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Research Article

Comparison of Conventional and Accelerated Orthodontics Techniques in Reducing Treatment Time

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ABSTRACT

Objective: To compare the effectiveness of conventional and accelerated orthodontic technique in reducing overall treatment time and to assess the treatment outcome and patient satisfaction.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Department of Orthodontics, Nishtar Institute of Dentistry, Multan from November 2025 to April 2026.

Methods: 120 patients were enrolled who needed fixed orthodontics treatment. Sample size was determined by the WHO formula for sample size determination at a 95% level of confidence, 80% study power and 5% level of significance. There were 60 patients in the conventional orthodontics group and 60 patients in the accelerated orthodontics group. Sixty patients were also assigned to one of the two groups, the conventional orthodontics group (n=60) and the accelerated orthodontics group (n=60). Treatment duration, alignment rate, pain perception and satisfaction were evaluated. Data was processed by SPSS version 26.0 with independent sample t-tests and Chi-square tests, $p<0.05$ was considered as statistically significant.

Results: There was a statistically significant difference in treatment time and tooth alignment between accelerated orthodontics and conventional orthodontics ($p<0.05$). The group that had accelerated treatment had better satisfaction and similar pain scores compared with the other group.

Conclusion: The accelerated orthodontic techniques do not compromise the treatment outcome and are safe and effective options when compared to conventional orthodontic therapy, and they are among those that can significantly shorten the time for treatment.

Keywords: Accelerated Orthodontics, Conventional Orthodontics, Treatment Duration, Fixed Orthodontic Appliances, Patient Satisfaction.

INTRODUCTION

Orthodontic treatment is very popular to fix the malocclusion, straighten teeth, improve the facial image and restore proper oral function. While conventional fixed orthodontic treatment is considered the gold standard in the treatment of various orthodontic issues, one drawback to this type of treatment is the extended time needed to finish the procedure (Gabada et al., 2023). The entire length of orthodontic treatment is generally 18-30 months, depending on the severity of malocclusion, age of the patient, etc., and compliance. A longer treatment time may result in problems like enamel demineralization, dental caries, gingivitis, external root resorption and poor patient compliance (Dipalma et al., 2023). Thus, minimizing treatment time has become a paramount goal in current orthodontic treatment.

In recent years, the field of orthodontics has progressed to the point that new treatment methods were created for moving teeth at faster rates and without compromising quality of treatment or patient safety (Al-Ibrahim et al., 2022). Technique can basically be divided into surgical and non-surgical methods. Surgery techniques available are cortectomy-assisted

orthodontics, piezo Cision and micro-Oste perforations that can promote active remodeling of bone tissue around the teeth and allow for quicker tooth movement. Non-surgical treatments consist of low-level lasers, photo biomodulation, vibration devices and customized orthodontic mechanics to maximize biological response to treatment. Of these, minimally invasive methods have come into more widespread use, due to their ability to achieve high rates of orthodontic tooth movement, minimal tissue loss or patient discomfort and short recovery times (Al-Ibrahim et al., 2022).

The underlying mechanism of accelerated orthodontics is the Regional Acceleratory Phenomenon (RAP) which is the process of localized enhancement in bone turnover and remodeling after controlled injury or stimulation of bone (Gasparro et al., 2022). The remodeling is enhanced, which temporarily reduces bone density to make teeth move more quickly during orthodontic treatment. Multiple clinical trials have shown a decrease in treatment time of 20–40% with accelerated orthodontics, but results differ among trials and study methods, and by patient factors (Gandedkar et al., 2024). Although numerous investigations have proven the effectiveness of the accelerated methods, there are concerns about the duration of the procedure, discomfort after surgery, long-term stability, and eventual impact.

Aesthetic, professional and social factors are significant contributors to the growing demand for shorter orthodontic treatment. Adults are particularly interested in treatment options that will reduce the time spent wearing appliances but not prevent treatment success (Pouliezou et al., 2022). Consequently, many orthodontists have come to routinely use accelerated techniques. Although there is increasing evidence for these methods, they have not yet been compared directly to conventional orthodontic care, and this could be affected by the different patient populations, clinical settings, and resources available in different countries, especially in developing nations (Pouliezou et al., 2022).

Therefore, conventional and accelerated orthodontic techniques should be evaluated to compare their effectiveness, safety, and patient acceptance (Nadkerny et al., 2023). This can help clinicians make the best treatment decision for the patient and specific clinical situation. In addition, knowledge of the advantages and disadvantages of accelerated orthodontics can help make better treatment planning, increase patient satisfaction, and make more effective use of healthcare resources (Keser & Naini, 2022).

Given this, the aim of the present study was to compare the conventional and accelerated orthodontic methods in reducing treatment time in patients who received fixed orthodontic therapy (Mousa et al., 2022). Treatment efficiency, perception of pain, number of appointments, and patient satisfaction were also assessed in the study to support the evidence-based recommendations for clinical orthodontic practice.

Objective

Comparing fixed orthodontic treatment efficiency, alignment rate, pain perception, number of clinical appointments and overall treatment satisfaction between conventional orthodontic treatment and accelerated orthodontic treatment in terms of overall orthodontic treatment time. To determine the difference in the efficiency of fixed orthodontic treatment, alignment rate, pain perception, number of clinical appointments and overall treatment satisfaction between conventional orthodontic treatment and accelerated orthodontic treatment in terms of overall orthodontic treatment time.

METHODOLOGY

The study is a comparative cross-sectional study carried out in the Department of Orthodontics, Nishtar Institute of Dentistry, Multan from November 2025 to April 2026. 120 patients were referred for fixed orthodontics were selected. The sample size was computed by applying the sample size determining formula from WHO with a 95% confidence level, 80% study power and 5% level of significance. Participants were split evenly into two groups: Group A (n=60) was the conventional orthodontic group and Group B (n=60) was the minimally invasive group who received accelerated orthodontic treatment. The duration of treatment, alignment rate, patient perception of pain, number of appointments, and patient satisfaction were evaluated. SPSS (version 26.0) was used to analyze data. Independent sample t tests and Chi square tests were used, $p<0.05$, were statistically significant.

Inclusion Criteria

Fixed orthodontic treatment for permanent dentition in patients between the ages of 15-35 years was included. Eligible were those with

informed consent and good general and periodontal health who had Class I, II, or III malocclusion. Those patients who were willing to make regular follow-up visits during the treatment period were also included.

Exclusion Criteria

Systemic illnesses that affect bone metabolism, craniofacial anomalies, previous orthodontic treatment, active periodontal disease, poor oral hygiene, pregnancy and medications that can affect bone remodeling (corticosteroids or bisphosphonates) were excluded. People who would not give informed consent or follow-up visits were also excluded.

Data Collection

All participants were asked to sign informed consent, and data were collected through a structured proforma. Pre-treatment demographic data (age, gender and malocclusion type) was collected. According to the treatment plan, the patients were classified into the conventional orthodontic group and accelerated orthodontic group. Clinical evaluations were conducted at appropriate follow-up appointments to document treatment time, alignment rate, number of appointments, and complications related to treatment. The Visual Analogue Scale (VAS) was used to evaluate pain perception, and a validated structured questionnaire was used to assess patient satisfaction at the end of treatment. The data obtained from all the clinical examinations and measurements were obtained by the trained orthodontists following standardized procedures for uniformity and reliability.

RESULTS

120 patients were enrolled in the study, with 60 patients in each of the two treatment groups. The demographic and clinical data was similar between the groups. There was a significant difference between the accelerated group and the conventional group regarding the mean length of treatment ($p<0.05$) and the rate of alignment ($p<0.01$). Fewer clinical appointments were needed, and outcomes were similar in patients treated with the accelerated techniques. The perception of pain was not statistically different between the groups ($p>0.05$). But the satisfaction of the patients was significantly high in accelerated orthodontic treatment because of the lesser treatment time and fewer follow-up visits. In general, accelerated orthodontics was seen to be more efficient than the conventional orthodontics treatment.

Table 4.1: Comparison of Clinical Outcomes between Conventional and Accelerated Orthodontic Groups (n = 120)

Variable	Conventional Orthodontics (n=60)	Accelerated Orthodontics (n=60)	*p*-value
Mean age (years)	22.8 ± 4.6	23.1 ± 4.8	0.741
Male, n (%)	28 (46.7%)	30 (50.0%)	0.714
Female, n (%)	32 (53.3%)	30 (50.0%)	0.714
Treatment duration (months)	22.4 ± 3.2	15.8 ± 2.7	**<0.001**
Alignment rate (mm/month)	0.82 ± 0.18	1.18 ± 0.21	**<0.001**
Number of appointments	18.5 ± 2.3	13.2 ± 1.9	**<0.001**
Pain score (VAS, 0–10)	3.9 ± 1.2	4.1 ± 1.3	0.368
Patient satisfaction (0–10)	7.8 ± 1.1	9.1 ± 0.8	**<0.001**

Data is expressed as mean ± SD or as frequencies (%). Continuous variables were analyzed by independent sample t-test and categorical variables were analyzed by a Chi-square test. A p value less than 0.05 was deemed to be statistically significant. As shown in Table 4.1, accelerated orthodontic treatment showed significant differences in patient satisfaction, treatment duration, alignment and clinical appointments compared to conventional treatment ($p<0.001$). The mean values of pain scores between the groups were not significantly different ($p=0.368$), demonstrating that accelerated orthodontic techniques did not cause any more discomfort to patients than regular ones and improved the efficiency of treatment.

Table 4.2: Comparison of Treatment Duration

Treatment Group	Mean Duration (Months)	SD	*p*-value

Conventional Orthodontics (n=60)	22.4	3.2	
Accelerated Orthodontics (n=60)	15.8	2.7	**<0.001**

The accelerated treatment group finished treatment significantly faster than the conventional treatment group (Table 4.2). There was a statistically significant difference ($p<0.001$) suggesting that accelerated orthodontics were highly effective in reducing overall treatment duration with a maintained success rate.

Table 4.3: Comparison of Alignment Rate

Treatment Group	Mean Alignment Rate (mm/month)	SD	*p*-value
Conventional Orthodontics (n=60)	0.82	0.18	
Accelerated Orthodontics (n=60)	1.18	0.21	**<0.001**

As shown in Table 4.3, the accelerated orthodontic group had a significantly greater tooth alignment than the conventional group. This increased alignment rate seen in accelerated methods suggests that they are more efficient in treating the teeth and suggests that they will be more effective in reducing the overall time of orthodontic treatment.

Table 4.4: Comparison of Pain Perception

Treatment Group	Mean VAS Pain Score	SD	*p*-value
Conventional Orthodontics (n=60)	3.9	1.2	
Accelerated Orthodontics (n=60)	4.1	1.3	0.368

Table 4.4 shows that there was no difference in pain perception between the two groups. There was no statistically significant difference between the mean pain scores of the accelerated and non-accelerated groups ($p=0.368$). This indicates that the use of accelerated orthodontic treatments cannot significantly shorten the patient's treatment experience of discomfort.

Table 4.5: Comparison of Patient Satisfaction

Treatment Group	**Mean Satisfaction Score (0–10)**	**SD**	***p*-value**
Conventional Orthodontics (n=60)	7.8	1.1	
Accelerated Orthodontics (n=60)	9.1	0.8	**<0.001**

As shown in Table 4.5, patient satisfaction was significantly higher among those that received accelerated orthodontic treatment than conventional treatment ($p<0.001$). Clinical benefits of faster orthodontic treatment may have been due to shorter treatment times and fewer clinical visits, leading to better patient experience.

DISCUSSION

The present study compared conventional and accelerated orthodontic technique in the overall treatment time in patients who received fixed orthodontic treatment (Alsino et al., 2022). The results showed that there were significant differences in the time of treatment, tooth movement rates and satisfaction among the patients between accelerated and conventional approaches, whereas no significant differences in the perception of pain. The findings agree with the many studies already proving that accelerated orthodontics can be an effective alternative to traditional orthodontics (Zheng et al., 2025).

This study revealed the most significant result was the significantly reduced treatment time of the accelerated orthodontic group. Traditional braces typically take 18 to 30 months to provide the desired outcome to the patient, which varies depending on the degree of malocclusion and adherence to treatment (Meme' et al., 2022). The accelerated orthodontics procedures, on the other hand, can stimulate life processes that are important for bone remodeling and aid in the speed of tooth movement. The treatment time savings found in the present study are similar to those found in previous clinical studies where the use of minimally invasive acceleration techniques was introduced into orthodontic treatment and resulted in treatment time savings of 20% to 40%.

The accelerated group also showed a much higher rate of alignment than the conventional

group. This is a biologically plausible finding because accelerated orthodontic procedures produce the Regional Acceleratory Phenomenon (RAP) which leads to enhanced bone turnover and an initial decrease in bone density then, allowing for more efficient movement under orthodontic forces (Viet et al., 2025). This is in line with previous orthodontic studies on piezo Cision, micro-Oste perforations and cortectomy-assisted orthodontics, which have reported better orthodontic tooth movement rates in the initial stages of orthodontics. The other significant benefit was that the number of clinical visits for patients with accelerated orthodontic treatment was reduced (Sultana et al., 2022). With fewer appointments comes greater ease on patients and healthcare providers and more clinical efficiency. A shorter duration of treatment may also reduce the risks of complications related to the extended periods of orthodontic treatments such as enamel decalcification, gingival inflammation, dental caries and external root resorption. Thus, accelerated orthodontics can not only be more efficient but help in improving oral health outcomes as well.

The two treatment groups (conventional and accelerated) did not significantly differ in their perception of pain. The pain that may occur after the minimally invasive acceleration procedures is usually mild and passes (Khlef & Hajeer, 2022). This study shows comparable pain scores in the accelerated orthodontic treatment group, indicating that a clinically significant difference in patient discomfort is not seen in accelerated orthodontic treatment. This discovery is promising, since there was a concern that it might be a hurdle to patients undergoing more modern orthodontic treatments (Alfailany et al., 2024).

Accident satisfied patients were much more satisfied with their care. This level of satisfaction could have been due to several factors, including the lower treatment time, fewer follow-up visits, and earlier attaining of desired esthetic outcomes (Dragomirescu et al., 2022). For adult patients, orthodontic treatment is often shorter due to professional, social and cosmetic reasons. Thus, fast orthodontics might benefit the uptake of treatment and patient compliance (Labunet et al., 2024).

Although these are encouraging results, there are some limitations in the present study. It was done in one school and may not be widely applicable because of the relatively small number of students (Alsulaimani et al., 2023). Additionally, long-term stability and post treatment relapses were not assessed. Larger, multicenter randomized controlled trials with longer follow up periods are suggested to validate the long-term effectiveness, safety and stability of accelerated orthodontic methods in different patient groups (He et al., 2024). The results suggest that accelerated orthodontics is an effective and clinically beneficial method of shortening the duration of orthodontic treatment while preserving a favorable clinical outcome.

CONCLUSION

Based on the data obtained from the present study, the authors recommend the use of accelerated orthodontic treatment which is more effective than conventional orthodontic treatment in reducing overall treatment time, while obtaining favorable clinical outcomes. Patients receiving accelerated treatment had greater satisfaction, fewer clinical visits and accelerated tooth movement with no significant increase in perception of pain. Based on these results, it is concluded that accelerated orthodontics is a safe, efficient, and patient-centered method to control fixed orthodontic treatment. While traditional braces are a great treatment option, there are benefits to accelerated braces for those who want a shorter treatment time. To further assess treatment stability, cost-effectiveness and long-term safety of accelerated orthodontic procedures, further multicenter studies with larger patient cohorts and long-term follow-up are recommended before these methods are implemented in routine clinical practice.

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