

Research Article

The Effect of Chewing Gum on the Pain Associated with Initial Placement and Activation of Fixed Orthodontic Appliances

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Aim: The aim of the study was to determine the effect of chewing gum on the pain caused by initial placement and activation of fixed orthodontic appliances.

Abstract

Objectives: To determine the effect of chewing gum on the pain associated with initial placement of fixed orthodontic appliances”.

Sample population: Subjects were selected from the Department of Orthodontics, who wanted to undergo fixed orthodontic therapy.

Subjects and Methods: A randomized clinical trial with two parallel groups allocated to receive chewing gum after initial placement of their appliance or who were asked not to use Chewing (chewing) gum. Subjects completed a compliance form and visual analogue scale (VAS) to assess the intensity of pain at 24hrs and after 1 week following placement of the initial working archwire.

Results: Values are Median (Minimum–Maximum). P-value by Mann-Whitney U test (Un-paired analysis using non-parametric methodology). P-value<0.05 is considered to be statistically significant.

- 24-Hrs and 7-Days post treatment average pain scores differ significantly in Non-Chewing Study group (P-value<0.001).
 - The average pain score after 24-Hrs is significantly higher in Non-Chewing Gum group (P-value<0.001).
 - The average pain score after 7-Days is significantly higher in Non-Chewing Gum group compared to Chewing Gum group (P-value<0.001).
 - The average change in pain score after 7-Days is significantly higher in Non-Chewing Gum group compared to Chewing Gum group (P-value<0.001).
- Conclusion: Chewing gum significantly decreased pain from the fixed appliances.

Introduction

It has been shown that fixed orthodontic appliances lead to a deterioration in both adolescent^[1,2] and adult^[3] oral health-related quality of life (OHRQoL), particularly in the first month after placement. This is related to the functional and social discomfort associated with wearing a fixed appliance^[4], as well as the physical discomfort and pain^[5,6]. This impact on OHRQoL may affect compliance and may lead to patients failing to complete treatment.

Research shows that 90% of orthodontic patients reported that their treatment was painful and 30% considered ceasing treatment prematurely because of the pain they experienced^[7]. The commonest method of controlling the pain and discomfort from orthodontic appliances investigated has been the use of systemic analgesics^[8].

The use of local pharmaceutical agents has also been investigated^[9]. Non-pharmacological methods include transcutaneous electrical nerve stimulation^[10] and lasers^[11]. Despite these research findings, there is no standard of care for analgesic use in the pain management of orthodontic patients. It is more common for orthodontists to simply tell their patients to take analgesics as

needed, leaving pain management decisions up to their mostly adolescent patients and their parents^[12,13].

Orthodontic appliances cause discomfort and can affect eating, speaking, smiling and other activities. Some patients give up treatment early because of the impact on their everyday life. We should therefore do all we can to minimize this impact^[14]. One simple intervention is to advise patients to chew gum when it suits them. However, there are few clinical studies examining either the positive or negative effects in patients with fixed orthodontic appliances, which hopefully are addressed with this study. This study found that chewing gum reduced the impact and discomfort of fixed appliances without the negative effects of causing more breakages.

Material and Methods

This study was a randomized trial, consisting of 60 randomly selected subjects undergoing orthodontic treatment in the Department of Orthodontics and Dentofacial Orthopaedics and were divided into 2 groups (30 patients each). Subjects were between the age of 13 and 30 years and those undergoing fixed orthodontic therapy, with all permanent dentition and habit of

brushing twice daily with toothpaste and toothbrush were only included in the present study. Patients with use of anti-inflammatory or antibiotic medications taken in the month before the study and use of chewing gum or mouthwash used in the last week of the study were excluded. Also patients with habit of smoking/alcohol/tobacco and having pre-existing gum diseases were excluded.

The patients in Group I were given sugar free chewing gum (Figure 1) to be chewed daily twice in morning and evening respectively for a period of one week^[16,17]. The patients in group 2 were asked not to chew gum for a period of one week Patients were asked to fill up a compliance schedule daily for taking chewing gum. Compliance schedule form (Table 1) was handed to the patient before trial. Visual analogue scale (Figure 2) was given to both the group to be filled up at the fixed schedule of 24 hours and after one week. Patient were asked to mark appropriate score depending upon the degree of pain felt (Figure 3).

Table 1: Compliance schedule chart

DAY	DATE	MORNING	EVENING
1			
2			
3			
4			
5			
6			
7			

Figure 1: Sugar free chewing gum



Figure 2: Visual Analogue Scale (VAS)

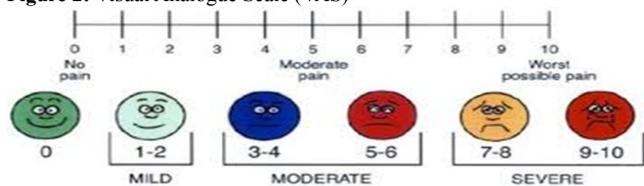
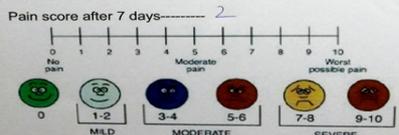


Figure 3: Example of form filled by patient.

DAY	DATE	MORNING	EVENING
1	18 Nov 2019	✓	✓
2	19	✓	✓
3	20	✓	✓
4	21	✓	✓
5	22	✓	✓
6	23	✓	✓
7	24	✓	✓

VISUAL ANALOGUE SCALE
Pain score after 24 hours----- 6
Pain score after 7 days----- 2



Result

Majority of subjects were in between fifteen to nineteen years in this study (Table 2, Figure 4). In the present study it was observed that sex distribution of the volunteers did not differ significantly between two study groups (P-value>0.05) (Table 3, Figure 5). However, majority of volunteers were females across two study groups.

Table 2: Age distribution of the volunteers studied across two study groups. Values are n (% of volunteers). P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. S: Statistically Significant, NS: Statistically Non-Significant.

Age Group (Years)	Non-Chewing gum group (n=30)	Chewing Gum Group (n=30)	P-value
<15.0	7 (23.4)	5 (16.6)	0.580 (NS)
15.0 – 19.0	13 (43.3)	17 (56.7)	
>=20.0	10 (33.3)	8 (26.7)	
Total	30 (100.0)	30 (100.0)	

Figure 4: Age distribution of the volunteers studied across two study groups.

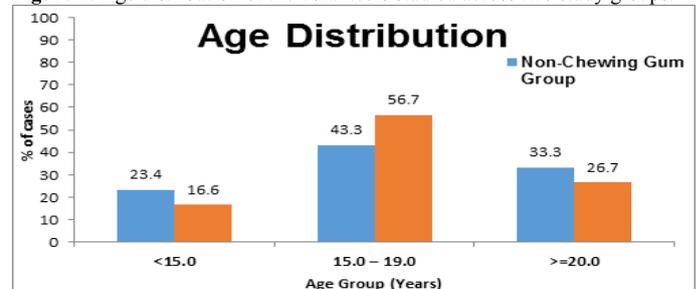


Figure 5: Sex distribution of the volunteers studied across two study groups.

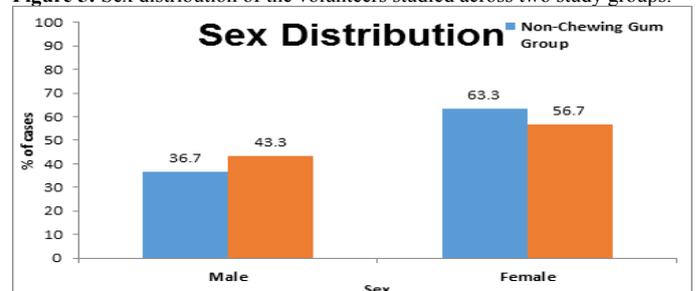


Table 3: Sex distribution of the volunteers studied across two study groups. Values are n (% of volunteers). P-value by Chi-Square test. P-value<0.05 is considered to be statistically significant. S: Statistically Significant, NS: Statistically Non-Significant.

Sex	Non-Chewing Gum Group (n=30)	Chewing Gum Group (n=30)	P-value
Male	11 (36.7)	13 (43.3)	0.598 (NS)
Female	19 (63.3)	17 (56.7)	
Total	30 (100.0)	30 (100.0)	

The average pain score after 24hrs was significantly higher in Non-Chewing Gum group compared to Chewing Gum group (P-value<0.001). The average pain score after 7 Days was significantly higher in Non-Chewing Gum group compared to Chewing Gum group (P-value<0.001). The average change in pain score after 7 Days was significantly higher in Non-Chewing Gum group compared to Chewing Gum group (P-value<0.001) (Table 4, Figure 6).

Figure 6: Intra-Group Comparison of Pain Score in each study groups.

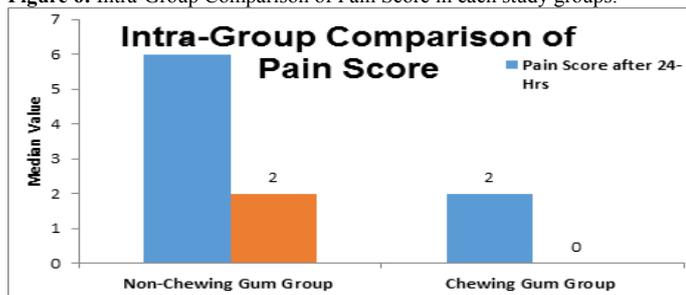


Table 4: Intra-Group Comparison of Pain Score in each study groups. Values are Median (Minimum – Maximum). P-value by Wilcoxon’s Signed Rank Test (Paired analysis using non-parametric methodology). P-value<0.05 is considered to be statistically significant. S: Statistically Significant, NS: Statistically Non-Significant.

Pain Score	Non-Chewing Gum Group (n=30)	Chewing Gum Group (n=30)
Pain Score after 24-Hrs	6 (3 – 8)	2 (0 – 5)
Pain Score after 7-Days	2 (0 – 3)	0 (0 – 2)
P-value (After 24Hrs v After 7Days)	0.001 (S)	0.001 (S)

The change in pain score was significantly higher in chewing gum group as compared to non-chewing gum group (Table 5, Figure 7ab).

Figure 7a: Inter-Group Comparison of Pain Score between two study groups

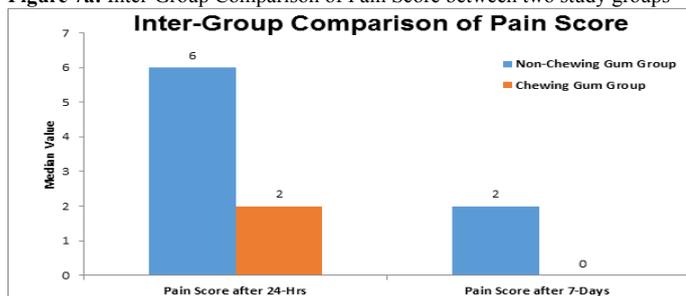


Figure 7b: Inter-Group Comparison of Change in Pain Score between two study groups.

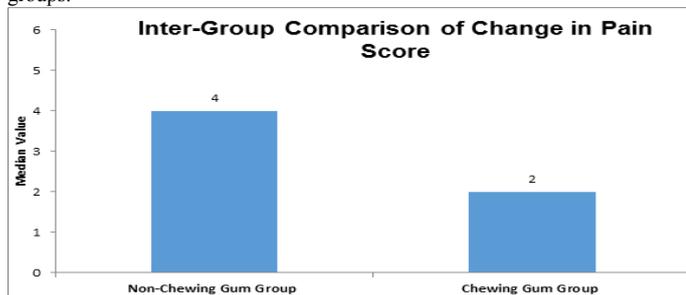


Table 5: Inter-Group Comparison of Pain Score in each study groups. Values are Median (Minimum – Maximum). P-value by Mann-Whitney U test (Un-paired analysis using non-parametric methodology). P-value<0.05 is considered to be statistically significant. S: Statistically Significant, NS: Statistically Non-Significant.

Pain Score	Non-Chewing Gum Group (n=30)	Chewing Gum Group (n=30)	P-value
Pain Score after 24-Hrs	6 (3 – 8)	2 (0 – 5)	0.001 (S)
Pain Score after 7-Days	2 (0 – 3)	0 (0 – 2)	0.001 (S)
Change in Pain Score	4 (0 – 6)	2 (0 – 5)	0.001 (S)

Discussion

Subjects were also asked to complete a compliance sheet twice which was given to them, they were specifically asked to fill up the time daily when they took chewing gum and to tick mark on compliance sheet handed over to them. We chose to use a single summary measure of impact and pain (the median score) at 24 hours and 1 week interval Generally, 24 h after fixed appliance placement adjustment is considered the peak time for pain, which then reduces over the next week^[18,19]. Even though we have given compliance sheet to be filled by the patient, our limitation was few subjects did not took the chewing gum.

We found no significant differences between boys and girls for the median score. Subjects in chewing gum group said that the chewing gum helped relieve the pain and discomfort, some subjects said chewing gum distracted their attention from the pain and discomfort. Others found that chewing gum did not help when the teeth were painful.

We also found out that chewing gum helped to keep the appliance clean, and few patients said that sometimes the chewing gum does help release food that gets stuck in the braces.

The additional potential benefit of chewing gum increasing salivary flow and helping clean the appliance and possibly reduce demineralization would be an interesting topic for future studies.

Conclusion

Chewing gum significantly reduced the amount of pain from the fixed appliance after initial placement and activation as compared to subjects not taking chewing gum.

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