

Comparing the Effectiveness of Bite Wafers and Ibuprofen in Pain Management After Initial Orthodontic Arch-wire Placement

Gulsanga Hassan Khan¹, Najam Ul Hassan², Zubair Ahmed³, Sundus Wahid⁴, Saad Saud⁵,
Usman Mahmood⁶, Ghazanfar Gul⁷, Afsheen Mansoor⁸

^{1,2,4}Demonstrator, Department of Orthodontics, School of Dentistry, SZABMU, Islamabad

³Associate Professor, Department of Orthodontics, CIMS Dental College, CMH Multan

⁵Senior Registrar, Department of Orthodontics, School of Dentistry, SZABMU, Islamabad

⁶Professor, Department of Science of Dental Materials, Lahore Medical and Dental College, Lahore

⁷Demonstrator, Department of Periodontology, School of Dentistry, SZABMU, Islamabad

⁸Associate Professor, Department of Science of Dental Materials, School of Dentistry, SZABMU, Islamabad

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³Wrote Discussion, ⁴Literature
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Address of Correspondent

Dr. Afsheen Mansoor

Associate Professor, Department
of Science of Dental Materials,
School of Dentistry, SZABMU,
Islamabad

drafsheenqamar@gmail.com

ABSTRACT

Objective: This study compares the effectiveness of ibuprofen and bite wafer use on pain reduction after initial archwire placement.

Methodology: This study was conducted at the Department of Orthodontics, School of Dentistry, SZABMU, Islamabad. From October 2024 to March 2025. A total of 80 patients make up the sample (40 in each group). This comparative study involved patients who were placed under an arch wire and were randomly allocated by lottery method into two groups i.e. Ibuprofen Group (IBG) and Bite Wafer Group (BWG). Patients were given a bite wafer to chew on to relieve pain, or a 400 mg ibuprofen tablet to chew on at 8-hour intervals, for at least a week if pain persisted, after following all the study protocols. The pain intensity was assessed using a VAS questionnaire at home, and the results were analyzed at the end of the week.

Results: Out of 80 patients, 40 were males & 40 were females aged between 14 and 25 years. An independent sample t test revealed that ibuprofen initially worked better than bite wafers at 2 and 24 hours ($P=0.01$). However, at the end of the week, or on the seventh day, the results were not statistically significant ($P=0.477$). However, both the groups were satisfied with the treatment offered.

Conclusion: Bite-wafers showed similar reduction in pain score after initial arch-wire placement as compared to ibuprofen over the 7 days period. Thus, offering bite wafers as an alternative to analgesics may be a reasonable solution for patients experiencing pain during orthodontic treatment.

Keywords: Analgesics, Bite wafer, Ibuprofen, Orthodontic treatment, Pain

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Introduction

Health is regarded as paramount assets of human life; oral health is extremely important for over-all physical health.^{1,2} Dental patients may complaint of swelling, severe pain, sensitivity.³⁻⁵ Outcomes of certain procedures has been always a matter of concern for both the clinician and patient ⁶. In this modern age and days, orthodontics has achieved incredible goals and success.⁷

Orthodontic pain is a common clinical symptom and the worst component of orthodontic treatment.⁸ Over 90% of patient's experience pain during treatment, and clinicians should consider protocols that can be easily and safely followed to reduce discomfort and enhance patient compliance.⁹ Most individuals undertake dental treatment to get relief from pain and restore oral functions.¹⁰⁻¹²

Pain is influenced by sensory and emotional components and follows a circadian rhythm.¹³ Pain assessment in orthodontic patients is complex and often involves paper-

based¹⁴ surveys, but methods like Ecological Momentary Assessment (EMA), Visual Analogue Scale (VAS), chairside screening tests, and Quantitative Sensory Testing offer optimal treatment interventions and pain management.¹⁵

Pain is influenced by psychological factors, such as adolescents being more vulnerable to treatment-related psychological effects and higher pain levels.¹⁶ Pain intensity can also be affected by the type of appliance, with patients with fixed appliances reporting greater pain intensity.¹⁷ Females are more likely to experience pain and should be advised to anticipate it for at least 1 to 3 days following appliance placement and subsequent adjustment visits.¹⁸

Pain management can be categorized into non-pharmacological and pharmacological approaches, such as distraction techniques¹⁹, TENS, low-level laser therapy, mechanical vibratory stimulation, and chewing on plastic or bite wafers.²⁰

Control of post-operative pain can involve numerous techniques & pharmacologic agents including antibiotics, which are prescribed too, and various decisions & factors are also taken into account preceding their prescription.²¹⁻²³ Non-pharmacological interventions are also used. Good orthodontist-patient communication, text messages, cognitive behavioral therapy, and brainwave music can help prevent pain in orthodontic patients.²⁴ The effectiveness of non-steroidal anti-inflammatory drugs for pain relief has been validated, but its effects on tooth movement and potential side effects are considered controversial.²⁵ The side effects of NSAIDs such as thrombocytopenia, skin rashes, headaches, and so on, have been considered issues of concern, particularly in young orthodontic patients. It is also suggested that repetitive chewing on plastic or bite wafers after the appliance is activated reduces the amount of pain. The temporary displacement of the teeth accelerates blood flow into and around the compressed periodontal membrane, alleviating symptoms of pain.²⁶

In orthodontic pain management both non-pharmacological and pharmacological methods are introduced. Nevertheless, orthodontists have to apply their best professional judgment to judge each individual case and choose a decent treatment modality in accordance with level of pain threshold of a person.²⁷ Orthodontists usually underestimated the degree to which orthodontic treatment can cause pain for their patients and their patients' use of

pain medication. Non-pharmacological interventions like chewing gum have reported more pain relief than ibuprofen ($p = 0.04$) in previously reported studies.²⁸

Such a study in Pakistan is necessary because there are not many evidence based studies exploring the effectiveness of bite wafers and ibuprofen in pain management, so the rationale of this study is to compare the effectiveness of ibuprofen and bite wafer use on pain reduction after initial arch-wire placement.

Methodology

This comparative study of 6 months' duration was conducted at the Department of Orthodontics, School of Dentistry, SZABMU, Islamabad from October 2024 to March 2025 after obtaining permission from the Ethical Review Board and consent from the patients. A total of 80 patients made up the sample (40 in each group), which was calculated using the parameters of Murdock et al.'s²⁹ with Population standard deviation = 2.35, Power of test = 80%, Level of significance = 0.05. Sampling technique used in this study was non-probability consecutive. The data was collected from Patients of both gender aged 14-25 years in need of traditional fixed appliance therapy, having Class I malocclusion, good periodontal health, with complete band and bond in one or more arches and were given specific pain management instructions. While patient using painkillers for persistent discomfort, diseases that prohibit the use of ibuprofen, ibuprofen allergies, present-day or prior gastric bleeding, or peptic ulceration, patients with syndromes, and patients with poor periodontal health were excluded from the study.

Stainless Steel brackets (0.022-inch slot, MBT prescription) were attached on the long axis of the teeth utilizing a bracket positioning gauge in accordance with the standard MBT chart. The flash at the margins of the brackets was removed. Once final bracket positioning had been achieved, the composite adhesive was polymerized with an LED curing unit and an initial 0.012 NiTi archwire was placed and secured in place using elastomeric ligatures. To establish uniformity, the entire procedure was carried out by a single operator.

Patients were divided into two groups: Ibuprofen Group (IBG) and Bite Wafer Group (BWG). IBG patients were instructed to take 400 mg of ibuprofen tablet immediately after archwire placement and at 8-hour intervals for a week if pain persisted. BWG patients were instructed to bite or chew on a wafer for 10 to 12 minutes and repeat the procedure at 8-hour intervals for 1 week if pain persisted. The patients completed a Visual Analogue

Scale (VAS) questionnaire to rate their pain intensity during chewing on food items. Assessments were conducted at the following time points after archwire placement: 2 hours, 24 hours, and 7 days. Frequency of pain was evaluated as: "Yes (VAS ranging from 1 to 10) and No (VAS=0), and the intensity of pain considered was the highest score recorded (1-3=mild, 4-6=moderate, 7-10=severe).¹¹ Patients who reported no pain (VAS = 0) at all follow-up intervals were included in the analysis under the "no pain" category and were not excluded.

Data was analyzed using SPSS Version 21.0. Descriptive statistics were used to summarize demographic variables (e.g., age) and pain responses at different time intervals. For quantitative variables such as age and VAS pain scores, mean and standard deviation (SD) were calculated. Frequencies and percentages were reported for categorical variables such as pain intensity levels (mild, moderate, severe) and presence or absence of pain (Yes/No).

For inferential analysis, to compare pain intensity between the IBG and BWG groups at each time point, independent samples t-tests were used. P value of <0.05 was considered significant.

Results

The study included a total of 80 patients, aged between 14 and 25 years, who were randomly assigned into two equal groups: The Ibuprofen Group (IBG) and the Bite Wafer Group (BWG), with 40 patients in each. Each group comprised an equal number of male and female participants (20 males and 20 females).

The mean age in the IBG was 20.0 ± 3.56 years, while the BWG had a mean age of 19.45 ± 3.18 years. The average number of ibuprofen tablets consumed by patients in the IBG was 2.93 ± 0.89 , compared to 9.68 ± 2.86 instances of bite wafer use in the BWG. Pain intensity during chewing was assessed using the Visual Analogue Scale

(VAS). The overall mean pain score following initial archwire placement was 5.8 ± 1.70 for males and 6.80 ± 1.47 for females. On the first day, the mean pain score was 5.40 ± 1.47 for males and 5.15 ± 1.27 for females. By the seventh day, the mean pain scores decreased to 1.20 ± 0.89 for males and 1.95 ± 1.23 for females.

An independent samples t-test showed a statistically significant difference in pain scores between the two groups at 2 hours and 24 hours post-archwire placement ($P = 0.01$). However, by the seventh day, the difference in pain scores was not statistically significant ($P = 0.477$).

Stratification by gender revealed that females reported higher mean pain scores than males at almost all time points, though the differences were not statistically significant except during the early phases (2 and 24 hours). This suggests a potential gender-based variation in pain perception, but not a strong confounding effect on treatment outcomes.

Both groups expressed satisfaction with the respective pain relief methods provided (Table I)

Discussion

Pain is a common experience in orthodontic patients and can be the highest reason for treatment disturbance or early termination of treatment²⁴. In clinical settings including dentistry, fear of cross infection is always there as well.³⁰⁻³³

It is a highly subjective response, dependent on factors such as age, gender, pain threshold, force applied, emotional state, stress, cultural differences, and previous pain experiences.³⁴ Patients most often complain of the discomfort related to the first placement of the archwire which peaks approximately four hours after it is placed and then decreases, though not disappearing completely, reaching twenty-four hours.³⁵

Table I: Comparison of mean pain score among both genders using ibuprofen and bite wafer after initial arch wire placement.

TIME	Gender	IBUPROFEN	BITE WAFER	Independent Sample T Test
		MEAN \pm SD	MEAN \pm SD	P- VALUE
2 HOURS	Males	5.8 ± 1.70	4.30 ± 1.22	0.001
	Females	6.8 ± 1.47	3.80 ± 1.47	0.001
	Male Vs Female	5.90 ± 1.72	4.05 ± 1.36	0.001
1ST DAY	Males	5.40 ± 1.47	3.0 ± 1.12	0.001
	Females	5.15 ± 1.27	2.90 ± 0.85	0.001
	Male Vs Female	5.28 ± 1.36	2.95 ± 0.99	0.001
7 TH DAY	Males	1.20 ± 0.89	1.45 ± 1.05	0.423
	Females	1.95 ± 1.23	1.35 ± 1.06	0.111
	Males	1.58 ± 1.13	1.40 ± 1.06	0.477
	Females			

Various treatment strategies have been proposed for pain management, including pharmacological and non-pharmacological interventions. Bite wafers have been reported as equally effective for initial pain control in orthodontic patients, and non-pharmacological methods like wafers can avoid systemic and local adverse effects associated with NSAIDs.³⁶ In this study, all subjects were in age bracket of 14 and 25 years. Another study demonstrated that age have a significant effect on orthodontic pain during adolescence.³⁷

Another study revealed that ibuprofen was found to be more effective than bite wafers on comparing the mean pain score on chewing after 2 hours of initial archwire placement.³⁸ However, the use of bite wafers is not considered inferior to over-the-counter analgesics in pain measurement and effectiveness.³⁹

In this study, there was a statistical significant difference between both the groups after 2 hours & 24 hours, where p-value was (P=0.01). This is contrary to the findings of another research where there was not a statistical significant difference.⁴⁰ The difference in results may be due to improper use or using bite wafers for a few minutes than the recommended time i.e.10-12 minutes.⁴¹ Another study showed that there was a statistical difference between the groups after 24 hours, where p-value was (P=0.001).⁴² This is comparable to another research which showed significant between-group differences in pain while chewing, biting, at all-time points (p<0.001) and VAS scores in ibuprofen and bite-wafer groups were close to each other. The results showed that ibuprofen was more effective on the first day and after the first day, but on the seventh day, both groups showed almost similar results, with ibuprofen being slightly more effective than bite wafer. The results were insignificant, meaning both treatment regimens were equally effective at the end of the week. The results varied at 2 hours and on the first day, with ibuprofen being more effective than bite wafers. However, on the seventh day, both ibuprofen and bite wafers showed almost similar results, indicating they were equally effective in reducing pain.⁴³ It is believed that any factor that can temporarily displace the teeth under orthodontic force can resolve the pressure and prevent the formation of ischemic areas, thus relieving pain.²⁶

The study suggests that bite wafers can be a suitable alternative to analgesics in reducing orthodontic pain, and they prevent side effects as well.⁴¹ Bite wafers can be used as many times as the patient wants, unlike analgesics which have dose restrictions.⁴⁴ Pain after fixed

orthodontic therapy is a common complaint, but it must be managed through appropriate interventions.²⁴ Orthodontists should use their professional judgment to assess each patient's pain threshold and consider the pharmacological action when prescribing analgesics.³⁴

Limitations: Small sample size & short duration were the limitations of this study.

Future implications: Non-analgesic pain management approaches such as chewing gum or chewing on a plastic wafer are recommended for future. Further studies with larger sample size are recommended.

Conclusion

Bite-wafers showed similar reduction in pain score after initial arch-wire placement as compared to ibuprofen over the 7 days period. Thus, offering bite wafers as an alternative to analgesics may be a reasonable solution for patients experiencing pain during orthodontic treatment, eliminating the possibility of systemic side effects from ibuprofen.

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