

Treatment Satisfaction and Quality of Life Changes in Patients Receiving Conventional Fixed Orthodontic Appliances and Clear Aligner Therapy: A Questionnaire-based Cross-sectional Study

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ABSTRACT

Introduction: The orthodontic outcome is mainly decided by the objective evaluation by orthodontists with minimal subjective considerations. Although there is increasing patient acceptance of orthodontic aligners for malocclusion treatment, minimal evidence exists regarding their efficacy and adverse effects compared to conventional fixed orthodontic appliances.

Aim: To assess patient satisfaction and quality of life changes after these two modalities of orthodontic treatment and to analyse the influencing co-factors.

Materials and Methods: A web-based three-part questionnaire survey was done amongst 303 participants who underwent either fixed orthodontic therapy or invisalign treatment. The first part collected the participants' demographic details and their treatment type. The second part of five questions addressed their preferences, facilitators, and factors preventing them from undergoing orthodontic treatment. The final part of ten questions measured the satisfaction ratio on a five-point Likert scale. Descriptive statistics were computed to provide an overview of responses using frequencies and percentages. Inferential

statistics were computed using the chi-square test, and a p-value less than 0.05 was considered statistically significant.

Results: This study of 303 orthodontic patients found no significant difference in overall satisfaction between fixed braces and clear aligners ($p=0.989$), although aligners were favoured for facial appearance, increased treatment costs were a concern for the majority. Female participants (185, 61.1%) constituted the majority of the participants, with 178 (58.7%) aged between 19-29 years. Clear aligner users experienced more discomfort with additional visits and appointment booking, while fixed braces users had greater concerns about appearance and increased brushing time. Younger patients reported higher satisfaction across several treatment aspects ($p=0.013$). Men were more satisfied with treatment duration and costs than women.

Conclusion: In conclusion, while clear aligners provide aesthetic and hygiene benefits, overall satisfaction was comparable to fixed braces, with cost being a significant factor. Comprehensive consultations are essential to align treatment with patient needs. Future research should involve larger, more diverse samples for validation.

Keywords: Clear aligners, Orthodontics, Patient satisfaction, Quality of life

INTRODUCTION

Malocclusion is an issue of public health concern globally. An array of factors influence the treatment of malocclusion [1]. One essential parameter influencing orthodontic treatment is the "felt need" of the patient and their satisfaction with it during and after therapy. Exploring patient satisfaction is an essential domain in the healthcare industry [2]. Orthodontics is a specialisation in which professional handling and patient compliance should go hand in hand to achieve the desired clinical outcome [3]. Hence, knowing the factors influencing subjective contentment with treatment is a key component in successful orthodontic practice.

The treatment process is arguably as important as the treatment outcome. It is, therefore, essential to understand and quantify satisfaction at all stages of treatment from the patient's perspective to achieve the best possible treatment outcomes [4]. In orthodontics, the traditional method involves using fixed mechanotherapy to treat moderate to severe malocclusions. The most uncomfortable aspect of fixed appliances is difficulty in mastication and aesthetics [5,6].

Recent developments in the field of aesthetic and functional considerations in orthodontics have led to thermoplastic clear aligner therapy, such as Invisalign® (Align Technology, Inc., Santa

Clara, California, United States of America), which uses a removable thermoplastic appliance to achieve orthodontic movement. A recent report supports that over 7.5 million people are utilising this appliance. Furthermore, evidence recommends that Invisalign aligners offer the advantage of better aesthetics, convenient removal during food consumption, and better oral care [7]. This appliance is unsuitable for skeletal disharmony or severe crowding.

Patient satisfaction with orthodontic treatments significantly differs between clear aligners and fixed appliances across various parameters. Clear aligners are preferred for their comfort and aesthetic appeal, with patients reporting less pain and fewer oral sores compared to traditional braces. The ability to remove clear aligners enhances oral hygiene and provides greater convenience, contributing to higher satisfaction levels. Aesthetic satisfaction is also higher with clear aligners due to their nearly invisible appearance, making them a popular choice among adults [8,9]. Additionally, clear aligners have been associated with shorter treatment durations, although this can vary depending on the complexity of the case and patient compliance [10].

In contrast, fixed orthodontic appliances are often deemed more effective for treating complex cases, providing precise control over tooth movements essential for severe malocclusions and significant

tooth rotations [10,11]. Despite potential longer treatment times and greater discomfort, the predictability and consistency of outcomes with fixed braces are significant advantages, particularly when patient compliance is a concern [9]. Fixed appliances also tend to be more effective in maintaining long-term results, as patients treated with clear aligners have shown higher rates of relapse in alignment post-treatment. Overall, while clear aligners excel in comfort, aesthetics, and convenience, fixed appliances are valued for their reliability and effectiveness in addressing complex orthodontic issues [8-11].

Malocclusion has a negative impact on the quality of life [12,13]. However, conflicting results have been reported regarding the relationship between malocclusion and quality of life [14]. A comprehensive knowledge of the quality of life in physical, psychological, and social domains after orthodontic treatment should be aimed at understanding the felt needs of the patients [13].

The literature revealed that most orthodontic outcome studies have focused on objective morphologic features by professionals, limiting the subjective outcome assessment, especially in adults [4,15,16]. A systematic review with meta-analysis of 11 studies (4 randomised/7 non-randomised) compared aligners with fixed appliances and concluded that aligner therapy had the worst occlusal outcome [17]. Another systematic review concluded that treatment with clear aligners is associated with better quality of life ratings compared to fixed appliances [18].

Current clinical evidence suggests that aligners can be used as an alternative to fixed appliances for patients with mild-to-moderate malocclusions. When deciding on treatment, factors such as patient preferences, discomfort, concerns, and perceptions of value should also be considered by practitioners.

This study aimed to measure host and service factors that affect patient satisfaction and treatment outcomes of orthodontic patients. It also compared clear aligners and fixed braces based on cost and duration, alignment and appearance, smile and aesthetics, retention, and overall satisfaction.

MATERIALS AND METHODS

The present study was designed as a web-based questionnaire survey among patients who underwent either fixed orthodontic therapy or Invisalign treatment in ISNC hospitals/private hospitals orthodontic dental clinics in the Jeddah region of Saudi Arabia. This study has been approved by Ibn Sina National College (ISNC) Institutional Research Review Board (IRRB) with Protocol Identification No. 011SRC10042021. After obtaining the list of hospitals from the Ministry of Health and Family Welfare, the first investigator visited the concerned orthodontic clinics and procured the email addresses of eligible patients.

Inclusion criteria: Patients undergoing more than six months of fixed braces or clear aligners treatment were included in the survey.

Exclusion criteria: Patients who were inconsistent in their appointments, undergoing re-treatment, or undergoing complex orthodontic/surgical procedures such as canine exposure were excluded.

With an approximate population of 9000 orthodontic patients in the Jeddah region [19], a confidence level of 95%, a margin of error of 5%, and a response distribution of 30%, a sample size of 313 was targeted. Convenience sampling technique was followed until the desired sample size was attained.

Survey Procedure

Recruitment emails were sent to the entire sampling frame of patients. The subject column of the email described the purpose of the survey, which was to assess satisfaction with their orthodontic treatment and the extent of quality-of-life changes. Furthermore, the main content of the email contained the web link to an anonymous web-based survey. A three-month time horizon was included. Participants' response to the virtual survey was considered implicit consent.

Questionnaire

A previously validated questionnaire was slightly modified and used in this study. The Arabic translation of the questionnaire was completed by a bilingual translator and validated through back translation to English. The questionnaires assessed factors such as motivation for orthodontic treatment, expected concerns before treatment, discomfort, and any other issues affecting the level of satisfaction after orthodontic treatment [15]. This pre-tested anonymous questionnaire contained three parts. The first part collected participants' demographic details and their treatment type. The second part addressed their preferences, facilitators, and factors preventing them from undergoing orthodontic treatment. The final part measured the satisfaction ratio on a five-point Likert scale. The Likert scale was used for each satisfaction item, ranging from very dissatisfied (1 point) to very satisfied (5 points). Before disseminating the email, a rough survey draft was pilot-tested among ten patients in fixed and Invisalign treatment groups to check internal validity. Construct validity ($p=0.473$) and test-retest reliability (intraclass correlation coefficient=0.84; 95% confidence interval, 0.68-0.94) demonstrated good performance.

STATISTICAL ANALYSIS

The data were imported and analysed using Statistical Package for Social Sciences (SPSS) version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were computed to provide an overview of responses using frequencies and percentages. Inferential statistics were computed using the Chi-square and independent samples t-tests. A p -value less than 0.05 was considered statistically significant.

RESULTS

A total of 303 participants who underwent orthodontic treatment participated in this study. Out of the total, 185 (61.1%) were females. The majority belonged to the age group of 19-29 years, with 178 (58.7%). A total of 251 (82.8%) underwent fixed orthodontic treatment, whereas only 52 (17.2%) underwent clear aligners treatment.

The primary motivation for orthodontic treatment was aligning teeth and improving facial appearance for 109 (43.4%) of fixed braces users and 21 (40.3%) of clear aligner users citing this reason (p -value 0.134, not significant). Overall, motivations are similar, but social recommendations slightly favour clear aligners [Table/Fig-1].

		N (303)	Fixed-braces		Clear aligners		p-value*
			N (251)	%	N (52)	%	
What is the main objective/motivation for your desire for orthodontic treatment	To align the teeth and improve the facial appearance	130	109	43.4%	21	40.3%	p value- 0.134 χ^2 -9.778
	To continue treatment related to surgery, orthopaedics	7	7	2.0%	0	0	
	To improve eating and chewing food	43	36	14.4%	7	13.4%	
	To prevent oral cavity or gum disease in the future	17	14	5.6%	3	5.8%	
	To smile with confidence and make a good impression on others	69	57	22.8%	12	23.1%	
	Recommendations from friends, family members or others	35	27	10.8%	8	15.3%	
	To continue interdisciplinary treatment related to surgery, prosthetics etc.	2	1	0.4%	1	0.92%	

[Table/Fig-1]: Treatment motivation factors.

Chi-square test; p -value <0.05 is considered significant

Before commencing the treatment, concerns about appearance were more significant among clear aligner users (23, 44.2%) than fixed braces users (96, 38.4%), which was statistically significant ($p=0.007$). Long treatment duration worried more fixed braces users (7.6%) compared to clear aligner users (1.92%) [Table/Fig-2].

Appearance concerns were more significant for fixed braces users (76, 30.3%) than clear aligner users (10, 19.2%) during treatment, with a p-value of 0.014. Chewing discomfort was similar for both groups (22, 8.8% for fixed braces, 5, 9.6% for clear aligners).

Clear aligner users found appointment booking (23, 44.2%) more problematic than fixed braces users (72, 28.7%). Waiting times,

parking, dis-satisfaction with doctor's treatment, and staff hospitality issues affect both groups similarly. Hospital cleanliness concerns are more common among fixed braces users (4.0% vs. 1.9%). More fixed braces users (58, 23.2%) reported no issues compared to clear aligner users (6, 11.8%) [Table/Fig-3].

Assessing the treatment satisfaction levels based on age groups [Table/Fig-4] revealed that there was statistical significance in satisfaction with respect to overall treatment experienced, alignment of teeth achieved, and time duration needed for retention ($p<0.05$). In all the above factors, patients below 18 years showed higher satisfaction levels compared to other age groups.

		N (303)	Fixed-braces		Clear aligners		p-value
			N (251)	%	N (52)	%	
Concerns that bothered most before commencing orthodontic treatment	Influence on the appearance (I was concerned about my appearance as braces are showing up outside my mouth)	119	96	38.25%	23	44.23%	$p=0.007$ $\chi^2=19.232$
	Concerns about pain during treatment	77	65	25.90%	12	23.08%	
	Difficulty maintaining regular/consecutive visits	44	34	13.55%	10	19.23%	
	High cost of orthodontic treatment	25	23	9.16%	2	3.85%	
	Long treatment duration	20	19	7.57%	1	1.92%	
	Potential risks of diseases of the teeth and gums.	10	9	3.59%	1	1.92%	
	I didn't know about orthodontics	4	1	0.40%	3	5.77%	
	There is no orthodontist in my area	4	4	1.59%	0	0	

[Table/Fig-2]: Expected concerns before treatment.

Chi-square test; p-value <0.05 is considered significant

		N (303)	Fixed-braces		Clear aligners		p-value
			N (251)	%	N (52)	%	
Throughout the entire treatment process (or even after that), what made you feel the most uncomfortable?	I was worried about my looks with orthodontic appliances showing outside my mouth	86	76	30.3%	10	19.2%	$p=0.014$ $\chi^2=12.466$
	I wasn't happy with the additional visits because of the accidental loss of orthodontic brackets and wires	95	66	26.3%	29	55.70%	
	Increased brushing time due to orthodontic appliances	62	57	22.7%	5	9.6%	
	It is annoying to keep orthodontic retention appliances after finishing of orthodontic treatment	33	30	12.0%	3	5.7%	
	Orthodontic treatment hurt my mouth and cause problems during chewing	27	22	8.8%	5	9.6%	
		N (303)	Fixed-braces		Clear aligners		p-value
			N (251)	%	N (52)	%	
Which part of the hospital/clinic system was not appropriate for you during treatment?	Appointment booking	95	72	28.7%	23	44.2%	$p=0.253$ $\chi^2=0.781$
	Waiting time	68	57	22.7%	11	21.6%	
	Parking	30	25	10.0%	5	9.8%	
	Staff hospitality	13	11	4.4%	2	3.9%	
	The doctor's treatment	22	18	7.2%	4	7.8%	
	Hospital cleanliness	11	10	4.0%	1	1.9%	
	None of the above	64	58	23.2%	6	11.8%	

[Table/Fig-3]: Factors causing discomfort during and after treatment.

Chi-square test; p-value <0.05 is considered significant

Variables assessed	Age of the participants (years)						p-value
	≤18	19-29	30-39	40-49	50-59	Total	
Overall satisfaction	4.5±0.7	4.1±1.1	4.2±0.8	3.7±1.4	3.8±1.5	4.2±1.0	0.013*
Teeth alignment	4.6±0.8	4.1±1.0	4.2±0.9	3.9±1.3	3.8±1.5	4.2±1.0	0.024
Facial appearance	4.5±0.8	4.3±0.9	4.2±1.0	4.0±1.4	4.0±1.2	4.3±0.9	0.194
Eating and chewing	4.5±0.8	4.3±0.8	4.1±0.9	3.9±1.3	3.8±1.0	4.3±0.9	0.053
Smile and self-confidence	4.5±0.9	4.3±1.0	4.2±0.9	4.1±1.4	3.5±1.3	4.3±1.0	0.200
Retention	4.4±0.8	4.0±1.1	3.8±1.0	4.2±1.1	3.5±0.6	4.1±1.1	0.033
Duration of treatment	4.3±0.9	4.1±1.1	4.0±1.1	3.9±1.1	2.8±1.0	4.1±1.1	0.075
Treatment costs	4.1±1.0	3.8±1.2	3.6±1.0	3.8±1.0	3.8±1.3	3.8±1.1	0.354
Relief of previous fears of orthodontic treatment	4.5±0.8	4.4±0.8	4.4±0.8	4.0±1.1	3.8±1.0	4.4±0.8	0.138
Recommend orthodontic treatment	4.5±0.8	4.5±0.8	4.5±0.7	4.2±1.1	3.8±1.3	4.5±0.8	0.204

[Table/Fig-4]: Comparison of Satisfaction levels based on age.

Independent samples t-tests; p-value <0.05 is considered significant

Sub-group analysis of satisfaction based on gender [Table/Fig-5] revealed that there was no statistically significant difference ($p>0.05$) between the groups except for the duration of treatment (3.9 ± 1.2 vs. 4.4 ± 0.9) and treatment cost (3.7 ± 1.2 vs. 4.1 ± 1.0) with men showing more satisfaction than females ($p<0.001$).

	Gender		p-value
	Female	Male	
Overall satisfaction	4.1 ± 1.1	4.3 ± 0.9	0.710
Teeth alignment	4.1 ± 1.1	4.3 ± 0.9	0.108
Facial appearance	4.3 ± 1.0	4.3 ± 0.9	0.945
Eating and chewing	4.3 ± 0.9	4.3 ± 0.9	0.631
Smile and self-confidence	4.2 ± 1.1	4.4 ± 0.8	0.087
Retention	4.0 ± 1.1	4.2 ± 0.9	0.092
Duration of treatment	3.9 ± 1.2	4.4 ± 0.9	<0.001*
Treatment costs	3.7 ± 1.2	4.1 ± 1.0	<0.001*
Relief of previous fears of orthodontic treatment	4.3 ± 0.9	4.6 ± 0.7	0.104
Recommend orthodontic treatment	4.4 ± 0.9	4.6 ± 0.7	0.050

[Table/Fig-5]: Comparison of satisfaction levels based on gender.

Independent samples t-tests; p-value <0.05 is considered significant*

The comparison of satisfaction levels between fixed braces and Invisalign groups shows similar overall satisfaction (4.5 ± 0.8 for fixed braces, 4.5 ± 1.0 for Invisalign, $p=0.989$), with no statistical significance. Invisalign users reported slightly higher satisfaction in facial appearance (4.5 ± 0.9 vs. 4.2 ± 1.0 , $p=0.057$) and the fixed braces group was more satisfied with treatment costs (4.4 ± 0.9 vs. 4.0 ± 1.1 , $p=0.013$). Overall, satisfaction is high for both treatments [Table/Fig-6].

Overall satisfaction	Fixed-braces	Invisalign	p-value
Teeth alignment	4.2 ± 1.0	4.4 ± 1.0	0.188
Facial appearance	4.2 ± 1.0	4.5 ± 0.9	0.057
Eating and chewing	4.3 ± 0.9	4.4 ± 1.0	0.280
Smile and self-confidence	4.3 ± 0.9	4.4 ± 0.9	0.518
Retention	4.3 ± 1.0	4.2 ± 1.0	0.456
Duration of treatment	4.0 ± 1.1	4.2 ± 1.0	0.338
Treatment costs	4.4 ± 0.9	4.0 ± 1.1	0.013*
Relief of previous fears of orthodontic treatment	3.8 ± 1.1	3.9 ± 1.1	0.549
Recommend orthodontic treatment	4.4 ± 0.8	4.6 ± 0.9	0.068
Overall satisfaction	4.5 ± 0.8	4.5 ± 1.0	0.989

[Table/Fig-6]: Comparison of satisfaction levels between fixed braces and invisalign.

Independent samples t-tests; p-value <0.05 is considered significant*

DISCUSSION

This study assessed the factors affecting treatment satisfaction and quality of life changes in patients using conventional fixed orthodontic appliances versus clear aligner therapy. Key findings from the questionnaire survey of 303 participants revealed several important insights into patient experiences and satisfaction levels. In the present study, the number of female respondents (61.1%) was higher than that of males, similar to the study conducted earlier [3]. A possible explanation may be that women attach more importance to their physical appearance than males and, therefore, are more likely to seek orthodontic treatment.

The primary motivation for orthodontic treatment is aligning teeth and improving facial appearance for both groups (43.4% vs. 40.3%) with no notable differences in other parameters. Before commencing treatment, appearance concerns were significantly higher among clear aligner users (44.2%) compared to fixed braces users (38.4%). In contrast, concerns about appearance were

significant for fixed braces users (30.3%) than clear aligner users (19.2%) during treatment, indicating that fixed braces patients are more concerned about metallic looks. Additionally, clear aligner users were more troubled by the inconvenience of additional visits due to the accidental loss of aligners (55.7% vs. 26.3%). These findings suggest that while clear aligners offer aesthetic benefits, they also present unique challenges not encountered with fixed braces. Recent studies highlight that clear aligners, while advantageous in terms of aesthetics, require more diligent patient compliance and can lead to frequent disruptions due to loss or damage [20].

Appointment booking emerged as a significant issue for clear aligner users, with 44.2% reporting it as problematic, compared to 28.7% of fixed braces users. Waiting times were similar for both groups, affecting about 22% of users in each group. These findings align with previous research highlighting the logistical challenges patients face in accessing orthodontic care. Studies in dental clinics where patients had shorter waits correlated with higher satisfaction [21,22]. Ease of appointment booking also impacts satisfaction [22]. Practices can enhance satisfaction with various booking channels and timely reminders and initiate processes to reduce patient waiting time. Age and gender differences were also explored in the present study, revealing that younger patients (below 18) had higher satisfaction levels compared to older age groups. This was in contrast with Lee R et al., who reported that adult patients generally have higher adaptability and satisfaction rates in orthodontic treatments compared to younger adults [15].

Satisfaction with both orthodontic treatments was high, with an average satisfaction ratio of 90%. This included high satisfaction with teeth alignment (86%) and facial appearance (87%). However, treatment cost was a notable dissatisfaction point, particularly among clear aligner users, reflecting concerns about the higher expense of this treatment modality. Cost is a significant determinant of patient satisfaction in orthodontic care, particularly with clear aligner systems. Clear aligners, although more expensive, offer the advantage of being less conspicuous and more comfortable, as they are removable and allow for better oral hygiene [23].

A study done among the Kuwait population revealed precise aligner therapy to be more user-friendly, especially during food consumption; furthermore, mucosal ulceration was less common than with fixed appliances. However, clear aligners had issues with pronunciation and speech delivery [7]. In contrast, participants felt that both conventional fixed appliances and aligner therapy to be equally user-friendly in this study. This inconsistent result guarantees further multi-centric studies to substantiate validity.

A recent study among Canadian orthodontic patients revealed no significant differences in the overall quality of life and satisfaction scores between the two treatment groups, i.e., fixed appliances vs. Invisalign. Furthermore, the authors reported high quality-of-life scores, indicating a low negative impact of their respective appliances [6]. Similarly, a clinical trial conducted among 66 malocclusion patients treated with an equal number of traditional fixed appliances and clear aligners demonstrated no difference in treatment outcomes for either group [24]. Supporting the literature, this study also found no difference in the satisfaction level in treatment outcomes between conventional therapy and Invisalign treatment except for the cost. In contrast, a study done in a Turkish population in a private clinic reported a lower self-reported quality of life in removable and fixed patients [2].

Numerous data of evidence revealed that clear aligner patients had good periodontal health, oral hygiene, and bacterial counts compared to traditional fixed appliances. Furthermore, treatment duration can also be shorter with clear aligners than with braces [11,24-28]. These findings highlight the need for clinicians to consider patient-specific factors such as oral health status, convenience, cost, and aesthetic concerns when recommending orthodontic treatments. While clear aligners offer significant benefits

in terms of aesthetics and oral hygiene, the associated logistical and cost challenges must be addressed to enhance patient satisfaction. Clinicians should consider these factors and engage in thorough consultations with patients to align treatment choices with individual preferences and lifestyle considerations.

This study provides valuable insights into patient experiences and satisfaction with orthodontic treatments, contributing to a more patient-centered approach in orthodontic practice. Further research with larger sample sizes and diverse populations is recommended to confirm these findings and explore additional factors influencing orthodontic treatment satisfaction, such as effective communication, long-term stability, and chewing function.

Limitation(s)

Although the initial study was planned for an equal number of participants receiving conventional fixed appliances and clear aligner treatment, fewer participants registered for the clear aligner group. This unequal participation could have either inflated or deflated the original satisfaction scores. The study's limitations also include its reliance on self-reported data, which may introduce bias, and the lack of consideration for the severity of malocclusion in the questionnaire. Additionally, the sample size may not be representative of the broader population, and the study did not account for long-term satisfaction beyond the immediate treatment period.

CONCLUSION(S)

This study underscores that while clear aligners offer significant advantages in aesthetics and oral hygiene, they do not necessarily result in higher overall satisfaction compared to conventional fixed braces. Cost remains a significant factor affecting patient satisfaction, especially with clear aligners. The findings highlight the importance of considering individual patient preferences, treatment challenges, and economic factors in orthodontic treatment planning. Clinicians should engage in comprehensive consultations to ensure treatment choices align with patient needs and expectations. Future research with larger, more diverse samples and long-term follow-up is recommended to validate these insights.

REFERENCES

- [1] Lombardo G, Vena F, Negri P, Pagano S, Barillotti C, Paglia L, et al. Worldwide prevalence of malocclusion in the different stages of dentition: A systematic review and meta-analysis. *Eur J Paediatr Dent.* 2020;21(2):115-22.
- [2] Büyükbayraktar ZÇ, Doruk C. Dental anxiety and fear levels, patient satisfaction, and quality of life in patients undergoing orthodontic treatment: Is there a relationship? *Turkish J Orthod.* 2021;34(4):234-41.
- [3] Mahmood TMA, Khale M. Patient's satisfaction with orthodontic treatment in Sulaimani City. *Sulaimani Dent J.* 2016;3(1):9.
- [4] Anderson LE, Arruda A, Inglehart MR. Adolescent patients' treatment motivation and satisfaction with orthodontic treatment: Do possible selves matter? *Angle Orthod.* 2009;79(5):821-27.
- [5] Carter LA, Geldenhuys M, Moynihan PJ, Slater DR, Exley CE, Rolland SL. The impact of orthodontic appliances on eating - Young people's views and experiences. *J Orthod.* 2015;42(2):114-22.
- [6] Sharma R, Drummond R, Wiltshire W, Schroth R, Lekic M, Bertone M, et al. Quality of life in an adolescent orthodontic population. *Angle Orthod.* 2021;91(6):718-24.
- [7] Alajmi S, Shaban A, Al-Azemi R. Comparison of short-term oral impacts experienced by patients treated with Invisalign or conventional fixed orthodontic appliances. *Med Princ Pract.* 2020;29(4):382-88.
- [8] Li Q, Du Y, Yang K. Comparison of pain intensity and impacts on oral health-related quality of life between orthodontic patients treated with clear aligners and fixed appliances: A systematic review and meta-analysis. *BMC Oral Health.* 2023;23(1):920.
- [9] d'Apuzzo F, Perillo L, Carrico CK, Castroflorio T, Grassia V, Lindauer SJ, et al. Clear aligner treatment: Different perspectives between orthodontists and general dentists. *Prog Orthod.* 2019;20(1):10.
- [10] Ke Y, Zhu Y, Zhu M. A comparison of treatment effectiveness between clear aligner and fixed appliance therapies. *BMC Oral Health.* 2019;19(1):24.
- [11] Chou B, Nickel JC, Choi D, Garfinkle JS, Freedman HM, Iwasaki LR. Outcome assessment of orthodontic clear aligner vs fixed appliance treatment in adolescents with moderate to severe malocclusions. *Angle Orthod.* 2023;93(6):644-51.
- [12] Javed O, Bernabé E. Oral Impacts on quality of life in adult patients with Class I, II and III malocclusion. *Oral Health Prev Dent.* 2016;14(1):27-32.
- [13] Dimberg L, Arnup K, Bondemark L. The impact of malocclusion on the quality of life among children and adolescents: A systematic review of quantitative studies. *Eur J Orthod.* 2015;37(3):238-47.
- [14] Bernabé E, Flores-Mir C, Sheiham A. Prevalence, intensity and extent of oral impacts on daily performances associated with self-perceived malocclusion in 11-12-year-old children. *BMC Oral Health.* 2007;7:6. Available from: <https://doi.org/10.1186/1472-6831-7-6>.
- [15] Lee R, Hwang S, Lim H, Cha JY, Kim KH, Chung CJ. Treatment satisfaction and its influencing factors among adult orthodontic patients. *Am J Orthod Dentofacial Orthop.* 2018;153(6):808-17.
- [16] Feldmann I. Satisfaction with orthodontic treatment outcome. *Angle Orthod.* 2014;84(4):581-87.
- [17] Papageorgiou SN, Koletsi D, Iliadi A, Peltomaki T, Eliades T. Treatment outcome with orthodontic aligners and fixed appliances: A systematic review with meta-analyses. *Eur J Orthod.* 2020;42(3):331-43.
- [18] Kakkamanos EG, Makrygiannakis MA, Athanasiou AE. Oral health-related quality of life throughout treatment with clear aligners in comparison to conventional metal fixed orthodontic appliances: A systematic review. *Int J Environ Res Public Health.* 2023;20(4):3537.
- [19] Al-Hummayani FM, Taibah SM. Orthodontic treatment needs in Saudi young adults and manpower requirements. *Saudi Med J.* 2018;39(8):822-28.
- [20] AlMogbel A. Clear aligner therapy: Up to date review article. *J Orthod Sci.* 2023;12:37. Doi: 10.4103/jos.jos_30_23.
- [21] Kreitz TM, Winters BS, Pedowitz DI. The influence of wait time on patient satisfaction in the orthopaedic clinic. *J Patient Exp.* 2016;3(2):39-42.
- [22] Chang WJ, Chang YH. Patient satisfaction analysis: Identifying key drivers and enhancing service quality of dental care. *J Dent Sci.* 2013;8(3):239-47.
- [23] Malik OH, McMullin A, Waring DT. Invisible orthodontics part 1: Invisalign. *Dent Update.* 2013;40(3):203-14.
- [24] Lin E, Julien K, Kesterke M, Buschang PH. Differences in finished case quality between Invisalign and traditional fixed appliances. *Angle Orthod.* 2022;92(2):173-79.
- [25] Rossini G, Parrini S, Castroflorio T, Deregius A, Debernardi CL. Periodontal health during clear aligners treatment: A systematic review. *Eur J Orthod.* 2015;37(5):539-43.
- [26] Jiang Q, Li J, Mei L, Du J, Levrini L, Abbate GM, et al. Periodontal health during orthodontic treatment with clear aligners and fixed appliances: A meta-analysis. *J Am Dent Assoc.* 2018;149(8):712-20.
- [27] White DW, Julien KC, Jacob H, Campbell PM, Buschang PH. Discomfort associated with Invisalign and traditional brackets: A randomized, prospective trial. *Angle Orthod.* 2017;87(6):801-08.
- [28] Buschang PH, Shaw SG, Ross M, Crosby D, Campbell PM. Comparative time efficiency of aligner therapy and conventional edgewise braces. *Angle Orthod.* 2014;84(3):391-96.

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