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Review Article

A questionnaire study to assess and evaluate the common gingival problems faced by patients undergoing fixed orthodontic treatment

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ABSTRACT

Background: Fixed orthodontic components used in orthodontic treatment often act as a nidus for the retention of plaque and biofilm thereby resulting in Plaque associated gingivitis. This is because of the classic interplay of the host and the microbial ecosystem around the components. The common gingival changes in color, contour, texture, shape & size should alarm the patient and concerned orthodontist to prevent its further progression. The orthodontist and the patient should be made aware of the undesirable complications associated with the gingival response to the treatment.

Materials and Methods: This Questionnaire study was performed to assess the common gingival problems faced by the patients undergoing fixed orthodontic therapy.

Results: Our study revealed that the majority of patients of both groups were cautious in maintaining good oral hygiene. A small group of patients of both groups of treatment complained of food lodgment and also experienced pain, sometimes itchy and swollen gums with bleeding from the gums.

Conclusion: Oral health lies majorly in the hands of the patient by ensuring correct, efficient and meticulous oral hygiene practices. Every orthodontic patient should be motivated and educated with regards to the changes that occur in the gingiva with respect to the orthodontic treatment and good oral hygiene practices.

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1. Introduction

Crowding or malaligned teeth is one of the most common forms of malocclusion.¹ Animano et.al (1972) stated that the ability to maintain oral hygiene is more difficult around malaligned teeth.² Fixed orthodontic appliances for treating malaligned teeth are also known to evoke soft tissue response due to the irritation caused by the appliances like orthodontic bands and resin-bonded attachments.³ This is usually associated with inability to maintain oral hygiene due to the hindrance of the orthodontic components which creates changes in the oral microbial ecosystem and alteration of the composition of the bacterial plaque qualitatively and quantitatively.³ The observation from

study by Zachrisson et al. (1972) also confirms that patients undergoing orthodontic treatment usually experience mild to moderate gingivitis within 1 to 2 months from the start of the treatment inspite of repeated motivation and excellent oral hygiene as compared to subjects who haven't undergone any orthodontic treatment.⁴ Gingival response to the local irritants in the form of inflammation results in bleeding, edema and slight pain in the gingiva. This can negatively affect the treatment outcome of orthodontic therapy and may also result in the failure of the treatment if the gingivitis progresses to periodontitis. During orthodontic treatment, it is indispensable to emphasis on the the importance of a daily brushing routine either by manual orthodontic toothbrush or by electric toothbrush, along with warm salt water rinses or mouthwashes form an integral

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part of the treatment.³ Maintaining meticulous oral hygiene during orthodontic therapy can definitely cause behavioural changes in patients motivating them to continue the same care and concern for the oral hygiene that was practised during the treatment.^{3,5} To assess and evaluate the gingival response during and after the fixed orthodontic treatment experienced by adult patients was the aim of our study. Patient centered symptoms with regards to swelling, pain and bleeding gums during and post treatment is emphasised.

2. Aim

To evaluate and assess the common gingival problems patients face while undergoing fixed orthodontic treatment.

3. Objectives

1. To evaluate the gingival problems patients face during fixed orthodontic treatment
2. To evaluate and assess the oral hygiene practices followed by the patient undergoing orthodontic treatment.

4. Materials and Methods

4.1. Duration of study

3 Months.

4.2. Study design

A cross sectional questionnaire based study.

4.3. Place of study

Online questionnaire forms were sent via whatsapp groups of the selected participants to collect the relevant data after taking relevant permissions from the ethical committee.

4.4. Inclusion criteria

1. Patients currently undergoing orthodontic treatment
2. Patients who have already undergone orthodontic treatment in the past
3. Non surgically treated cases
4. Age group of 14 to 35 yrs
5. Patients wearing metal braces only
6. Only Fixed Orthodontic treatment cases

4.5. Exclusion criteria

1. Surgically treated cases.
2. Patients treated with myofunctional appliances
3. Patients below age 14 or above age 35
4. Patients with any Systemic diseases related to bleeding gums
5. Removable Orthodontic appliance treatment cases
6. Patients with ceramic braces

4.6. Statistical analysis

Descriptive analysis will be performed with the help of SPSS Software and mean and standard deviation will be recorded.

4.7. Relevant permissions

The study was carried out only after receiving permissions from the scientific advisory committee and Institutional Ethics Committee. Permission in the form of informed consent was also taken from the participants involved in the study.

4.8. Sample size calculation

Recommended Sample size is: 148

The sample size (n) is calculated according to the formula: $n = [z^2 * p * (1-p) / e^2] / [1 + (z^2 * p * (1-p) / (e^2 * N))]$

Where: z= 1.96 for a confidence level (a) of 95%, p= Proportion (expressed as a decimal), N= Population size, e= margin of error.

$$z = 1.96, p = 0.5, N = 51, e = 0.05$$

$$n = [1.96^2 * 0.5 * (1-0.5) / 0.05^2] / [1 + (1.96^2 * 0.5 * (1-0.5) / (0.05^2 * 52))]$$

$$n = 415.16 / 2.8325 = 148.523$$

$$n = 148$$

The Sample Size (with finite population correction) is equal to 148

Result from open Epi, version, 3 open Source Calculator—SS Propor

4.9. Method

A Google form of the questionnaire was created to assess and evaluate the common gingival problems faced by patients undergoing fixed orthodontic treatment. The questionnaire along with a brief synopsis explaining the aims and objectives of the study was sent to the relevant ethical clearance committees. After receiving clearance from the Scientific Advisory Committee and the Institutional Ethics Committee, the questionnaire was circulated amongst the participants. The participants were approached by the principal investigator and co-investigators via personal connections and Whatsapp groups. Relevant reminders were sent at 3 and 5 days to the patients after which if the response did not appear they were excluded from the study. The aims and objectives of the study were explained in a message accompanying the online questionnaire link. Informed consent was taken from all the participants before solving the questionnaire. Timely reminders were sent as well. The participation was completely voluntary and all the participants had an option of opting out of the study whenever desired. The questionnaire was divided into two groups, those who were currently undergoing orthodontic treatment and those

who had undergone orthodontic treatment in the past. Each group was exposed to a different set of questions. This division was made to understand the difference in perception of gingival problems between those who had undergone orthodontic treatment in the past and those who had not.

4.10. Questionnaire

The questions were a mix of multiple choice questions. After some questions about the informed consent, gender and age the following questions were asked:

Table 1: Questions for patients with ongoing orthodontic treatment

1.	How many times a day do you brush?
2.	Do you experience spontaneous bleeding from your gums after brushing?
3.	Do you experience swelling in your gums?
4.	Do you experience itching of gums?
5.	Do you experience food lodgement in your gums?
6.	Do you experience pain in your gums?
7.	How would you rate your ongoing orthodontic treatment experience from 1 to 5?

Table 2: Questions for patients with past orthodontic treatment

1.	How many times a day would you brush when you had braces?
2.	Would you experience spontaneous bleeding from your gums after brushing when you had braces?
3.	Would you experience swelling in your gums when you had braces?
4.	Would you experience itching of gums when you had braces?
5.	Would you experience food lodgement in your gums?
6.	Would you experience pain in your gums?
7.	How would you rate your past orthodontic treatment experience from 1 to 5?

5. Results

This survey analyzed the knowledge and application of Lingual Orthodontics among Orthodontists in their routine clinical practice in India. This questionnaire based study highlighted the following results:-

1. Majority of the patients brushed twice a day, both the ongoing treatment group as well as the patients with past orthodontic treatment, suggesting that majority of the participants maintained an additional measure of good oral hygiene along with orthodontic treatment.
2. Both the groups reported of experiencing no spontaneous bleeding of gums after brushing, which could be directly correlated to the oral hygiene habit of majority of the participants.

3. Majority of the participants of both Group 1 (ongoing treatment group) and Group 2 (past treatment group) polled of never having experienced swelling or itching of gums.
4. Majority of both groups also sometimes experienced food lodgement and pain in gums.
5. When asked about their experience with Orthodontic treatment, on a scale from 1 to 5, both groups gave a rating of 4, suggestive that they had a very good experience with orthodontic treatment with only minor areas of discomfort.

6. Discussion

Gingivitis is described as a result of an imbalance of the oral microbiota, in the dento-gingival area, and the host response leading to inflammation of gingival tissues in susceptible individuals.⁶ This study was being carried out to assess and evaluate the most common gingival problems that might arise when patients undergo Orthodontic treatment with fixed mechano-therapy. This questionnaire based study aimed at gauging the gingival related problems that the patient might face during the entire process of fixed orthodontic therapy and also enabled to assert and assess the oral hygiene protocols advocated by the patients undergoing braces treatment. Orthodontic appliances, as well as mechanical procedures, are prone to evoke local soft-tissue responses in the gingiva. These effects can either be of positive nature, helping tooth movement, or negative ones like gingival problems, which should be avoided.³ The aim of the present questionnaire study was to evaluate the effect of orthodontic tooth movement on gingival status in patients undergoing orthodontic treatment. A set of questions were asked to both the groups. 1st group included the participants who were currently undergoing orthodontic treatment and the 2nd group included participants who had undergone orthodontic treatment in the past. Firstly, a sample size was estimated based on previous studies done related to the same topic. The sample size was calculated using software for sample size calculation. The sample size was estimated to be 148. A Questionnaire was then fabricated on Google Forms which was then circulated to age groups from 14 to 35 years via various Whatsapp groups. The consent of the participants was recorded on Google forms itself. After 148 participants filled the Google questionnaire form, the data was collectively analyzed. Out of 148 participants, 76 participants were included in group 1 (currently undergoing orthodontic treatment) and 72 participants were included in group 2 (past orthodontic treatment).

Majority of the participants belonged to the age group of 18 to 22, which represents the most common age of undergoing orthodontic treatment (Figure 1). Most of participants were females (79.3%), with only a few male patients (20.7%) (Figure 2). A majority of 58.6%

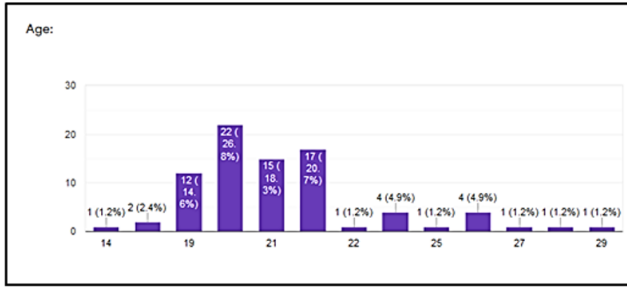


Fig. 1: Age

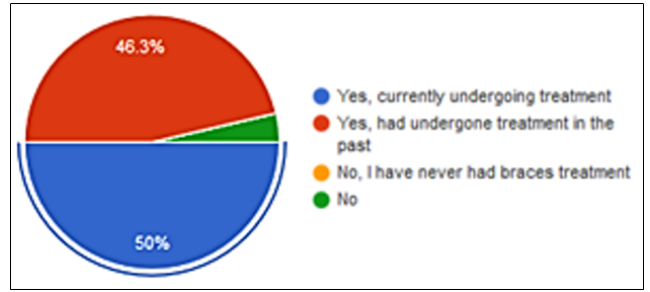


Fig. 4: As you undergoing braces treatment?

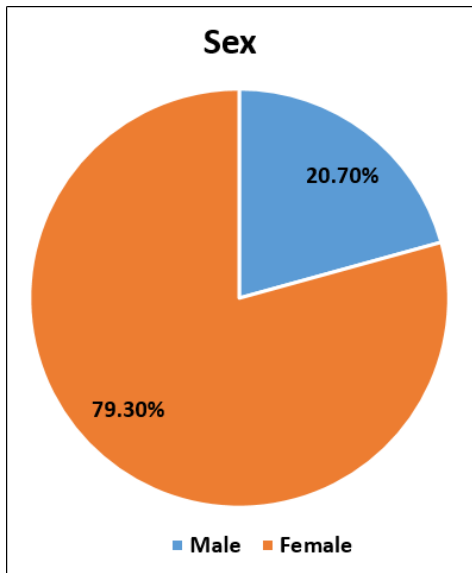


Fig. 2:

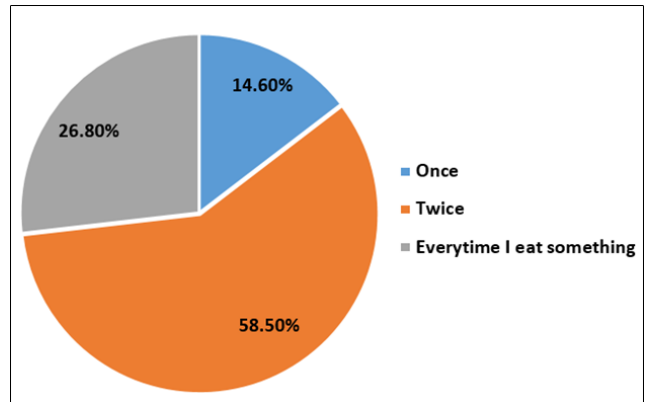


Fig. 5: How many times a day do you brush?

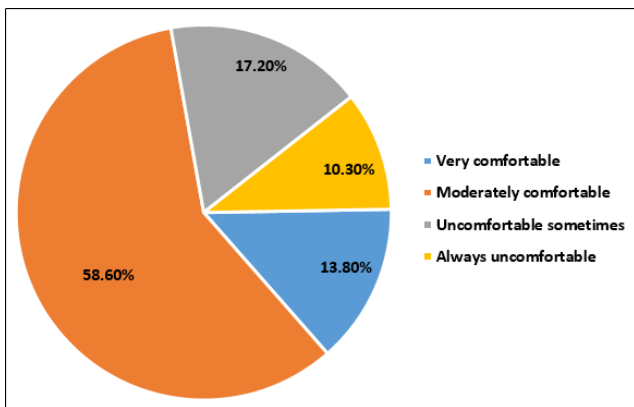


Fig. 3: How comfortable have you been since you started wearing braces

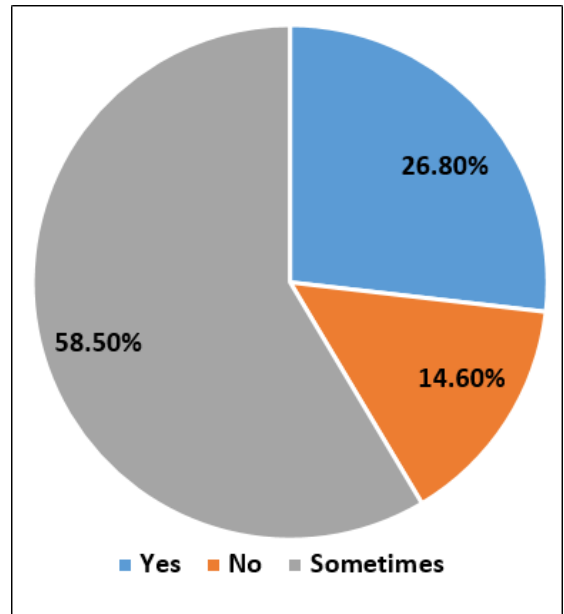


Fig. 6: Do you experience spontaneous bleeding from your gums after brushing?

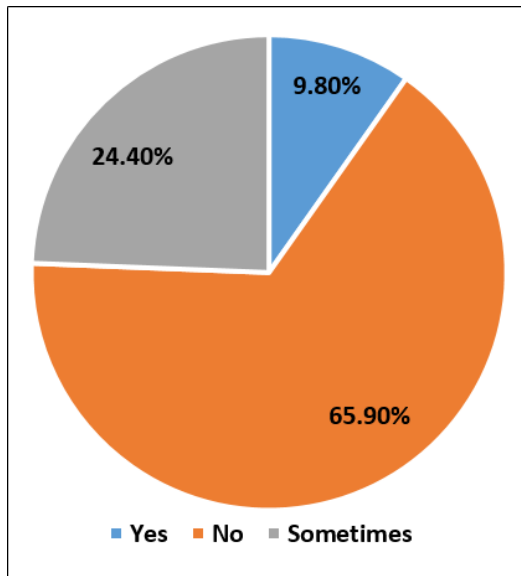


Fig. 7: Do you experience swelling in your gums?

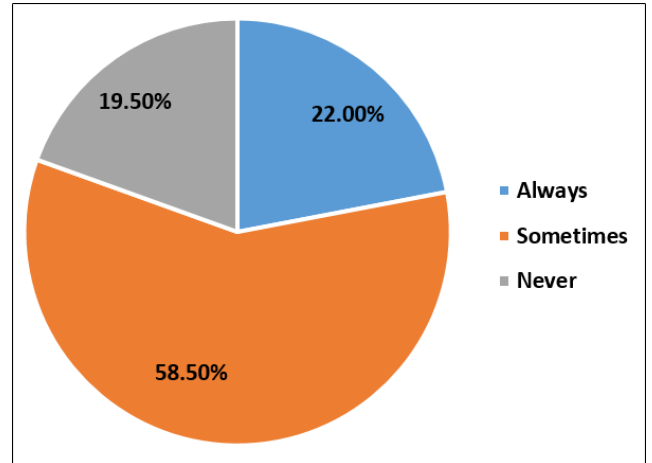


Fig. 9: Do you experience food lodgement in your gums?

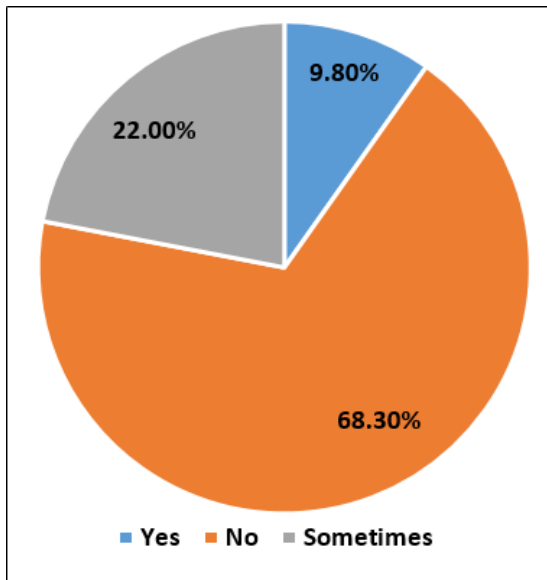


Fig. 8: Do you experience etching of gums?

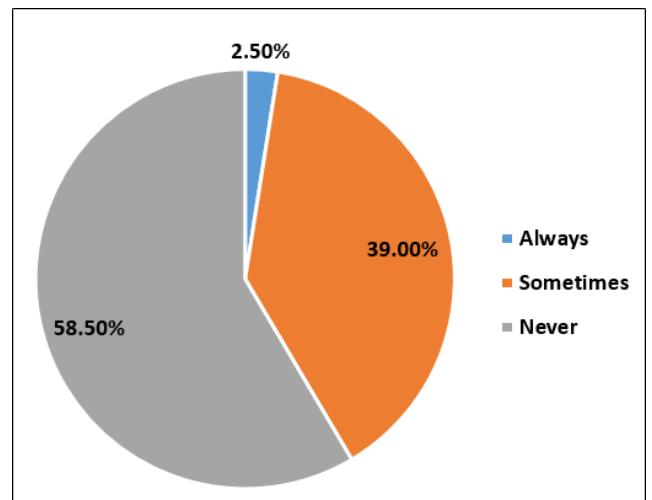


Fig. 10: Do you experience pain in your gums?

of the participants reported of having been moderately comfortable with the braces treatment (Figure 3) and only 13.6% of the participants reported of being very comfortable. The 148 participants were almost divided equally in 2 groups (Figure 4). Majority of the participants in both groups (Figures 5 and 12) brushed twice a day, suggesting that majority of the participants maintained an additional measure of good oral hygiene along with orthodontic treatment. A majority of 58.5% of the participants in group 1 (Figure 6) and 50% in group 2 (Figure 13) never experienced bleeding from gums after brushing. A whopping majority of the participants of Group

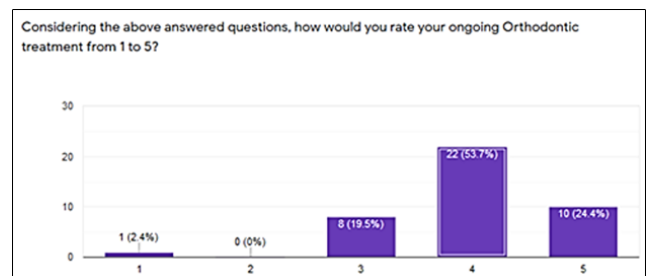


Fig. 11:

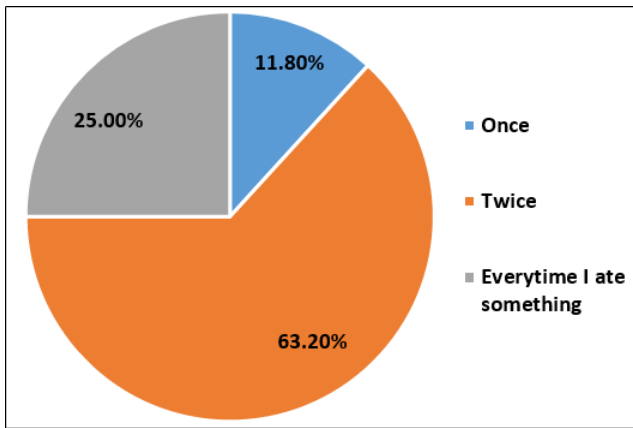


Fig. 12: How many times a day would you brush when you had braces?

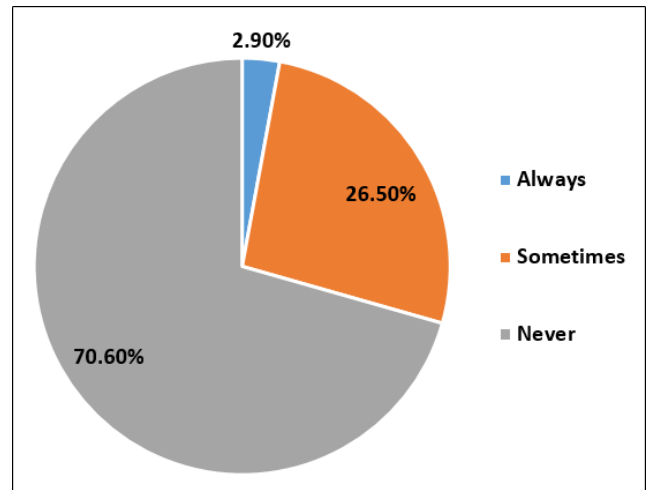


Fig. 15: Would you experience itching of gums?

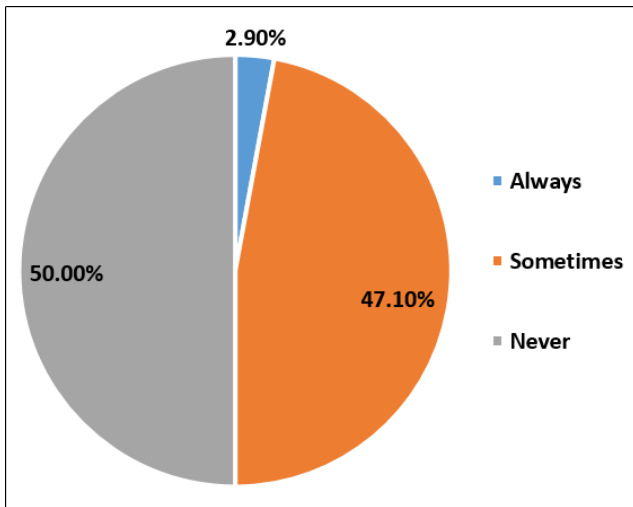


Fig. 13: Would you experience bleeding from your gums after brushing when you had braces?

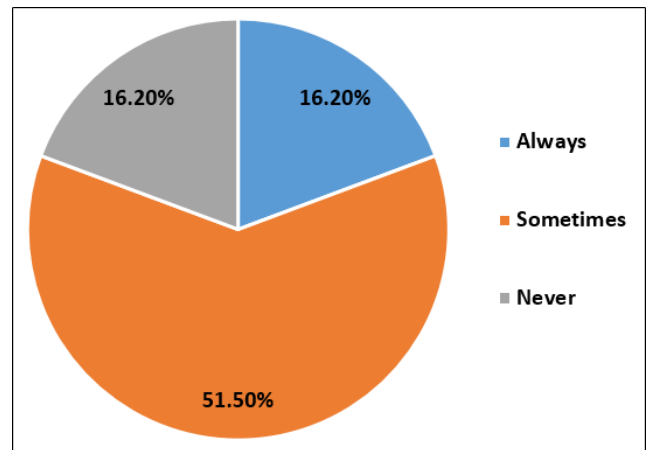


Fig. 16: Would you experience food lodgement in your gums?

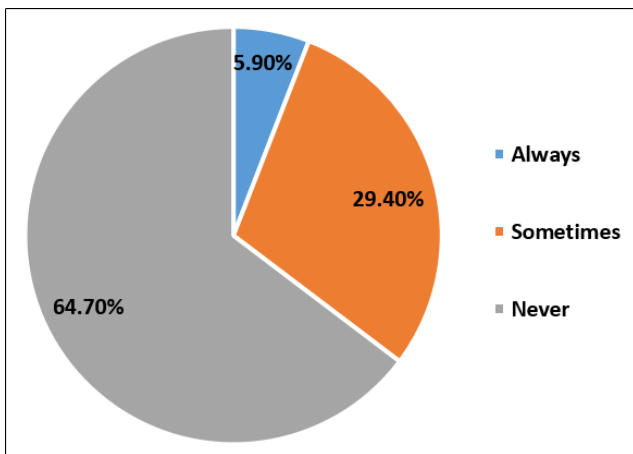


Fig. 14: Did you experience swelling in your gums when you had braces?

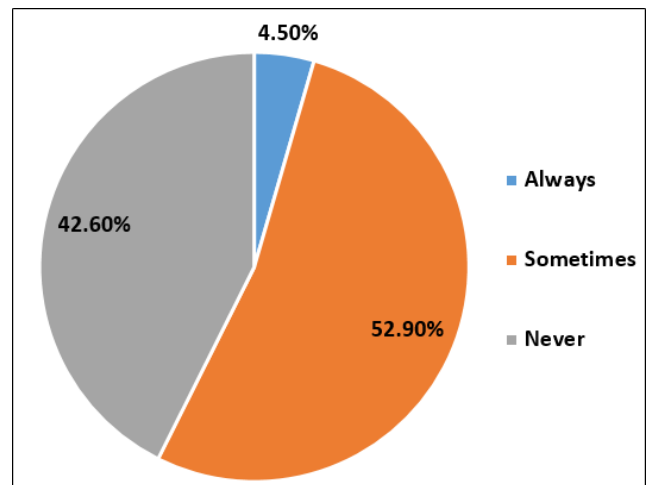


Fig. 17: Would you experience pain in your gums?

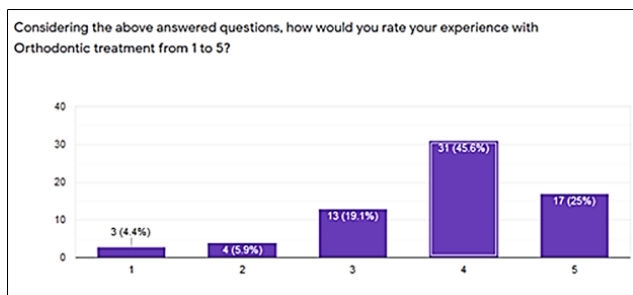


Fig. 18:

1 (ongoing treatment group) (Figures 7 and 8) polled of never having experienced swelling (65.9%) or itching (68.3%) of gums. Majority of the participants of Group 2 (past treatment group) (Figures 14 and 15) also experienced no swelling (64.7%) and itching (70.6%) of gums. A majority of both groups also sometimes experienced food lodgement and pain in gums (Figures 9, 10, 16 and 17). When asked about their experience with Orthodontic treatment, on a scale from 1 to 5, both groups gave a rating of 4, suggestive that they had a very good experience with orthodontic treatment with only minor areas of discomfort (Figures 11 and 18). Thus this questionnaire based study helped to evaluate and assess the common gingival problems patients face while undergoing fixed orthodontic treatment alongside assessment of oral health of patients undergoing orthodontic treatment.

7. Conclusion

Oral health lies majorly in the hands of the patient by ensuring correct, efficient and meticulous oral hygiene practices. Every orthodontic patient should be motivated and educated with regards to the changes that occur in the gingiva with respect to the orthodontic treatment and good oral hygiene practices.

8. Source of Funding

None.

9. Conflict of Interest

The authors declare that there is no conflict of interest.

10. Acknowledgement

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