

COMPARISON BETWEEN IBUPROFEN AND CHEWING GUM FOR ORTHODONTIC PAIN CONTROL

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ABSTRACT

Pain is common experience in orthodontic patients that begins two hours after force application and reaches peak at 24 hours, then lasts for 5 to 7 days. The objective of this study was to compare the decrease in pain score with ibuprofen and chewing gums in orthodontic pain control during the first week after initial arch wire placement. This study was conducted at de, Montmorency College of Dentistry, Lahore, from April 2014 to October 2014. 250 patients with age range of 12 to 16 years of both sex were selected and divided in to ibuprofen and chewing gum groups (125 each group) using random number table. The patients in each group received pain control 24 hours after initial arch wire insertion and then at 8-hour interval till 7th day. Patients were asked to complete a Visual Analog Scale (VAS) Questionnaire, at 24 hours after arch wire insertion, then at 24 hours, and 7th day. Two-way ANOVA was used for analyzing significance of mean decrease in VAS between two groups. Results showed that decrease in pain score for ibuprofen group; baseline to 24 hours was 2.35 ± 1.36 which was significantly lower than decrease in pain score for chewing gum group 3.34 ± 1.34 . At 7th day, ibuprofen group showed decrease in pain score as 4.07 ± 1.43 which was significantly lower than decrease in pain score of 5.86 ± 1.56 for chewing gum group. This was concluded that chewing gums showed more decrease in pain score for orthodontic patients as compared to ibuprofen.

Key Words: Orthodontic pain control, Ibuprofen, Chewing gums, Initial arch wire.

INTRODUCTION

Pain is common experience in orthodontic patients. Fear of pain and discomfort is a key element in deterring patients from seeking orthodontic treatment. Orthodontists underestimate the degree to which orthodontic treatment cause pain to their patients.¹ A more positive attitude is found in patients who experience less pain during orthodontic treatment.²

Orthodontic pain arises from ischemia, inflam-

mation, and edema in the compressed periodontal ligament.³ Pain begins two hours after force application and reaches maximum intensity at 24 hours, and lasts for 5 to 7 days.⁴

Non-Steroidal Anti-inflammatory Drugs (NSAIDs) has been reported as the most successful modality for orthodontic pain control.^{5,6} However, in recent years, the overuse and side effects of NSAIDs have been considered issues of concern particularly they reduce orthodontic tooth movement.⁷ Various new non-pharmacological methods, such as Low Intensity Laser Therapy⁸, chewing gums⁹ or bite wafers^{9,10} have been suggested for orthodontic pain control. The mechanism of action behind these non-pharmacological methods is to loosen the tightly grouped periodontal ligament fibers, restoring the normal blood flow, thus preventing the buildup of metabolites that stimulates pain receptors. Recent literature suggested that chewing gum can also be recommended for initial orthodontic pain control.⁹

No study in Pakistan has been conducted to compare the decrease in pain score with chewing gums and ibuprofen in orthodontic pain control. Results

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may be different in Pakistani population because of nutritional reasons, genetic reasons and patient compliance. However, objective of this study was to compare a non-pharmacological option of chewing gums with ibuprofen in orthodontic pain control. It will be beneficial for orthodontic patients as chewing gums lack negative side effects in tooth movement physiology, it will also eliminate the possible systemic side effects from ibuprofen and can easily be used at home, school or work place and in patients with contraindications to ibuprofen.

METHODOLOGY

This Randomized clinical study was conducted at Department of Orthodontics, de, Montmorency College of Dentistry, Lahore, from April 2014 to October 2014. After obtaining hospital ethical committee approval, 250 patients with age range 12 to 16 years, irrespective of gender, were selected according to the selection criteria using Non-Probability Purposive sampling technique. Sample was divided in two groups using random number table and assigned ibuprofen and chewing gum groups (125 in each group). A written informed consent was obtained from all patients for inclusion in study.

INCLUSION CRITERIA

- 12 to 16 years of age both sex.
- Severe/moderate crowding requiring first premolar extractions.
- The extractions scheduled at least two weeks before bonding.

EXCLUSION CRITERIA

- Medically Compromised Patients.
- Receiving Analgesic Therapy.
- Contraindication to the use of Ibuprofen.
- Oral surgery in the previous four weeks.

Maxillary arch was bonded using straight wire edgewise appliance system and 0.016" nickel-titanium (Ni-Ti) arch wire (3M Unitek) ligated. All patients in both groups were called after 24 hours and requested to mark Visual Analog Scale (VAS) score according to their level of pain feeling. This was considered as base line pain score. The patients of ibuprofen group were prescribed to take 400 mg ibuprofen tablet immediately after first visit and repeated 8-hourly for one week. In the chewing-gum group, the patients were prescribed to chew a sugar-free gum (Orbit; The Wrigley Company) for 5 minutes immediately after this visit and repeated 8-hourly for one week.

To record pain level, the subjects were asked to complete a Visual Analog Scale (VAS) score. The format of scoring was a 10 cm line, weighted at both ends by

descriptive terminology with a happy face and a sad face.

The patients were requested to mark a location on the line corresponding to the amount of pain they experienced at 24 hours after arch wire insertion (Base line); then at 24 hours, and 7th day after prescribing ibuprofen and chewing gum for pain control. The measurements were made with a ruler for the distance from the left margin of the line to the mark and recorded as the score. Decrease in VAS score was obtained by subtracting VAS score at 24 hours and 7th day, from baseline score. All this information was collected on a predesigned performa attached. The patients were instructed not to use any additional analgesics.

Statistical Analysis

Data was analyzed using SPSS software (version 17.0). Quantitative data like age and VAS score at different stages was presented by mean \pm SD while Qualitative data like gender was presented by frequency and percentages. Two-way ANOVA was used for significance of mean decrease in VAS in both groups. The level of significance was set at $P \leq 0.05$.

RESULTS

Two hundred and fifty patients with 12-16 years age range; mean age of 14.03 ± 1.17 years were included in this study as shown in Table 1. There were 133 (53%) male patients while 117 (47%) females. The male-to-female ratio was 1.1:1 as shown in Fig 1.

In ibuprofen group, baseline pain score was 7.78 ± 1.28 which was significantly reduced to 5.52 ± 1.29 after 24 hours and further reduced to 3.80 ± 1.11 at 7 days. There was statistically significant ($p < 0.05$) decrease in mean pain score from baseline to 24 hours and after 7 days. In chewing gum group, baseline pain score was 7.72 ± 1.49 which was significantly decreased to 4.38 ± 1.52 after 24 hours and further reduced to 1.86 ± 1.35 at 7th day. At baseline, both groups had insignificant difference for pain ($P > 0.05$), while significant difference was observed after 24 hours and 7 days ($P < 0.05$) and chewing gum group had less mean pain as compared to ibuprofen group as shown in Table 2.

In ibuprofen group, decrease in pain score from baseline to 24 hours after taking ibuprofen was 2.35 ± 1.36 which was significantly lower than decrease in mean pain score for chewing gum group which showed 3.34 ± 1.34 at ($P < 0.05$). Similarly, ibuprofen group showed decrease in pain score from baseline to 7 days after procedure 4.07 ± 1.43 which was significantly less than that decrease in mean pain score for chewing gum group which showed decrease of pain 5.86 ± 1.56 at ($P < 0.05$). This showed that chewing gum group had more decrease in mean pain as compared to ibuprofen

TABLE 1: DESCRIPTIVE STATISTICS OF AGE OF PATIENTS

	N	250
Age (years)	Mean	14.03
	SD	1.17
	Minimum	12
	Maximum	16

TABLE 2: COMPARISON OF MEAN DECREASE IN VAS PAIN SCORE IN BOTH GROUPS AT DIFFERENT FOLLOW-UPS

		Baseline pain	After 24 hours	After 7 days
Group	Ibuprofen	7.87±1.28	5.52±1.29	3.80±1.11
	Chewing gum	7.72±1.49	4.38±1.52	1.86±1.35
p-value		0.387NS	0.000*	0.000*

NS = Insignificant (P>0.05)

* = Significant (P<0.05)

TABLE 3: COMPARISON OF MEAN DECREASE IN VAS PAIN SCORE IN BOTH GROUPS AT DIFFERENT FOLLOW-UPS

		Decrease from baseline to 24 hours	Decrease from baseline to 7 days
Group	Ibuprofen	2.35±1.36	4.07±1.43
	Chewing gum	3.34±1.34	5.86±1.56
p-value		0.000*	0.000*

* = Significant (P<0.05)

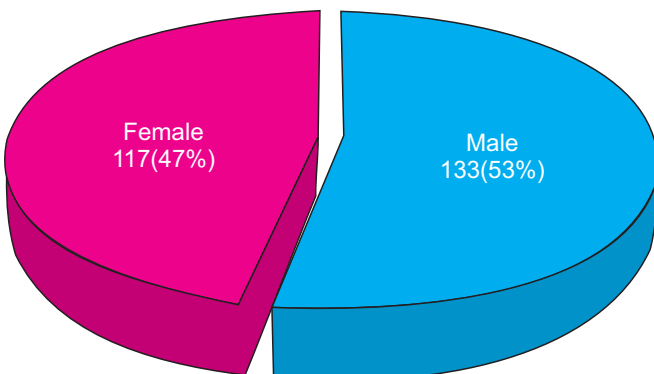


Fig 1: Gender distribution

group as shown in Table 3. At each point of follow-up both groups showed overall significant difference and chewing gum showed more decrease in mean pain score at each level in comparison to ibuprofen as shown in Fig 2.

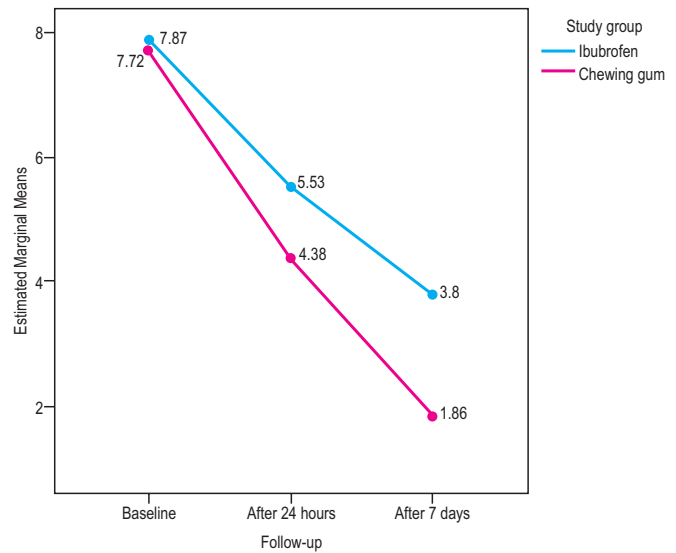


Fig 2: Comparison of both groups during follow-up of patients

DISCUSSION

This study was designed to compare the effects of ibuprofen and chewing gum on orthodontic pain control by measurement of decrease in mean VAS pain score following initial arch wire placement. The reports on the influence of chronological age and gender on pain of patients after orthodontic appliance application are inconsistent.¹¹⁻¹⁴ To control these factors, this study was limited to adolescents of 12-16 years age group, and stratification based on sex was used to balance the distribution of boys and girls in two groups.

In both groups, the recorded score of pain on VAS was peaked at 24 hours and decreased over the rest of the week after initial arch wire placement. This finding agrees with the results of Polat et al¹⁵, Bernhardt et al¹⁶, Law et al¹⁷ and Ngan et al.¹⁰ This pattern and experience of pain during function was also reflected similarly in previous studies.^{11,12,14,18}

We observed that both groups had almost equal baseline pain score with insignificant difference at P>0.05, while after 24 hours, significant difference was observed (P<0.05) and chewing gum group had less pain as compared to ibuprofen group. Furthermore, after 7 days, the difference observed was significant (P<0.05) and at this point again chewing gum group had less pain as compared to ibuprofen group.

In this study, the decrease in pain was more with chewing gum (3.34±1.34) as compared to ibuprofen (2.35±1.36) from baseline to 24 hours which showed significant difference of decrease in pain score between both groups at P<0.05. Similar difference was observed after 7 days of initial arch wire placement and prescription of treatment. In chewing gum group, decrease in pain score from initial arch wire placement to 7 days

after procedure was 5.86 ± 1.56 which was significantly higher than decrease in pain score from ibuprofen group which showed decrease of 4.07 ± 1.43 pain ($P < 0.05$). At this point again chewing gum group had more decrease in pain as compared to ibuprofen group.

Ngan et al¹⁰ concluded that ibuprofen was the preferred analgesic to decrease pain associated with orthodontic treatment. According to Davidovitch and Shanfield, pain during orthodontic treatment is due to an inflammatory response in the periodontal ligament, and NSAIDs have been called the gold standard for orthodontic pain control.¹⁹ Furstman and Bernik³ noted that pain after orthodontic appliance placement is a combination of pressure, ischemia, inflammation, and edema in the periodontium. It is believed that any factor that can temporarily displace the teeth under orthodontic force can relieve the pressure and stop the further formation of ischemic spots, thus cure pain. Based on this theory, Proffit²⁰ recommended chewing gum for pain control in orthodontic patients following appliance placement. However, the effectiveness of chewing gum in pain control for orthodontic patients has not been evaluated in any other Pakistani study. Results may be different in Pakistan because of cultural reasons, genetic reasons, emotional status and patient compliance.

Otasevic et al²¹ concluded that avoiding hard food in the first week after initial arch wire placement was more effective in pain reduction than chewing on bite wafers. However, the recommendation of hard food avoidance to patients does not seem reasonable. Recently, Murdock et al²² compared pain response during the first week after initial arch wire placements in patients randomly assigned to 1 of the 2 pain management groups: They concluded that the bite wafers were at least as effective as NSAIDs for pain control after orthodontic procedures. Similarly, in our study, the chewing gums were more effective as compared to ibuprofen in orthodontic pain control.

The results of our study matches with recently conducted study by Fahimeh and Zebarjad⁹ who concluded that both chewing gum and viscoelastic bite wafers are effective for pain reduction in orthodontic patients and can be recommended as suitable substitute for ibuprofen. However, the main difference between two studies was that study of Fahimeh and Zebarjad was only conducted on girls, while in this study stratification based on sex was used to balance the distribution of boys and girls in the two groups.

So it was found in this study that chewing gum was not inferior to ibuprofen with respect to any pain management. The mechanism of chewing gums is to loosen the tightly packed periodontal ligament fibers, restoring the normal blood flow of periodontium, thus

preventing the buildup of pain receptors stimulating metabolites and finally curing the pain.

Another main issue that complicates ibuprofen usage in orthodontic patients is their proven side effect of inhibiting orthodontic tooth movement. Alternative pain management methods such as the chewing gum and wafers do not have these possible consequences. So use of chewing gums will be beneficial for orthodontic patients as these lack negative side effects in tooth movement physiology. It will also eliminate possible systemic side effects of ibuprofen and can easily be used at home or school and in patients with contraindications to ibuprofen.

By dint of this study the care providers will be enabled to prescribe non-pharmacological option for orthodontic pain control. The limitation of this study was small sample size; hence conducting another study with larger sample size is suggested.

CONCLUSION

Chewing gums showed more decrease in pain score for orthodontic pain after initial arch wire placement as compared to ibuprofen. So chewing gum can be good substitute for ibuprofen in orthodontic pain control that eliminates the possibility of side effects from ibuprofen and can easily be used.

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