Original Research Article

A Comparative Evaluation of Initial Pain, Discomfort, and Oral Health–Related Quality of Life in Patients Treated with Clear Aligners and Fixed Orthodontic Appliances: A Questionnaire-Based Study

Abstract :

Background:
Pain and discomfort are common during the initial phase of orthodontic treatment and can affect patient cooperation and satisfaction. Clear aligners are increasingly used as an alternative to fixed appliances, requiring comparison of patient experiences.
Aim:
To compare initial pain, discomfort, and oral health-related quality of life between clear aligner and fixed appliance patients.
Materials and Methods:
A cross-sectional questionnaire study was conducted among 120 adult orthodontic patients treated with clear aligners or fixed appliances. A structured self-administered Google Forms questionnaire assessed pain intensity, duration, functional limitations, psychosocial impact, pain management, and treatment preference during the first week. Descriptive statistics and Chi-square test were used, with $p < 0.05$ considered significant.
Results:
More than half of the participants experienced pain within 24 hours, mostly moderate in intensity. Pain was commonly worse at night and lasted one to five days. Eating difficulty, tooth soreness, and soft tissue irritation were frequently reported. Most patients did not use medication, and ice packs were commonly used. Clear aligner patients reported significantly higher satisfaction and preference.
Conclusion:
Pain and discomfort are common initially. However, clear aligners provide greater comfort, satisfaction, and better oral health-related quality of life compared to fixed orthodontic appliances.

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INTRODUCTION:

Pain and discomfort are the most common adverse experiences in the initial period of orthodontic treatment and may affect patient cooperation, satisfaction, and acceptance of therapy.[1] The biological mechanisms for orthodontic pain could be explained by the inflammatory response within the periodontal ligament due to mechanical loading, which induces tissue ischemia, prostaglandin release, and subsequent nociceptor activation.[2] These symptoms usually reach a peak in the first 24–48 hours after appliance placement and diminish in the days that follow.[3] Although transient, early pain has been found to impact daily activities such as eating, speaking, and sleeping.

Fixed orthodontic appliances, traditionally utilized to correct malocclusion, have been widely related to soft-tissue irritation, friction between brackets and arch wires, and masticatory discomfort during the early adjustment period.[4] Clear aligner therapy offers an esthetics

alternative approach that is removable and produces controlled tooth movement through the use of sequential thermoplastic trays. Clinical investigations up to now would suggest that clear aligners may lead to less initial pain and fewer functional limitations when compared with fixed appliances, largely due to the smooth surfaces, absence of brackets, and the application of lower-magnitude intermittent forces.[5,6] However, some studies report similar pain levels for both systems, which suggests that differences might be associated with individual sensitivity, treatment design, or different aligner protocols.[7]

In addition to the physical symptoms, there is a growing acknowledgment that the impact of orthodontic treatment on oral health-related quality of life (OHRQoL) is an essential outcome of the treatment. OHRQoL reflects the psychosocial and functional dimensions of oral health and comprises aspects related to self-confidence, social interaction, and performance of daily activities.[8] Understanding how different appliance systems influence pain, discomfort, and OHRQoL could serve to instruct treatment planning, aid in patient counselling, and improve the total treatment experience of patients.

In the light of conflicting evidence and increasing popularity of clear aligner therapy, further comparative evaluation is required to detail differences in early patient experiences. This research will examine the initial pain, discomfort, and oral health-related quality of life (OHRQoL) in patients undergoing treatment with clear aligners and fixed orthodontic appliances by utilizing a structured method involving questionnaires.

MATERIAL AND METHODS:

Study design and setting:

This cross-sectional survey was conducted at the . Prior to the start of data collection, the study protocol was approved by the Institutional Ethics Committee of. All participants provided their informed consent before joining the study.

Study Population and Sample Selection:

The study population comprised adult patients (aged 18 years and above) undergoing active orthodontic treatment at the Department of Orthodontics . Patients were eligible for inclusion if they were in active treatment with either clear aligners or fixed orthodontic appliances, had completed at least the first week of treatment, and were able to comprehend and complete the questionnaire in English or the local language. Exclusion criteria included patients with systemic diseases, cognitive disorders, chronic medical conditions, presence of active dental caries or periodontal disease, patients requiring orthodontic-surgical treatment, and those unwilling to participate in the study.

A total of 120 patients who met the inclusion criteria were invited to take part in the study.. All eligible patients were contacted and invited to complete an online questionnaire distributed via WhatsApp using Google Forms platform.

Data collection instrument:

Data were gathered using a self-administered structured questionnaire that was electronically distributed via WhatsApp as a Google Forms survey. The questionnaire was created following a thorough literature review and included several sections aimed at evaluating different facets of the patient experience during orthodontic treatment.

The questionnaire comprised the following section:

Section 1: Demographic Information - This section gathered basic demographic data including gender and age of the participants.

Section 2: Treatment Characteristics - The section evaluated the kind of orthodontic device in use (clear aligners or fixed braces) as well as the present stage of treatment.

Section 3: Pain Assessment - This section evaluated multiple dimensions of pain experience including: (a) presence of pain during the first 24 hours of treatment; (b) pain intensity during eating; (c) need for pain relief medication; (d) sleep disturbance due to discomfort; (e) effect of pain on ability to speak; (f) soreness in teeth and gums; (g) soft tissue injuries to cheek or lip; (h) pain as a constant distraction during the day. Every item was evaluated using a 5-point Likert scale that spanned from "Strongly Disagree" to "Strongly Agree."

The overall pain intensity during the first week was assessed using a numerical rating scale from 0 (no pain) to 10 (the worst pain imaginable). Further questions explored when the pain was at its peak (morning, afternoon, evening, night, or not at a specific time) and the duration of the highest pain intensity (less than 1 day, 1-2 days, 3-5 days, or more than 5 days).

Section 4: Emergency Visits and Pain Management - This section recorded whether patients required unscheduled appointments due to discomfort and what pain relief methods were employed (ice packs, eating soft foods, warm water rinses, avoiding the affected side, or no additional methods).

Section 5: Functional and Psychosocial Impact - This section assessed the impact of orthodontic appliances on speech, confidence in social settings, comfort while talking or smiling, overall satisfaction with oral health, and ability to manage daily life while wearing the appliance. Each parameter was evaluated using appropriate rating scales.

Section 6: Treatment Preference - Patients were asked to indicate their preference for future orthodontic treatment based on their current comfort experience (removable appliance/clear aligners, fixed braces, or no preference).

Data Collection Procedure:
Eligible patients were contacted via WhatsApp and provided with a link to the Google Forms questionnaire. The initial message included a short overview of the study objectives and guidelines for filling out the questionnaire. Participants were guaranteed that their responses would be kept confidential and anonymous. The questionnaire was intended to take about 10-15

minutes to finish. Participants had a two-week period to complete and submit their answers. Reminder messages were sent to non-respondents after one week to maximize response rate.

Statistical Analysis:
Data obtained from the Google Forms survey were input into a spreadsheet and analyzed using SPSS Statistics software. Descriptive statistics were employed to summarize the information, with quantitative variables reported as mean and standard deviation, while qualitative variables were shown as frequencies and percentages.
The relationships between categorical variables were analyzed using the chi-square test, specifically to examine the connection between the type of orthodontic appliance (clear aligners versus fixed braces) and factors like gender, overall satisfaction with oral health, and pain-related aspects. A p-value of under 0.05 was deemed statistically significant.
Data accuracy and completeness were ensured through mandatory response fields and validation checks in the questionnaire, and all completed forms were reviewed before final analysis.

RESULTS

Demographic, Clinical Characteristics, and Patient-Reported Outcomes

The comprehensive demographic, clinical characteristics, pain experience, and patient-reported outcomes during the first week of orthodontic treatment are presented in [Table 1]. The study included 120 orthodontic patients, with the majority aged between 25-30 years (n=64, 53.3%), followed by the 21-25 age group (n=47, 39.2%). Female participants comprised 64.2% (n=77) of the sample, while males represented 35.8% (n=43). Fixed braces were the predominant treatment modality (n=95, 79.2%), with clear aligners used in 20.8% (n=25) of cases.

Regarding pain experience during the first week, more than half of the participants (54.2%) experienced pain during the first 24 hours, with 44.2% (n=53) agreeing and 10.0% (n=12) strongly agreeing. Pain during eating was reported by 57.5% of patients (50.0% agree, 7.5% strongly agree). Tooth and gum soreness affected 51.6% of participants, while soft tissue injuries to the cheek or lip were experienced by 51.6% of patients. Pain served as a constant distraction during the day for 51.6% of respondents.

The mean pain intensity during the first week showed a distribution favoring moderate levels, with 40.0% (n=48) rating their pain as 5 on a 0-10 scale, and 21.7% (n=26) rating it as 6. The majority of patients (66.7%, n=80) reported that pain was worst at night, followed by evening (14.2%, n=17). The duration of highest pain intensity lasted 3-5 days for 43.3% (n=52) of participants and 1-2 days for 42.5% (n=51).

Regarding pain management, the majority of patients did not require pain relief medication, with 45.0% (n=53) disagreeing and 45.0% (n=55) remaining neutral about needing such medication. Ice packs were the most commonly used pain relief method (75.0%, n=90), followed by eating

soft foods (12.5%, n=15) and warm water rinses (6.7%, n=8). A substantial proportion of patients (92.5%, n=111) required unscheduled appointments due to discomfort.

Sleep disturbance was minimal, with 47.5% (n=57) strongly disagreeing that their sleep was affected. However, the appliances had a notable impact on speech during the first week, with 67.5% (n=81) reporting moderate effects and 27.5% (n=33) reporting mild effects. Pain affected the ability to speak for 49.2% of cases (44.2% agree, 5.0% strongly agree) [figure-1]

Most patients (80.8%, n=97) rated their ability to manage daily life while wearing the appliance as neutral, while 11.7% (n=14) rated it as good. Psychosocial measures remained predominantly neutral, with 81.7% (n=98) reporting neutral confidence in social settings and 84.2% (n=101) neutral comfort while talking or smiling. Overall satisfaction with oral health was neutral for 79.2% (n=95) of participants, with 10.8% (n=13) satisfied and 10.0% dissatisfied or very dissatisfied combined [table-2]

Based on their comfort experience during the first week, the majority of patients (86.7%, n=104) expressed a preference for removable appliances (clear aligners) in future treatment, compared to only 8.3% (n=10) preferring fixed braces [table 2]

DISCUSSION:

The current study aimed to assess pain levels, discomfort, and oral health-related quality of life (OHRQoL) in patients undergoing treatment with clear aligners and fixed orthodontic appliances during the early stages of orthodontic therapy. The results of this study showed that pain and discomfort are common during the first week after starting orthodontic treatment.

In this study, more than half of the patients experienced pain within the first 24 hours after appliance placement. Most patients reported moderate pain, which was commonly rated between 5 and 6 on the pain scale. Pain was most severe during night-time and usually lasted between one and five days. Similar findings have been reported in earlier studies, which showed that orthodontic pain usually increases during the first few days due to inflammation in the tissues around the teeth and then gradually decreases.[1–3] Krishnan and Davidovitch explained that this pain is caused by the release of inflammatory substances when orthodontic force is applied to teeth.[1]

Pain during eating, soreness of teeth and gums, and irritation of the cheeks and lips were commonly reported in the present study. These findings are in agreement with previous studies which reported that orthodontic appliances, especially fixed braces, can cause discomfort during chewing and irritation to the oral soft tissues during the initial adjustment period.[4,5]

Although pain and discomfort were common, most patients in this study did not require pain relief medication. This suggests that orthodontic pain is generally tolerable. Similar observations were reported by Miller et al. and Fujiyama et al., who stated that orthodontic pain can usually be managed using simple methods such as eating soft foods, applying ice packs, and avoiding hard foods.[6,7] In the present study, ice packs were the most commonly used method to relieve pain.

A significant discovery of this study was that patients using clear aligners expressed greater overall satisfaction with their oral health than those receiving treatment with fixed appliances. This result is similar to findings from previous studies which reported that clear aligners are associated with less discomfort and better early quality of life when compared to fixed braces.[8–10] The removable nature of aligners and their smooth surface may be the reason for better comfort and satisfaction.

Although most patients reported neutral confidence in social situations and comfort while speaking, the majority of patients preferred clear aligners for future treatment. This finding is supported by previous studies which showed that patients prefer clear aligners due to improved comfort and ease of use.[11]

In conclusion, the findings of the present study suggest that both clear aligners and fixed orthodontic appliances cause initial pain and discomfort. However, clear aligners provide better patient satisfaction and are preferred by most patients during the early stage of orthodontic therapy.

CONCLUSION:

The findings of this study indicate that pain and discomfort are prevalent during the initial week of orthodontic treatment.Most patients experienced moderate pain, especially during the initial days after appliance placement, and the pain usually lasted for a few days. However, the discomfort was temporary and manageable, and most patients did not require pain relief medication.

Patients treated with clear aligners showed better satisfaction with oral health when compared to patients treated with fixed orthodontic appliances. Although both treatment methods affected daily activities to some extent, clear aligners were preferred by most patients because of better comfort.

Overall, the study highlights the importance of patient counselling regarding expected pain during orthodontic treatment and suggests that clear aligners may provide better comfort and patient satisfaction during the early phase of treatment.

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Table 1: Demographic and clinical characteristics, pain experience, and patient-reported outcomes in the first week of orthodontic treatment

	Responses	Number (n)	Percentage (%)
Age (in years)	<20	5.0	4.2
	21-25	47.0	39.2
	25-30	64.0	53.3
	>30	4.0	3.3
Gender	Female	77	64.2
	Male	43	35.8
Type of orthodontic appliance	Clear aligners	25	20.8
	Fixed braces	95	79.2
How would you rate your overall pain in [I experienced pain during the first 24 hours]	Agree	53	44.2
	Disagree	2	1.7
	Neutral	52	43.3
	Strongly agree	12	10.0
	Strongly disagree	1	0.8
How would you rate your overall pain in [The pain increased during eating]	Agree	60	50.0
	Disagree	2	1.7
	Neutral	48	40.0
	Strongly agree	9	7.5
	Strongly disagree	1	0.8
How would you rate your overall pain in [I need pain relief medication]	Agree	2	1.7
	Disagree	53	45.0
	Neutral	55	45.0
	Strongly agree	9	7.5
	Strongly disagree	1	8
How would you rate your overall pain in [My sleep was disturbed by the discomfort]	Agree	1	0.8
	Disagree	3	2.5
	Neutral	52	43.3
	Strongly agree	7	5.8
	Strongly disagree	57	47.5
How would you rate your overall pain in [The pain affected my ability to speak]	Agree	53	44.2
	Disagree	2	1.7
	Neutral	58	48.3
	Strongly agree	6	5.0
	Strongly disagree	1	0.8
How would you rate your overall pain in [I felt soreness in my teeth /gums]	Agree	52	43.3
	Disagree	4	3.3
	Neutral	53	44.2
	Strongly agree	10	8.3
	Strongly disagree	1	0.8
How would you rate your overall pain in [I experienced soft tissue Injuries (cheek/lip)]	Agree	55	45.8
	Disagree	2	1.7
	Neutral	54	45.0
	Strongly agree	7	5.8
	Strongly disagree	2	1.7
	Agree	55	45.8

How would you rate your overall pain in [Pain/discomfort was a constant distraction during the day]	Disagree	3	2.5
	Neutral	54	45.0
	Strongly agree	7	5.8
	Strongly disagree	1	0.8
How would you rate your overall pain intensity during the first week?	0	2	1.7
	1	11	9.2
	2	5	4.2
	3	1	0.8
	4	17	14.2
	5	48	40.0
	6	26	21.7
	7	4	3.3
	8	3	2.5
	9	2	1.7
	10	1	0.8
At what time of the day was the pain / discomfort worst?	Afternoon	6	5.0
	Evening	17	14.2
	Morning	7	5.8
	Night	80	66.7
	No specific time	10	8.3
How long did the highest pain intensity last?	1-2 days	51	42.5
	3-5 days	52	43.3
	Less than 1 day	13	10.8
	More than 5 days	4	3.3
Did you need an unscheduled appointment (emergency visit) because of discomfort?	Yes	111	81.7
	No	9	18.8
How often did you use any pain relief method (other than medication)?	Avoid using affected side	4	3.3
	Eating soft foods	15	12.5
	Ice packs	90	75.0
	No additional methods used	3	2.5
	Warm water rinses	8	6.7
My confidence in social settings	High	6	5.0
	Low	10	8.3
	Neutral	98	81.7
	Very low	6	5.0
My comfort while talking or smiling	Comfortable	6	5.0
	Neutral	101	84.2
	Uncomfortable	7	5.8
	Very comfortable	6	5.0
Overall satisfaction with oral health	Dissatisfied	6	5.0
	Neutral	95	79.2
	Satisfied	13	10.8
	Very dissatisfied	6	5.0
My ability to manage daily life while wearing the appliance	Excellent	1	0.8
	Good	14	11.7
	Neutral	97	80.8
	Poor	2	1.7

	Very poor	6	5.0
Did your appliance (braces or aligners) affect your speech in 1st week	Mildly	33	27.5
	Moderately	81	67.5
	Not at all	4	3.3
	Severely	2	1.7
Would you prefer a removable appliance like aligners or fixed braces in the future based on comfort experience?	Fixed braces	10	8.3
	No preference	6	5.0
	Removable appliance (clear aligners)	104	86.7

Table 2: Chi-Square test Result

		Type of orthodontic appliance		p-value
		Clear aligners	Fixed braces	
Gender	Male	5 (4.2)	38 (31.7)	0.064
	Female	20 (16.7)	57 (47.5)	
Overall satisfaction with oral health	Dissatisfied	5 (4.2)	1 (0.8)	0.000*
	Neutral	14 (11.7)	81 (67.5)	
	Satisfied	5 (4,2)	8 (6.7)	
	Very dissatisfied	1 (0.8)	5 (4.2)	

*Statistically significant at $p<0.05$, Chi-Square test

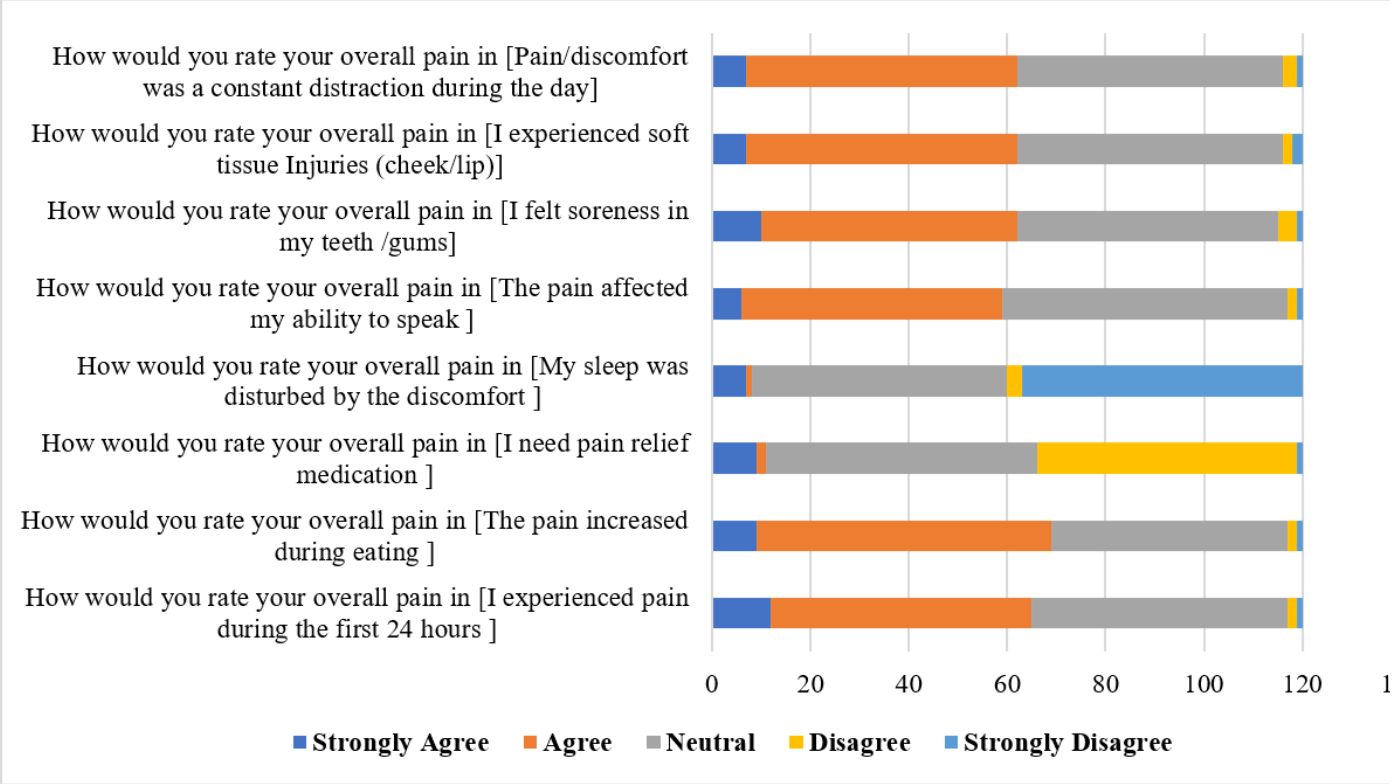

Fig 1 : Participants' response to pain experience