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Research Article

Adult Patients' Perceptions And Preferences Toward Accelerated Orthodontic Treatment Perceptions of Accelerated Orthodontic Treatment

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Abstract

Statement of the Problem: Prolonged orthodontic treatment may discourage adults from initiating or continuing orthodontic care. Several approaches have been proposed to accelerate orthodontic treatment, but their acceptance by patients may vary according to invasiveness and cost.

Purpose: This study aimed to evaluate adult patients' perceptions of orthodontic treatment duration, their acceptance and preferences regarding invasive and non-invasive approaches to accelerate treatment, and their willingness to pay additional fees.

Materials and Methods: This hospital-based cross-sectional study included adult patients receiving orthodontic treatment at İstanbul Yeni Yüzyıl University Faculty of Dentistry between October and December 2021. A 21-item questionnaire adapted from a previously published survey was administered electronically through Google Forms. The questionnaire assessed demographic characteristics, perceptions and expectations regarding treatment duration, acceptance and ranking of acceleration techniques, and willingness to pay additional fees. Data were analyzed using IBM SPSS Statistics 25. Friedman's test with pairwise post-hoc comparisons, Spearman correlation, and rank-biserial correlation were used, with statistical significance set at $p < 0.05$.

Results: Of 300 distributed questionnaires, 295 were returned and 293 eligible participants were included. Overall, 87.3% of participants agreed that orthodontic treatment takes a long time, while 85.7% considered prolonged treatment a reason why adults may avoid orthodontic treatment. Although only 14.7% expected treatment to last less than one year, 65.5% desired treatment to be completed within one year. Overall, 70.9% were willing to undergo an additional procedure to accelerate treatment. Customized wires were the most accepted approach (89.1%), followed by vibration devices (69.6%), whereas intraoral injected drugs (28.7%), piezocision (8.2%), and corticotomy (5.2%) were less accepted. Nearly half of the participants (48.4%) were willing to pay higher monthly fees for shorter treatment.

Conclusions: Adult patients demonstrated a strong preference for shorter orthodontic treatment. Non-invasive approaches, particularly customized wires and vibration devices, were substantially more acceptable than invasive procedures. Financial considerations also influenced willingness to pay for treatment acceleration.

Keywords: Orthodontics, orthodontic appliances, patient preference, patient satisfaction, time factors.

Yetişkin Hastaların Hızlandırılmış Ortodontik Tedaviye İlişkin Algı ve Tercihleri Hızlandırılmış Ortodontik Tedavi Tercihleri

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Özet

Problem: Uzun süren ortodontik tedavi, yetişkin hastaların ortodontik tedaviye başlamasını veya tedaviyi sürdürmesini olumsuz etkileyebilmektedir. Ortodontik tedaviyi hızlandırmaya yönelik çeşitli yöntemler geliştirilmiş olmakla birlikte, hastaların bu yöntemleri kabulü invazivlik ve maliyet gibi faktörlere bağlı olarak değişebilmektedir.

Amaç: Bu çalışmanın amacı, yetişkin hastaların ortodontik tedavi süresine ilişkin algılarını, tedaviyi hızlandırmaya yönelik invaziv ve non-invaziv yöntemlere ilişkin kabul ve tercihlerini ve ek ücret ödeme istekliliklerini değerlendirmektir.

Gereç ve Yöntem: Bu hastane temelli kesitsel çalışma, Ekim-Aralık 2021 tarihleri arasında İstanbul Yeni Yüzyıl Üniversitesi Diş Hekimliği Fakültesi'nde ortodontik tedavi gören yetişkin hastalar üzerinde gerçekleştirildi. Daha önce yayımlanmış bir çalışmadan uyarlanan 21 soruluk anket Google Forms aracılığıyla elektronik olarak uygulandı. Ankette demografik özellikler, tedavi süresine ilişkin algı ve beklentiler, hızlandırma yöntemlerinin kabulü ve sıralanması ile ek ücret ödeme istekliliği değerlendirildi. Veriler IBM SPSS Statistics 25 kullanılarak analiz edildi. Friedman testi ve ikili post-hoc karşılaştırmalar, Spearman korelasyonu ve rank-biserial korelasyon kullanıldı ve $p < 0.05$ istatistiksel olarak anlamlı kabul edildi.

Bulgular: Dağıtılan 300 anketin 295'i geri alındı ve uygunluk kriterlerini karşılayan 293 katılımcı çalışmaya dahil edildi. Katılımcıların %87.3'ü ortodontik tedavinin uzun sürdüğünü düşünürken, %85.7'si uzun tedavi süresini yetişkinlerin tedaviden kaçınmasının bir nedeni olarak değerlendirdi. Yalnızca %14.7'si tedavinin bir yıldan kısa süreceğini öngörürken, %65.5'i tedavinin bir yıl içinde tamamlanmasını istedi. Katılımcıların %70.9'u tedaviyi hızlandırmak amacıyla ek bir işlem uygulanmasını kabul edeceğini belirtti. Özelleştirilmiş teller (%89.1) ve titreşim cihazları (%69.6) en fazla kabul edilen yöntemler olurken, intraoral ilaç enjeksiyonu (%28.7), piezokizyon (%8.2) ve kortikotomi (%5.2) daha düşük kabul oranlarına sahipti. Katılımcıların %48.4'ü daha kısa tedavi için daha yüksek aylık ücret ödeyebileceğini belirtti.

Sonuç: Yetişkin hastalar daha kısa ortodontik tedavi süresine belirgin bir tercih göstermiştir. Özellikle özelleştirilmiş teller ve titreşim cihazları gibi non-invaziv yöntemler invaziv yöntemlere göre daha fazla kabul görmüştür. Tedavi hızlandırmaya yönelik ek ücret ödeme istekliliğinde ekonomik faktörler de etkili olmuştur.

Anahtar Kelimeler: Hasta memnuniyeti, hasta tercihi, ortodonti, ortodontik apareyler, zaman faktörleri.

Introduction

Orthodontic treatment is often perceived as time-consuming, and prolonged treatment may influence both patients' willingness to initiate treatment and their experience during therapy. A conventional fixed-appliance treatment course is commonly close to two years, although the duration varies according to malocclusion severity, treatment modality, patient cooperation, and other clinical factors (1,2).

Longer treatment has been associated with several biological and psychosocial concerns, including greater difficulty maintaining oral hygiene, risk of enamel decalcification, periodontal complications, root resorption, treatment fatigue, and dissatisfaction with the appearance of orthodontic appliances (1,3). These concerns are particularly relevant in adults, who may seek treatment for specific aesthetic, social, or professional reasons and may therefore place a high value on treatment efficiency.

Several approaches have been investigated to accelerate orthodontic tooth movement. These include biological interventions, physical or mechanical stimulation, customized orthodontic appliances, and surgically facilitated procedures (1,4). Surgical approaches such as corticotomy and piezocision may produce biological effects associated with accelerated remodeling, but their invasiveness and postoperative discomfort may limit patient acceptance (5,6). Similarly, evidence concerning vibrational devices remains mixed, with systematic reviews reporting inconsistent effects on the rate of tooth movement and overall treatment duration (7).

Patient acceptance is therefore an important component of the clinical feasibility of accelerated orthodontic procedures. Previous surveys have shown that patients generally prefer less invasive approaches and that willingness to pay additional fees is influenced by perceived treatment-time reduction and financial circumstance (8,9). However, perceptions may differ between populations because treatment expectations, socioeconomic conditions, and cultural factors vary.

To date, the thesis underlying the present study identified a lack of published Turkish data specifically addressing adult patients' perceptions of orthodontic treatment duration, acceptance of acceleration procedures, and willingness to pay additional fees. The present study therefore aimed to evaluate these factors in adult Turkish orthodontic patients. The primary

objectives were to determine (1) patients' perceptions and desired duration of orthodontic treatment, (2) the extent to which prolonged treatment is perceived as a barrier to orthodontic care, (3) acceptance and preference for selected invasive and non-invasive acceleration techniques, and (4) willingness and capacity to pay additional treatment fees.

Materials and Methods

Study design and setting

This hospital-based, cross-sectional study was conducted in the Department of Orthodontics, Faculty of Dentistry, İstanbul Yeni Yüzyıl University, İstanbul, Türkiye, between October and December 2021. The study population consisted of adult patients actively receiving orthodontic treatment.

Ethical considerations

Ethical approval was obtained from the Ethics and Research Committee of İstanbul Yeni Yüzyıl University (Approval No. 2021/10-717, dated 05.10.2021). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki, as revised in 2013. All participants were informed about the purpose and procedures of the study and written informed consent was obtained before participation. Participation was voluntary, and the questionnaire was completed anonymously.

Sample size and participant selection

The primary inferential outcome was participants' preference among five orthodontic treatment-acceleration approaches. Because the primary comparison involved five related ordinal responses, the final analysis used Friedman's test. A priori sample-size planning was performed with G*Power 3.1 using the corresponding five-category omnibus comparison as a conservative approximation: chi-square goodness-of-fit, 5 categories, two-sided $\alpha=0.05$, 80% power, and a small-to-moderate effect size ($w=0.20$). This analysis indicated a minimum sample size of 299 participants. A total of 300 questionnaires were therefore distributed. Of the 295 returned questionnaires, two were excluded according to the eligibility criteria, resulting in 293 participants. Thus, the final analysable sample was slightly below the conservative a priori target (293 vs 299); however, the study retained high participation and provided sufficient data for the planned descriptive and nonparametric analyses.

Adult patients attending routine orthodontic appointments at the Department of Orthodontics, aged ≥ 18 years were invited to participate in the survey. Patients younger than 18 years, individuals with craniofacial disorders or disabilities that prevented participation, and individuals who did not consent were excluded.

Questionnaire

A 21-question questionnaire adapted from Uribe et al. (8), was administered electronically using Google Forms. The survey was distributed through the WhatsApp application. Before answering questions concerning acceleration techniques, participants were provided with descriptions of the procedures. The questionnaire comprised five sections: demographic characteristics; perceptions and expectations regarding orthodontic treatment duration; willingness to undergo invasive and non-invasive acceleration procedures; ranking of procedures according to preference and estimated treatment-time reduction; and ability and willingness to pay additional fees.

The acceleration approaches evaluated were customized orthodontic wires/appliances, teeth vibration devices, intraoral injected drugs, corticotomy, and piezocision. Participants rated their willingness using ordered response categories and ranked the techniques according to preference. Additional questions assessed the percentage of fee increase participants would accept for different procedures and different hypothetical reductions in treatment duration.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics version 25 (IBM Corp., Armonk, NY, USA). Categorical data were summarized as frequencies and percentages. Friedman's test with pairwise post-hoc comparisons was used to compare the ranked willingness to undergo the five treatment-acceleration approaches. Spearman correlation coefficients were used to examine associations involving ordinal variables, while rank-biserial correlation coefficients were used for appropriate ordinal/binary associations. Statistical significance was set at $p < 0.05$. The a priori power analysis was performed using G*Power version 3.1.9.7 (Heinrich Heine University Düsseldorf, Düsseldorf, Germany). Because G*Power does not provide a direct Friedman-test sample-size module, the primary five-category comparison was conservatively approximated using the chi-square goodness-of-fit procedure with five categories, an effect size of $w = 0.20$, $\alpha = 0.05$, and power $(1 - \beta) = 0.80$. The resulting required sample size was 299 participants.

Results

Participant characteristics

Of the 300 questionnaires distributed, 295 were returned and 293 eligible participants were included, corresponding to a 98.3% participation rate. The sample comprised 116 males (39.6%), 176 females (60.1%), and one participant with missing sex information. The largest age group was 18–20 years (43.3%), followed by 20–30 years (41.3%), 30–40 years (9.9%), and above 40 years (3.8%); age was missing for five participants (1.7%).

Regarding education, 46.1% had less than four years of college education, 45.1% had completed four years of college, and 8.2% had a postgraduate degree. Monthly income was below 2000 TL for 6.5%, 2000–6000 TL for 53.9%, 6000–9000 TL for 29.0%, and above 9000 TL for 8.2%; income was missing for 2.4%. Regarding treatment duration at the time of the survey, 16.7% had been in treatment for less than one year, 43.0% for 1–2 years, and 26.3% for 2–3 years.

Table 1. Sociodemographic and treatment characteristics of the study participants (N=293).

Characteristic	n (%)
Male	116 (39.6)
Female	176 (60.1)
Missing sex	1 (0.3)
18–20 years	127 (43.3)
20–30 years	121 (41.3)
30–40 years	29 (9.9)
>40 years	11 (3.8)
Missing age	5 (1.7)
Less than 4 years college	135 (46.1)
4 years college	132 (45.1)
Postgraduate degree	24 (8.2)
Income <2000 TL	19 (6.5)
2000–6000 TL	157 (53.9)
6000–9000 TL	85 (29.0)
>9000 TL	24 (8.2)
Treatment <1 year	49 (16.7)
Treatment 1–2 years	126 (43.0)
Treatment 2–3 years	77 (26.3)

Perceptions and expectations regarding treatment duration

A total of 87.3% of participants agreed that orthodontic treatment takes a long time (41.6% strongly agreed and 45.7% somewhat agreed). There was no statistically significant association between sex and this perception ($p=0.094$). A mild positive association was

observed between education level and agreement that orthodontic treatment takes a long time ($p=0.001$, $r=0.199$).

Regarding expected treatment duration, 14.7% expected treatment to last less than one year, 26.3% expected 1–1.5 years, 36.2% expected 1.5–2 years, and 22.2% expected more than two years. In contrast, 65.5% wished their treatment could be completed in less than one year, 21.5% wished for 1–1.5 years, and 13.0% for 1.5–2 years. No participant selected more than two years as a desired duration. Male sex showed a mild association with wishing for a shorter treatment duration ($p=0.029$, $r=0.128$).

When asked why adults may reject or avoid orthodontic treatment, prolonged treatment duration was the most frequently selected reason (85.7%), followed by high cost (70.6%) and pain (51.5%). No significant associations were observed between these reasons and sex ($p=0.474$), education ($p=0.416$), or monthly income ($p=0.674$).

Table 2. Participants' perceptions, expectations, and desired orthodontic treatment duration.

Outcome	n (%)
Agreed treatment takes a long time	256 (87.3)
Expected <1 year	43 (14.7)
Expected 1–1.5 years	77 (26.3)
Expected 1.5–2 years	106 (36.2)
Expected >2 years	65 (22.2)
Wished <1 year	192 (65.5)
Wished 1–1.5 years	63 (21.5)
Wished 1.5–2 years	38 (13.0)
Long treatment as reason for rejection/avoidance	251 (85.7)
High cost as reason	207 (70.6)
Pain as reason	151 (51.5)

Acceptance of acceleration procedures

Overall, 70.9% of participants agreed that they would undergo additional techniques or procedures to accelerate orthodontic treatment (39.2% strongly agreed and 31.7% somewhat agreed). A mild association was observed between sex and willingness to undergo acceleration procedures ($p=0.012$, $r=0.146$), with greater agreement among males. Higher monthly income was also associated with greater willingness ($p=0.048$, $r=0.118$).

Customized wires were the most accepted approach, with 89.1% of participants indicating willingness to use them. Teeth vibration was accepted by 69.6%. For intraoral

injected drugs, 28.7% were willing, 30.7% were neutral, and 40.6% were unwilling. Only 5.2% were willing to undergo corticotomy, while 81.2% were unwilling. Piezocision was accepted by 8.2%, while 77.8% were unwilling.

Table 3. Acceptance and preference ranking of orthodontic treatment-acceleration techniques.

Technique	Willing n (%)	Neutral n (%)	Unwilling n (%)	Mean rank
Customized wires	264 (89.1)	24 (8.2)	5 (1.7)	4.60
Teeth vibrator	204 (69.6)	67 (22.9)	21 (7.1)	3.76
Intraoral injected drug	84 (28.7)	90 (30.7)	119 (40.6)	3.07
Piezocision	24 (8.2)	40 (13.7)	228 (77.8)	1.81
Corticotomy	16 (5.2)	38 (13.0)	238 (81.2)	1.77

The Friedman test demonstrated significant differences in preference among the evaluated approaches ($p < 0.001$). Customized wires ranked significantly higher than the other approaches. Teeth vibration ranked significantly higher than intraoral injected drugs, corticotomy, and piezocision. Intraoral injected drugs ranked significantly higher than the two surgical approaches. No significant difference was found between corticotomy and piezocision ($p = 1.000$).

Preferences according to estimated reduction in treatment duration

When participants were asked to rank procedures considering their estimated reduction in treatment duration, customized wires, associated with a 25–35% reduction, were the first choice for 86.5% of participants. Teeth vibration, associated with a 30% reduction, was the first choice for 73.4%. Corticotomy and piezocision, each presented with an estimated 50% reduction, were predominantly placed in fourth position, by 84.6% and 61.3%, respectively.

Willingness and ability to pay additional fees

Overall, 48.4% of participants reported that they were able to pay higher monthly payments to reduce treatment duration (13.3% very able and 35.1% somewhat able), whereas 19.3% were unable and 30.7% were neutral. Male sex was associated with greater ability to pay additional monthly fees ($p = 0.002$, $r = 0.182$), and higher monthly income was also associated with greater ability to pay ($p = 0.002$, $r = 0.185$).

For customized wires, 70.6% of participants willing to use the technique accepted a 10% fee increase and 16.0% accepted a 20% increase. For teeth vibration, 75.8% accepted a 10%

increase and 9.6% accepted a 20% increase. For intraoral injected drugs, 50.9% accepted a 10% increase and 7.8% accepted a 20% increase. Among respondents who answered for surgical procedures, 30.7% accepted a 10% increase for corticotomy and 32.8% accepted a 10% increase for piezocision; a large proportion left these items unanswered because they had already rejected the procedures.

Table 4. Preferred fee increase according to hypothetical reduction in orthodontic treatment duration.

Reduction in treatment time	10% fee	20% fee	30% fee	40% fee	50% fee
10%	267 (91.4)	13 (4.5)	5 (1.7)	2 (0.7)	3 (1.0)
20%	228 (78.1)	49 (16.8)	7 (2.4)	3 (1.0)	3 (1.0)
30%	176 (60.3)	73 (25.0)	37 (12.7)	2 (0.7)	3 (1.0)
40%	121 (41.4)	112 (38.4)	23 (7.9)	30 (10.3)	3 (1.0)
50%	86 (29.5)	107 (36.6)	56 (19.2)	11 (3.8)	30 (10.3)

Discussion

The present study demonstrates that treatment duration is a major concern among adult Turkish orthodontic patients. Most participants (87.3%) agreed that orthodontic treatment takes a long time, and 85.7% identified prolonged treatment as a reason adults may reject or avoid orthodontic treatment. This finding is consistent with previous patient surveys in which treatment duration was identified as an important concern and a substantial proportion of participants expressed a desire for shorter treatment (8,9).

An important finding was the difference between patients' expectations and their desired treatment duration. Only 14.7% expected treatment to last less than one year, whereas 65.5% wished to complete treatment within one year. This discrepancy suggests that patients may understand that conventional orthodontic treatment commonly requires substantially more than one year but nevertheless desire a shorter course. Previous Saudi studies similarly demonstrated a strong preference for reduced treatment duration among young adult patients (8,9).

The high overall willingness to undergo additional procedures (70.9%) should, however, be interpreted in conjunction with the marked differences between individual techniques. Customized wires were by far the most accepted option, followed by vibratory devices. These findings are consistent with previous surveys showing that patients tend to prefer

approaches that resemble conventional orthodontic treatment and do not require surgical intervention (8,9).

The strong preference for customized wires is clinically understandable because the intervention can be perceived as an extension of conventional orthodontic mechanics rather than as an invasive procedure. Nevertheless, patient preference should not be interpreted as evidence of clinical efficacy. The evidence concerning acceleration by customized appliances remains limited, and the clinician should distinguish perceived convenience from demonstrated reduction in treatment duration.

Vibratory devices were the second most accepted approach in the present study. This high acceptance contrasts with the uncertainty of the clinical evidence. A systematic review of randomized and controlled clinical studies found that most included trials did not demonstrate a clinically meaningful advantage of vibrational devices in tooth movement, total treatment time, or pain (7). Therefore, the high patient acceptance observed in the present study may reflect the non-invasive nature and perceived convenience of these devices rather than established clinical effectiveness.

In contrast, surgical techniques showed very low acceptance. Only 5.2% of participants were willing to undergo corticotomy and 8.2% were willing to undergo piezocision. This result is consistent with previous surveys reporting lower acceptance of invasive approaches and greater preference for non-invasive alternatives (8,9). The invasive nature of corticotomy and piezocision, the possibility of postoperative discomfort, and patients' concern about surgical procedures may explain this pattern. Although piezocision may be less invasive than conventional corticotomy, it still involves surgical manipulation and therefore may remain unacceptable to many patients.

The financial findings further demonstrate that patient acceptance is influenced by cost. Less than half of the participants (48.4%) reported an ability to pay higher monthly fees for shorter treatment. Higher income was significantly associated with greater ability to pay. For the most accepted non-invasive approaches, the majority of participants preferred a 10% rather than a larger fee increase. This finding is broadly consistent with previous work de-

monstrating that patients are generally willing to pay additional fees for accelerated orthodontics but that the acceptable increase is constrained by the magnitude of the financial burden (8,9).

The present findings also have implications for patient-centered treatment planning. Patients may value a shorter treatment period highly, but the willingness to accept an acceleration procedure depends on invasiveness, perceived convenience, and financial cost. Orthodontists should therefore discuss the actual evidence supporting each acceleration method, potential adverse effects, expected magnitude of benefit, and additional cost rather than assuming that patient preference alone indicates clinical appropriateness.

Limitations

The study has several limitations. First, its cross-sectional design prevents causal inference and may be affected by information and response biases. Second, participants were recruited from a single university dental hospital in İstanbul, which limits the generalizability of the findings to the wider Turkish adult orthodontic population. Third, the study assessed stated preferences rather than actual uptake of acceleration procedures or objectively measured reductions in treatment duration. Finally, some fee-increase questions were unanswered by participants who had already rejected the relevant invasive procedure, which limits interpretation of willingness-to-pay estimates for those procedures.

Future research

Future multicentre studies involving a broader range of Turkish orthodontic patients are needed to confirm these findings. Studies combining patient-reported preferences with evidence-based information on the actual effectiveness, risks, and costs of individual acceleration techniques could provide a more clinically useful assessment of patient decision-making.

Conclusion

Adult Turkish orthodontic patients showed a strong desire for shorter treatment durations and identified prolonged treatment as the leading reason adults may reject or avoid orthodontic treatment. Although most participants were willing to consider an additional approach to accelerate treatment, acceptance was strongly dependent on invasiveness. Customized

wires and vibratory devices were the most acceptable options, whereas corticotomy and piezocision were poorly accepted. Nearly half of the participants were able to pay additional fees, but most preferred modest increases, particularly around 10%. These findings support the importance of incorporating patient preferences and financial considerations into shared decision-making while ensuring that recommendations remain grounded in the available clinical evidence.

Consent for publication: Not applicable.

Availability of data and materials: The datasets generated and/or analysed during the current study are not publicly available because they contain survey data obtained under the approved study protocol but may be available from the corresponding author on reasonable request, subject to applicable ethical and institutional restrictions.

Competing interests: The authors declare that they have no competing interests.

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Authors' contributions: Hanan Miftah Ashour and Göksu Trakyali contributed to the conception and design of the study, data collection, interpretation of the findings, and preparation/revision of the manuscript. Both authors approved the final version. Hanan Miftah

Ashour contributed to the conceptualization, methodology, validation, formal analysis, investigation and writing of original draft. Göksu Trakyali contributed to the reviewing and editing of original draft, visualization, project administration and supervision..

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