMPACT OF ORTHODONTIC TREATMENT ON PERIODONTAL HEALTH AMONG MEDICAL STUDENTS

1. Periodontitis is
  - a) Inflammation of enamel
  - b) Inflammation of dentin
  - c) Inflammation of gingiva
  - d) Inflammation of periodontal ligament, cementum and bone
2. What are the clinical manifestations in periodontitis?
  - a) Bleeding gums
  - b) Mobile teeth
  - c) Gingival recession
  - d) All of the above
3. What kind of cleaning aid do you use?
  - a. Toothbrush/paste
  - b. Finger and toothpowder
  - c. Charcoal
4. What method do you use for tooth brushing?
  - a. Horizontal
  - b. Circular
  - c. Vertical
  - d. Combined
5. How many times a day does you brush your teeth?
  - a. Once daily

- b. Twice daily
  - c. Thrice daily
  - d. Irregular
6. What type of toothbrush do you use?
- a. Soft
  - b. Medium
  - c. Hard
7. How often do you change your toothbrush?
- a. Once in 3 months
  - b. Once in 6 months
  - c. Once in a year
  - d. After it is worn out
8. Do you use a dental floss?
- a. Yes
  - b. No
  - c. Sometimes
9. Did you go to a periodontist during the period of orthodontic treatment?
- a. Yes
  - b. No
10. Is there any change in the oral hygiene practice after starting orthodontic treatment?
- a. Yes
  - b. No
11. Has orthodontic treatment interfered in the maintenance of oral hygiene?
- a. No difficulty
  - b. Difficulty only in flossing
  - c. Difficulty in brushing and flossing
12. Has orthodontic treatment resulted in a change in the bleeding from the gums?
- a. Increase in bleeding from the gums
  - b. Decrease in bleeding from the gums
  - c. No change
13. Did u notice any bad breath during orthodontic treatment?
- a. Yes
  - b. No
14. Has orthodontic treatment resulted in increase in the mobility of teeth?
- a. Yes
  - b. No
15. Has orthodontic treatment resulted in the development of an abscess or swelling of the gums?
- a. Yes
  - b. No
16. Has orthodontic treatment resulted in tooth sensitivity?
- a. Yes
  - b. No
17. Are you aware of the effects of incorrect toothbrushing on the gingiva?
- a. Yes
  - b. No
18. Has orthodontic treatment caused a change in the position of the gums?
- a. Shift in the position of the gums towards the tooth surface
  - b. Shift in the position of the gums away from the tooth surface
  - c. No change
19. Do you think oral hygiene maintenance is easier after starting orthodontic treatment?
- A. Yes
  - B. No

#### Statistical Analysis

Data obtained was analyzed using the SPSS (Statistical package for social sciences).

#### Results

A total of 150 subjects were included in the survey of which 67% were females. All the subjects included in this survey were medical students from different colleges in Mangalore.



Fig 1 : Daily Brushing Habits

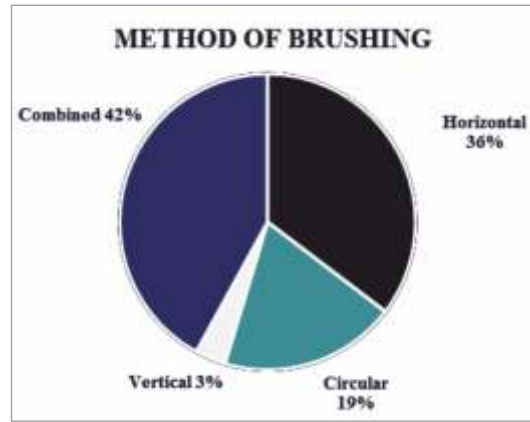


Fig 2 : Method of Brushing

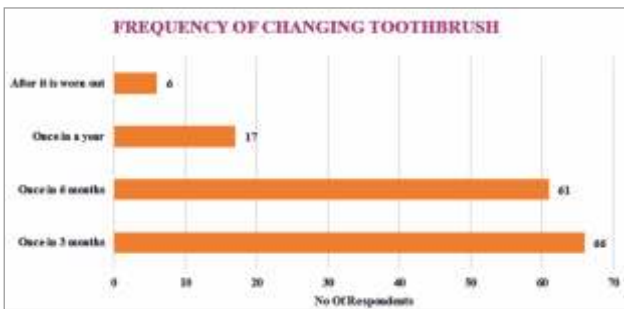


Fig 3 : Frequency of Changing Toothbrush

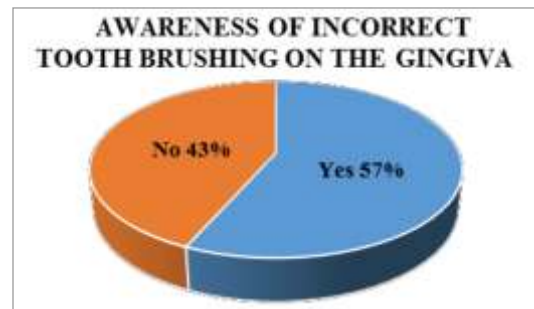


Fig 4: Awareness of incorrect tooth brushing on the gingival

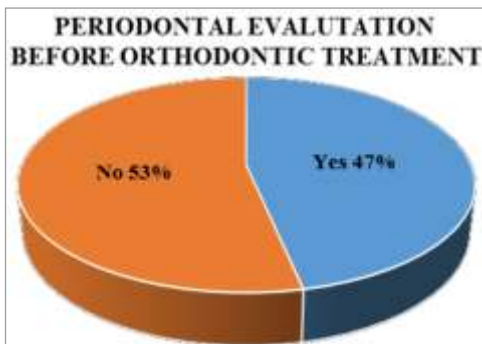


Fig 5: Periodontal evaluation during orthodontic treatment

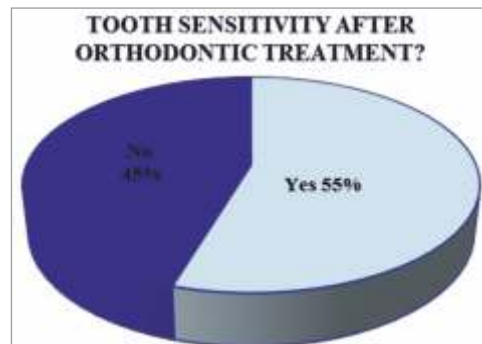


Fig 6: Tooth sensitivity after orthodontic treatment

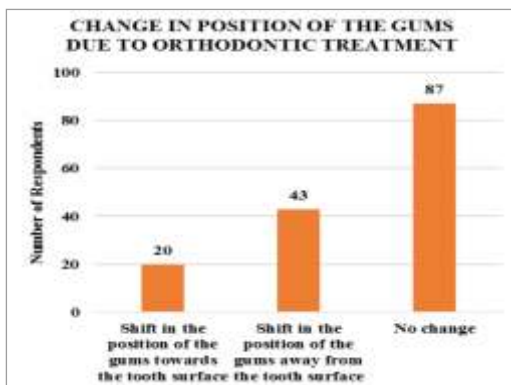


Fig 7 : Change in position of gums due to orthodontic treatment

Figures 1- 3 indicate the oral hygiene practices of the students involved in the survey whereas figures 4-7 indicate the impact orthodontic treatment has on the periodontal health. All the subjects used toothbrush and paste.

Fig 1 depicts the daily brushing habits, which evidently indicates that majority of the students brush their teeth twice daily(70%) whereas around 17% of the students brush once daily and only around 9.3% brush their teeth thrice daily.

Fig 2 depicts the method of brushing – combination

method used by 42%, horizontal method used by 36% and vertical method of brushing used by 3% of the students included in the survey.

Fig 3 indicates that 40% changed their toothbrush once in 6 months, 44% changed their toothbrush once in 3 month, 11.3% changed their toothbrush once in a year and around 4% said they change it only once it is worn out.

Assessment of the awareness levels indicated that 57% were aware of the effects incorrect tooth brushing had on the gingiva (Fig 4).

53% of the students were not evaluated periodontally during the period of orthodontic treatment. (Fig 5). Regarding change in the oral hygiene practice, 53% reported a change whereas 47% reported no change. With respect to the effect that orthodontic treatment had on the periodontium, teeth sensitivity and change in the position of the gums were most prevalent. 55% of the students complained of tooth sensitivity post orthodontic treatment (Fig 6).

Majority of the students (58%) didn't notice any change in the position of the gums. However 28.6% of the students believed that gingival recession occurred post orthodontic treatment (Fig 7). 64% of the students stated that oral hygiene maintenance was easier after completion of orthodontic treatment.

#### Discussion

The main objective of fixed orthodontic therapy is to promote and improve oral health. An ideal occlusion should be able to improve oral health by proper alignment of teeth making maintenance of oral hygiene easier. Also, the periodontal changes caused due to an abnormal functional occlusion can be avoided by creating a normal functional occlusion and placing the teeth in a good position relative to the alveolar bone.<sup>(4)</sup>

The orthodontist should recognize the importance of periodontal status of a patient undergoing fixed orthodontic therapy. The plaque retention ability of orthodontic appliances could be responsible for gingival

inflammation. Thus, a regular dental checkup to monitor the periodontal status of such patients is important. However, in this survey, only 47% of the participants received periodontal examination prior to fixed orthodontic treatment (Fig 5). Most of the patients who undergo orthodontic treatment often always have gingivitis, bleeding gums, gingival enlargement and sometimes even gingival recession or mobility of teeth and this can adversely affect the orthodontic treatment.<sup>(1)</sup>

With regard to oral hygiene practices, 105 respondents said they brush twice daily and 26 respondents said they brushed only once daily with 42% of them using combined method of brushing followed by the horizontal method reportedly used by 36%(Fig 1 &2). There was only a slight difference in the percentage of students who changed their toothbrush once in 6 months (40%) and once in 3 months (44%) (Fig 3). This indicates that medical students have adequate knowledge of oral hygiene practices As for other oral hygiene practices, 25.3 % said they use inter dental aids whereas 57.3% said they don't use any inter dental aids. When asked about if there was change in the oral hygiene practice, 53% said there is change in the oral hygiene practice and 47% said there was no change. However, difficulty in brushing and flossing after initiating orthodontic treatment was reported by a few. Inability to follow oral hygiene measures can result in gingival hyperplasia or progression of periodontal destruction. Gingival hyperplasia is generally more common in the posterior teeth.<sup>(5)</sup> The main reasons for this could be:

1. Poor oral hygiene, suggestive of difficulty in maintaining plaque free posterior zones by conventional means during fixed orthodontic treatment
2. Mechanical irritation by orthodontic bands which are more likely to come in contact with the gingiva in the posterior region than in the anterior region
3. Chemical irritation by the exposed cement at the gingival margins of the band
4. Food impaction in the posterior teeth due to close proximity of the teeth to the soft tissue and
5. Easier maintenance of oral hygiene in the anterior teeth.<sup>(4)</sup>

This was similar to the results of a study done by Soumi et al who suggested that good oral hygiene retarded the progression of periodontal disease.<sup>(6)</sup> Zachrisson also noted that periodontal damage in orthodontically treated patients was considerably lesser with good oral hygiene.<sup>(7)</sup> Hence, it can be concluded that an indispensable aspect of orthodontic treatment is an oral hygiene program.<sup>(5)</sup> However, gingival enlargement and inflammation are not permanent and often resolve post orthodontic treatment.

Proper brushing technique as well as patient compliance plays a very important role. Ideally, 3 different types of brushes have to be used and initially it takes around 15-20 minutes. In time, the duration reduces. Proper brushing is conducive for healthy gingiva whereas incorrect brushing technique can affect the teeth as well as gingival tissues<sup>(1)</sup>. In this survey, 56 % reported they were aware of effects on incorrect brushing on the gingiva while 44% were not aware of it (Fig 4). This result was in contrast to studies conducted by Elanchezhiyan et.al<sup>(8)</sup> and Mayuresh et al<sup>(1)</sup> which showed that the effects of prolonged brushing were known by only 8% while 92% were not aware.

With regard to the effects orthodontic treatment had on the periodontium, teeth sensitivity and change in the position of the gums were most prevalent. Around 55% of the students complained of tooth sensitivity. One of the major reasons for tooth sensitivity could be inter proximal stripping which is done as an alternative to extraction especially for the correction of mild crowding. Inter proximal stripping causes reduction in enamel thickness resulting in hypersensitivity of stripped teeth. However, tooth sensitivity is generally transient and decreases with time. It is usually treated by either fluoride application or by the use of desensitizing toothpastes.<sup>(9)</sup> Regarding the change in the position of the gums, 28.6% students believed that gingival recession occurred post orthodontic treatment. However,

However, 58% didn't notice any change in the position of the gums (Fig 6 & 7). Thus, the effect of orthodontic

treatment on the periodontium was small for a majority of patients. Though reported cases of mucogingival defects were less, tooth sensitivity, gingival hyperplasia and shift in the position of gums were prevalent. Trossello and Gianelly also reported some differences in the distribution of gingival clefting and recession in orthodontically treated patients.<sup>(5)</sup> However, to the best of our knowledge, no other literature has been reported regarding sensitivity post orthodontic treatment.

In this survey, 43% were unaware of the effects that incorrect tooth brushing had on the gingiva, 53% did not undergo periodontal evaluation during orthodontic treatment, 55% complained of tooth sensitivity post orthodontic treatment and only 28.6% had gingival recession. But overall, the effect was relatively modest for majority of the patients.<sup>(5)</sup> Rateishak, on the other hand, found almost no permanent "damage" in the "healthy" periodontium as a result of orthodontic treatment.<sup>(10)</sup>

It is also important to outline the possible limitations of the study. Since the study was conducted only among the medical students, majority of the students would have some knowledge about maintenance of oral hygiene. Also, their responses could be subject to change depending on their peers. Hence further surveys have to be conducted among the general population for more genuine results.

#### Conclusion

It can be concluded from the analysis of this survey that medical students have adequate knowledge of oral hygiene practices. However, the approach towards oral hygiene practices especially among orthodontically treated patients indicates the need for patient education. Due to the various effects of poor oral hygiene on the gingival and periodontal health, extra attention should be given to spread of oral hygiene awareness, patient education and motivation. Thus, equal emphasis should also be laid on the necessity of good oral hygiene for the best outcome.

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