



Patient Perceptions, Preferences and Patient-Reported Outcomes Associated with Accelerated Orthodontic Treatment: A Systematic Review

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ABSTRACT

Background: Accelerated orthodontic procedures have been introduced to reduce orthodontic treatment duration. However, their clinical acceptability also depends on patient perceptions, preferences, discomfort, and willingness to undergo or pay for additional procedures.

Objective: To systematically evaluate patient-reported perceptions, preferences, willingness, pain and discomfort, and related outcomes associated with accelerated orthodontic procedures.

Methods: Patients of any age or gender receiving active orthodontic treatment with fixed labial or lingual appliances were eligible. Non-invasive acceleration procedures, including photobiomodulation, cyclic vibration force appliances, low-intensity laser therapy, and low-intensity light therapy, were considered. Both randomized and non-randomized studies were eligible. PubMed, Scopus, Google Scholar, and Web of Science were selected as information sources. Risk of bias was assessed using the Newcastle–Ottawa Scale for non-randomized studies and RoB 2 for randomized controlled trials.

Eleven studies were included in the qualitative synthesis. The included evidence comprised cross-sectional surveys, prospective and retrospective studies, and randomized controlled trials. Study populations included orthodontic patients, adults, adolescents, parents, and orthodontists. The studies evaluated perceptions and willingness toward accelerated orthodontic treatment as well as patient-reported symptoms associated with specific acceleration procedures.

Conclusion: Patient-reported outcomes are important when evaluating accelerated orthodontic procedures. The available evidence is heterogeneous and has methodological limitations. Standardized patient-reported outcome measures and well-designed clinical studies are needed.

Keywords: accelerated orthodontics; patient-reported outcomes; patient preference; willingness to pay; pain; discomfort; orthodontic treatment.

INTRODUCTION

Orthodontic treatment with fixed appliances generally requires a prolonged period of active treatment, and treatment duration is an important consideration for both patients and clinicians. A systematic review and

meta-analysis reported that comprehensive fixed-appliance treatment commonly requires a substantial treatment period, highlighting treatment duration as a relevant consideration in orthodontic care.¹

The need to shorten treatment duration has led to increasing interest in accelerated orthodontic treatment. Several approaches have been investigated to increase the rate of orthodontic tooth movement, including non-surgical adjunctive procedures such as photobiomodulation, low-intensity laser or light therapy, vibration-based interventions, and electrical stimulation. However, the evidence for non-surgical acceleration remains heterogeneous, with considerable variation in interventions, protocols, and clinical outcomes.²

Although accelerated orthodontic treatment is commonly evaluated using clinical outcomes such as tooth-movement rate or treatment duration, these measures do not fully reflect the patient's experience. Additional procedures may involve discomfort, inconvenience, repeated applications, or increased financial expenditure. Therefore, patient-centered outcomes such as treatment preference, willingness to undergo or pay for accelerated treatment, pain, discomfort, functional impairment, and quality of life are important when evaluating the acceptability of these interventions.

Patient-based studies have demonstrated variability in attitudes toward accelerated orthodontic procedures and willingness to accept additional procedures or costs. Patients may also differ in their preferences for specific acceleration approaches, with the perceived benefit of shorter treatment duration being weighed against treatment burden, discomfort, and financial considerations.³⁻⁵

Despite growing interest in accelerated orthodontics, evidence regarding patient perceptions, preferences, willingness, pain, discomfort, and other patient-reported outcomes remains heterogeneous. Therefore, this systematic review was undertaken to evaluate patient-reported perceptions and outcomes associated with accelerated orthodontic treatment, with particular emphasis on willingness, treatment preference, pain and discomfort, functional impairment, and willingness to pay.

MATERIALS AND METHODS

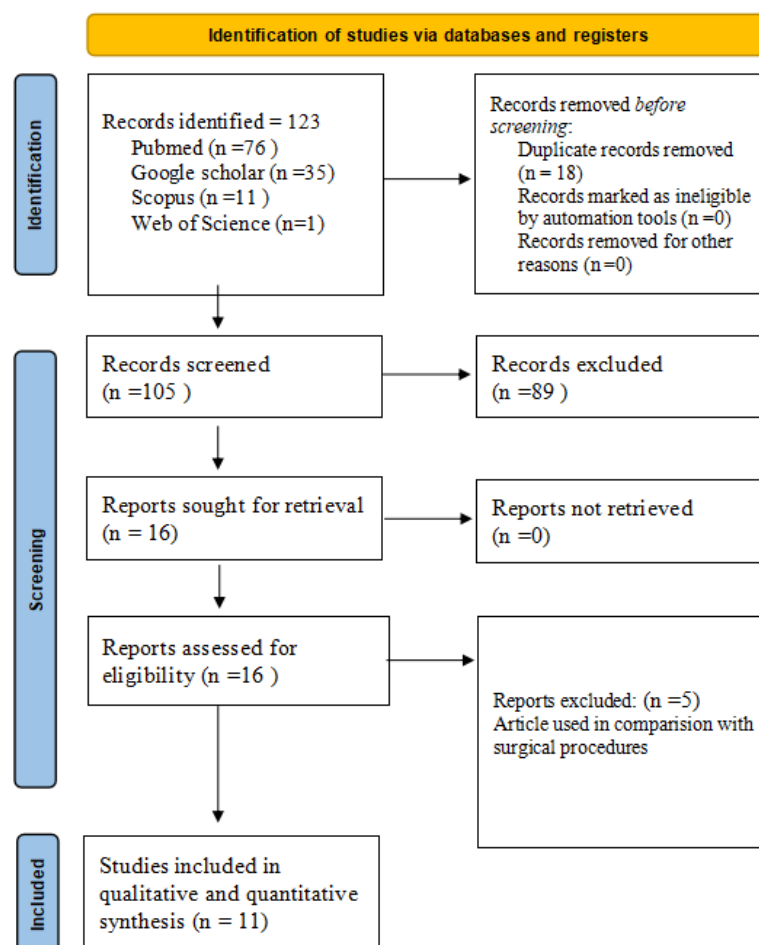


Figure 1. PRISMA flow diagram

This systematic review was conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement(Figure-1).⁶

Eligibility criteria

Table:1 Eligibility Criteria

Domain	Inclusion Criteria	Exclusion Criteria
Population	Patients of any age or gender receiving active orthodontic treatment using fixed labial/lingual appliances.	Patients presenting with craniofacial anomalies, patients undergoing orthognathic surgical procedures
Intervention / Exposure	Non invasive accelerated orthodontics procedures like photobiomodulation , cyclic vibration force appliance , Low intensity laser therapy and low intensity light therapy	Any other invasive accelerated orthodontic procedures
Comparator / Control	Comparison between different modalities of different procedures in accelerated orthodontics	No comparator group reported
Outcome	Willingness, Pain ,and discomfort, that measured by the visual analog scale, numerical rating scale, or Likert scale. Complications and quality of life, that assisted in any certified way which can be self-administered, and are self-reported (Open-ended questionnaires and/or standardized questionnaires that measure the quality of life)	
Study Design	Both randomized and non randomized study type will be included.	Case reports, case series, expert opinions, Reviews, editorials, letters to the editor; Conference abstracts or studies without full-text availability were excluded

Patients of any age or gender undergoing active orthodontic treatment with fixed labial or lingual appliances were eligible. Non-invasive acceleration modalities, including photobiomodulation, cyclic vibration, low-intensity laser therapy, and low-intensity light therapy, were included. Invasive procedures and studies without a required comparator were excluded. Outcomes included willingness, pain and discomfort, complications, and quality of life assessed using validated or self-reported measures. Both randomized and non-randomized studies were eligible. Case reports, case series, expert opinions, reviews, editorials, letters, conference abstracts, and studies without full-text availability were excluded. (Table 1)

Information sources and search strategy

Table 2: Search strategy

DATABASE	SEARCH STRATEGY USED	NO
PubMed Advanced	(((((patient perception) AND (ACCELERATED ORTHODONTICS))) AND (NON INVASIVE)))	76
SCOPUS	PATIENT PERCEPTION AND ACCELERATED ORTHODONTICS AND NON INVASIVE OR MINIMALLY INVASIVE	11
Google scholar	PATIENT PERCEPTION TOWARDS NON INVASIVE OR MINIMALLY INVASIVE ACCELERATED ORTHODONTIC TREATMENT	39
Web of science	PATIENT PERCEPTION (All Fields) and ACCELERATED ORTHODONTICS (All Fields) and NON INVASIVE (All Fields)	1

A comprehensive electronic search was conducted in PubMed, Scopus, Google Scholar, and Web of Science to identify studies addressing patient perceptions, preferences, willingness, pain, discomfort, and other patient-

reported outcomes related to accelerated orthodontic treatment. The search strategy combined relevant keywords and controlled vocabulary relating to accelerated orthodontic tooth movement and patient-centered outcomes (Table 2).

Study selection and data extraction

Table 3. Characteristic table

S n o	Study	Design	Setting	No. of patie nts (M/F)	Age in years (SD)	Interve ntions	Treat ment time	Evalu ation	Outco mes
1.	Flavio Uribe AJODO 2013	Retrospective study	School of Dental Medicine ,University of connecticut , Farmington	Overall 1-665 Adults -50 Adolescents -200 Parents-200	Adult-18years and older Adolescent(13-17years of age)	Group I – Patients treated with intraoral vibrating device Group II- Intraoral injectable drugs		Questionnaire	Willingness , Payment ,Preference
2.	Linjaw i al 2020 Journal of health care	Cross sectional survey	University of health sciences	Total of 200 participants	Participants of age 18 to 45 years	Group I – customized wires Group II – medication	Ranges from 0 to 28 months	Questionnaire	Willingness , Payment ,Preference
3.	Hatami et al Australian Orthodontic journal	Cross sectional survey	Australian society of orthodontics.	427 Participants	Most participants Age between 40 to 49 years of age	Group I – Patients treated with intraoral vibrating device Group II- Intraoral injectable drugs		Questionnaire	Willingness , Payment ,Preference
4.	Alam et al Journal of pharmacy	Prospective study	Jouf university,Sakaka	Total of 32 patients	Age between 14 to 25 years of age	Low level laser therapy		Numerical rating scale was used	
5.	Umeh et al	Cross section	College of medical	Total of 100	46 adolesc	Group I- teeth		Questionnaire	Pain, disco

	African journal of oral health	al study	universit y,Lagos	partici pants	ents and 54 adults	vibrato r Group II-LLLT Group III- intra oral injectab le drugs			mfort, Functi onal impai rment
6.	Shaado uh et al Interna tional orthod ontics	Rando mized control led trial	Mintab College , Pennsylv ania,USA	Total of 40 partici pants		20 patient s withLIE S(Low intensit y electric al stimula tion)20 patient s traditio nal method	Pt was asked to wear for 5 hours a day	Questi onaire	
7.	Alfaila ny et al Cures	Rando mized control led trial	Universit y of Damascu ss	Total of 54 patien ts	Total of 12 males and 42 females (age 20.65+ 2.85)	Divided into three groups LLLT group , piezoin cision group and control group	Follo w up for total of 28 days		Pain, disco mfort , swelli ng , chewi ng difficu lty, accep tance
8.	Ozkan et al Turkis h Journal of orthod ontics	----- --	Universit y of Health sciences	Total of 183 partici pants	Males= 74, Female s=109	Questio naire about various modalit ies in orthod ontics			Willin gness, Increa se in fee
9.	Linjaw i et al 2020 Journal of health care	Cross section al survey	King Abdulazi z Universit y	Total of 200 partici pants	50.5%fr om 18- 25 years of age 67%fe males	----- ----		Questi onaire	Pain, disco mfort, swelli ng , difficu lty in

									chewing
10.	Zeitounlouian et al J Orofac Orthop	Randomized controlled trial	Department of Orthodontics, Damascus University	Total of 21 patients	Patients of age 16 – 28 years	21 patients were taken into 42 halves one half with PRF injection and another half was taken as control group	Pain was checked after 1h(T1) 2h (T2) 6h(T3) 24h(T4) 48h (T5)	Visual analog scale was used	Preference, willingness, increase in fee
11.	Al-Attar Et al International journal of dentistry	Survey	Iraqi Orthodontic society , Baghdad city	236 participants	Females - 59.62 % Males- 40.2%	Group I- customized appliances Group II- intra oral vibrating devices Group III- Locally injected drugs		Questionnaire	

Retrieved records were evaluated according to the predetermined eligibility criteria. After duplicate removal, the remaining records underwent title and abstract screening, and potentially relevant articles were subsequently evaluated through full-text review. Studies fulfilling the predefined criteria were included in the final synthesis

Data were extracted regarding study design, setting, sample size, participant characteristics, intervention, comparator, treatment or evaluation period, and patient-reported outcomes. (Table 3)

Risk of bias

Table 4. Risk of bias using Newcastle–Ottawa Scale (NOS) for non-randomized studies

S. N o.	Study	Representativeness of exposed cohort	Select ion of non-exposed cohort	Ascertainment of exposure	Out come absent at start	Comparability of cohorts	Assessment of outcome	Follo w-up long enough	Ade quacy of follo w-up	N O S score
1	Uri be et al.	0	1	Self-report	N/A	2	Self-report	Yes	0	3
2	Lin jaw i et al.	0	1 (convenience sampling)	0	1	2	0 (self-report)	1 (Ye s)	0	6
3	Hat am i et al.	1	1 (convenience sampling)	1 (structured interview)	1	2	1	1 (Ye s)	0	8
4	Um eh et al.	0	1 (convenience sampling)	1	1	2	1	1 (Ye s)	0	7
5	Oz aka n et al.	0	1	1	1	2	1	1 (Ye s)	0	7
6	Al-Att ar et al.	0	1	1	1	2	1	1 (Ye s)	0	7
7	Ala m et al.	1	1	1	1	2	1	1 (Ye s)	0	8
8	Lin jaw i et al. (Saudi Arabia)	1	1	1	1	1	1	1 (Ye s)	0	7

Table 5. Risk of bias using RoB 2 for randomized controlled trials

S.N o.	Study	Bias arising from randomization	Bias due to deviations from intended interventions	Bias due to missing outcome data	Bias in measurement of outcome	Bias in selection of reported result	Overall risk
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1	Shaadoun et al.	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns
2	Zeitounlouian	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns
3	Alfailany et al.	Low Risk	High Risk	Low Risk	Low Risk	Low Risk	Some Concerns

Risk of bias was assessed according to study design. The Newcastle–Ottawa Scale (NOS) was used for non-randomized studies includes selection, comparability, and outcome-related domains.(Table 4) Randomized controlled trials were assessed using RoB 2 across the domains of bias arising from randomization, deviations from intended interventions, missing outcome data, measurement of the outcome, and selection of the reported result.7 (Table 5)

Data synthesis

Given the considerable variation among the included studies in terms of intervention modalities, study designs, outcome measures, and assessment methods, the findings were integrated through a narrative synthesis rather than pooled quantitatively.

RESULTS

Study Characteristics

Eleven studies were included in the qualitative synthesis, comprising cross-sectional, prospective, retrospective, and randomized controlled studies. The studies evaluated orthodontic patients, adults, adolescents, parents, and orthodontists and investigated willingness, treatment preference, willingness to pay, pain, discomfort, functional impairment, swelling, and chewing difficulty. The interventions and outcome-assessment methods varied considerably across studies (Table 3).

Patient Perceptions, Preferences and Willingness

Studies evaluating patient perceptions reported varying levels of willingness to undergo accelerated orthodontic treatment and accept additional costs. Participants generally considered shorter treatment duration desirable, although preferences varied according to the acceleration modality, treatment burden, and associated costs. Overall, treatment duration was an important consideration but was not the only factor influencing acceptance. 1-3,8-10,15

Pain, Discomfort and Functional Outcomes

Patient-reported outcomes included pain, discomfort, swelling, functional impairment, and difficulty in chewing. The reported symptoms varied across acceleration modalities and assessment periods. Differences in outcome measures and follow-up intervals limited direct comparison between studies. 11-14

Overall Findings

Overall, patient acceptance of accelerated orthodontic treatment was influenced by treatment duration, intervention-related burden, discomfort, functional effects, and financial considerations. The heterogeneity of the included studies limited quantitative comparison of patient-reported outcomes.

Risk of bias

The non-randomized studies demonstrated limitations mainly involving representativeness, convenience sampling, response rates, and self-reported outcomes. In the randomized studies assessed using RoB 2, the randomization process, missing outcome data, outcome measurement, and selection of the reported result were assessed as low risk. Deviations from intended interventions were assessed as high risk because of lack of participant blinding, resulting in an overall assessment of some concerns.

DISCUSSION

This systematic review identified consistent interest in reducing orthodontic treatment duration, but the degree of acceptance varied according to the type of acceleration procedure, its invasiveness, discomfort, and additional financial cost. Across several surveys, a substantial proportion of patients considered conventional treatment duration too long and expressed a preference for shorter treatment. However, willingness to undergo an additional procedure was generally lower than the desire for shorter treatment duration.^{3-5,8-9,15} A recurring finding was the preference for less-invasive or non-invasive approaches. Customized appliances and intraoral vibration were generally more acceptable than surgical procedures such as corticotomy and piezocision. This pattern was particularly evident in the Saudi, Turkish, Nigerian, and Iraqi surveys.^{4,5,8,9,15} The findings suggest that patients may consider the reduction in treatment time together with the additional procedural burden when deciding whether to accept an acceleration technique.

Financial considerations were also important. Although some patients were willing to pay an additional fee

for shorter treatment, the acceptable increase was generally modest. In the Saudi and Iraqi studies, willingness to pay was reported for additional procedures, but patients generally accepted lower fee increments than orthodontists.^{8,9,15} This indicates that the perceived value of treatment-time reduction may not be sufficient to justify substantial additional expenditure for many patients.

Pain and functional outcomes showed a different pattern because they were assessed mainly in clinical intervention studies rather than perception surveys. The study by Alam demonstrated lower pain scores following LLLT, with pain decreasing during the first week after orthodontic appliance placement.¹¹ However, the available studies used different interventions, pain scales, assessment intervals, and clinical protocols, making direct comparison difficult.¹¹⁻¹⁴

The evidence should therefore be interpreted cautiously. Most included studies were cross-sectional surveys, while only three were randomized controlled trials.¹²⁻¹⁴ The survey studies also differed considerably in population characteristics, geographic setting, explanation of acceleration procedures, and questionnaire design. In addition, patient preference does not necessarily indicate that an intervention is clinically effective in accelerating tooth movement. Patient-reported acceptability and clinical effectiveness should therefore be considered as complementary outcomes when evaluating accelerated orthodontic treatment.

Overall, the available evidence indicates that shorter treatment duration is an important patient-related outcome, but acceptance depends on the balance between perceived time saving, invasiveness, discomfort, and additional cost. The heterogeneity of the available evidence and the limited number of randomized studies evaluating patient-reported outcomes highlight the need for well-designed clinical trials using standardized patient-reported outcome measures.

LIMITATIONS

The main limitations of the evidence were heterogeneity of study design and outcome measurement, use of convenience sampling in several non-randomized studies, response-rate limitations, reliance on self-reported outcomes, and concerns related to participant blinding in randomized studies.

CONCLUSION

Patient-reported outcomes are an important component of evaluating accelerated orthodontic procedures. The available evidence addresses willingness, preference, willingness to pay, pain, discomfort, and functional outcomes, but substantial methodological heterogeneity limits direct comparison. Further well-designed studies using standardized patient-reported outcome measures are required.

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