EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Coden USA: EJBPBO
Volume: 13
Issue: 11
Year: 2026

AN ASSESSMENT OF PARENTAL KNOWLEDGE, AWARENESS AND PERCEPTION OF INVISALIGN THERAPY IN CHILDREN DURING MIXED DENTITION: A CROSS-SECTIONAL STUDY

Divyaprakash Tripathi*

Rishiraj College of Dental Science and Research Centre, Bhopal, -India.

***Corresponding Author: Divyaprakash Tripathi**

Rishiraj College of Dental Science and Research Centre, Bhopal, -India.

DOI: https://doi.org/10.5281/zenodo.23911626

How to cite this Article: Divyaprakash Tripathi* (2026). An Assessment Of Parental Knowledge, Awareness And Perception Of Invisalign Therapy In Children During Mixed Dentition: A Cross-Sectional Study. European Journal of Biomedical and Pharmaceutical Sciences, 13(11), 297–301.

This work is licensed under Creative Commons Attribution 4.0 International license.

Article Received on 05/10/2026 **Article Revised on 25/10/2026** **Article Published on 03/11/2026**

ABSTRACT

Background: Early orthodontic intervention during the mixed dentition stage is crucial for guiding craniofacial growth and managing developing malocclusions. Invisalign therapy, particularly with systems like Invisalign First, offers an esthetic, comfortable, and removable alternative to traditional appliances. Parental knowledge, awareness, and perception play a key role in treatment acceptance and compliance. **Aim:** To assess parental knowledge, awareness, and perception regarding Invisalign therapy for children during the mixed dentition stage in Bhopal city, Madhya Pradesh. **Materials and Methods:** A cross-sectional, questionnaire-based survey was conducted among parents of children aged 6–12 years attending private dental clinics. A structured, pre-validated online questionnaire assessed demographic details, knowledge, awareness, and perception of Invisalign therapy. Responses were collected anonymously, out of 500 responses a total of 400 completed questionnaires were analyzed. Descriptive statistics were used to summarize categorical variables. **Results:** Approximately 70% of parents had heard of Invisalign therapy, while 57.8% were aware of its use during mixed dentition. Most parents recognized its transparency and removability (91.1%) and ability to correct crowding, spacing, and crossbite (85.6%). About 78.9% knew the recommended wear duration, and 90% were aware of higher costs compared to traditional appliances. Discussions with dentists occurred in 60% of parents, while 78.9% obtained information from non-dental sources. A majority perceived Invisalign as more comfortable (85.6%), esthetic (90%), and easier for children to adapt to (88.9%). Despite cost concerns, 88.9% were willing to choose Invisalign for their child, and 95.6% would recommend it to others. **Conclusion:** Parents generally exhibit a positive attitude and preference for Invisalign therapy over traditional braces, driven by esthetic appeal, comfort, and adaptability. Knowledge gaps and cost concerns persist, highlighting the need for targeted education and professional guidance to improve acceptance, compliance, and overall pediatric orthodontic outcomes.

KEYWORDS: Invisalign therapy, mixed dentition, parental perception, pediatric orthodontics, clear aligners.

INTRODUCTION

Early orthodontic intervention during the mixed dentition period plays a critical role in guiding craniofacial growth, preventing progression of malocclusion, and reducing the complexity of future orthodontic treatment. Traditionally, removable and fixed orthodontic appliances have been used in interceptive orthodontics; however, these appliances are often associated with limitations such as poor esthetics, discomfort, speech difficulties, and compliance issues in children.[1]

Invisalign therapy, based on clear aligner technology, has emerged as a contemporary orthodontic treatment modality offering advantages such as improved esthetics, comfort, removability, and better oral hygiene maintenance. With the introduction of Invisalign systems specifically designed for children, such as Invisalign First, its application during the mixed dentition phase has gained increasing attention. Invisalign in the mixed dentition allows early interception of developing malocclusions, helping to guide the proper eruption of permanent teeth, correct mild crowding, spacing issues,

anterior crossbites, and certain functional problems.[2] The system's staged and customizable treatment approach adapts to the dynamic nature of the mixed dentition, enabling orthodontists to make periodic modifications as new teeth erupt. Early use of clear aligners can reduce the complexity and duration of later treatments with fixed appliances, improve patient comfort, and increase cooperation due to its removable and esthetic nature. Despite its growing popularity, parental knowledge, awareness, and perception play a decisive role in acceptance, affordability, compliance, and overall treatment success in pediatric patients. Educating parents about the benefits, limitations, and realistic expectations of Invisalign therapy in children is therefore essential for achieving optimal outcomes.[3]

In India, literature assessing parental understanding and perception of Invisalign therapy for children in the mixed dentition stage remains limited. Evaluating these parameters is essential to identify knowledge gaps, misconceptions, and barriers to acceptance of early orthodontic interventions using clear aligners. Such insights can help dental professionals provide targeted education, set realistic expectations, and improve treatment uptake. Therefore, the present study was conducted to assess parental knowledge, awareness, and perception of Invisalign therapy specifically during the mixed dentition phase, where early intervention can guide tooth eruption, correct developing malocclusions, and potentially reduce the need for more extensive orthodontic treatment later.[4]

AIM AND OBJECTIVES

Aim: To assess parental knowledge, awareness, and perception regarding Invisalign therapy in children during the mixed dentition stage in Bhopal city, Madhya Pradesh.

Objectives

1. To evaluate parental awareness and knowledge about Invisalign therapy for children.
2. To assess parental perception regarding comfort, esthetics, adaptability, and cost of Invisalign therapy.
3. To determine parental willingness to opt for and recommend Invisalign therapy for their children.

MATERIALS AND METHODOLOGY

Study Design and Setting

A cross-sectional, questionnaire-based survey was conducted among parents of children in the mixed dentition stage attending private dental clinics in Bhopal city.

Study Population and Sample Size

Parents of children aged between 6–12 years presenting with mixed dentition were included in the study. A total of 500 parents were initially approached to participate. Incomplete and partially filled questionnaires were excluded, and only fully completed responses were considered for final analysis. A total of 400 completed questionnaires were included in the study.

Study Tool

A structured, pre-validated online questionnaire was developed using Google Forms. The questionnaire consisted of four sections: Demographic details, Knowledge regarding Invisalign therapy, Awareness about clinical use and limitations of Invisalign and Perception and attitude toward Invisalign therapy in children.

Data Collection

The questionnaire link was distributed through the dental OPDs of private clinics in Bhopal city. Informed consent was obtained electronically from all participants prior to participation. Responses were collected anonymously to ensure confidentiality. A total of 500 parents participated in the study.

Statistical Analysis

The collected data were compiled in Microsoft Excel and analyzed using IBM SPSS statistical software (Version 25; IBM, Armonk, NY, USA). Descriptive statistics were used to express categorical variables as frequencies and percentages.

RESULTS

A total of 400 parents participated in the study. Descriptive analysis revealed that 54.4% of parents noticed malocclusion or irregularity in their child's teeth prior to visiting the dentist, while 45.6% did not. The majority of parents (82.2%) reported that the pediatric dentistry clearly explained their child's dental or jaw problem.

For **Knowlegde** approximately 70% of parents had prior awareness of Invisalign therapy for children before visiting the clinic. Awareness regarding its use during the mixed dentition stage was observed in 57.8% of participants. A high proportion of parents recognized that Invisalign aligners are transparent and removable (91.1%), and that they are effective in correcting common malocclusions such as crowding, spacing, and crossbite (85.6%). Additionally, 78.9% of parents were aware that aligners need to be worn for 20–22 hours per day, while 90% acknowledged that this treatment modality is generally more expensive than conventional orthodontic appliances. However, despite this overall awareness, a notable proportion of parents demonstrated confusion between Invisalign and other clear aligner systems, indicating a gap in precise knowledge and differentiation between these orthodontic modalities.

For **Awareness** Discussion about Invisalign therapy with a dentist had occurred in 60% of parents. Additionally, 78.9% reported learning about Invisalign from non-dental sources such as the internet and social media, highlighting the role of external information channels in shaping parental awareness.

Perception Overall, parents demonstrated a positive perception of Invisalign therapy in children, particularly regarding its esthetic appeal, comfort, and potential to correct early malocclusions during the mixed dentition phase. Parental perception was also influenced by factors such as cost, treatment duration, and the perceived need for professional guidance before considering aligner therapy.

Table 1: Shows Knowledge, Awareness & Perception of parents.

Domain	Findings
Knowledge	70% knew about Invisalign; 57.8% knew it can be used in mixed dentition. 91.1% knew aligners are transparent/removable; 85.6% knew they correct malocclusion.
Awareness	82.2% received proper explanation from pedodontist; 60% discussed Invisalign with dentist. 78.9% learned about Invisalign from social media/internet.
Perception	85.6% felt Invisalign is more comfortable; 90% felt it is more esthetic. 88.9% preferred Invisalign for their child despite cost concerns (87.8%).

Regarding perception, 85.6% believed Invisalign to be more comfortable for children compared to traditional appliances, and 90% felt it provided better esthetics. Most parents (88.9%) felt children adapt more easily to Invisalign than removable acrylic appliances. The higher cost was perceived as a barrier by 87.8% of parents. Despite this, 88.9% stated they would choose Invisalign therapy for their child if recommended by a pediatric dentistry, and 95.6% were willing to recommend it to other parents following a positive experience.(Table.1)

DISCUSSION

With respect to clinical effectiveness, studies have demonstrated that Invisalign First can produce predictable arch expansion and alignment in mixed dentition patients. Kim et al. (2024) reported favorable predictability of arch expansion using Invisalign first also confirmed its efficiency in promoting expansion movements in children.[1]

The present study also demonstrated a strong parental preference for Invisalign therapy due to its esthetics, comfort, and ease of use. This is consistent with the findings of Kalaoglu and Dumanli Gok (2024), who reported higher acceptability of Invisalign First compared to removable acrylic appliances among children in mixed dentition. Improved comfort, reduced irritation, and better oral hygiene maintenance contribute significantly to this preference, ultimately enhancing compliance in pediatric patients.[2]

Additionally, Levrini et al. (2025) concluded that clear aligners are effective in achieving maxillary expansion, although outcomes may vary depending on case complexity.[3]

The high level of general awareness about Invisalign observed in this study can be attributed to digital media and social exposure. However, this awareness often lacks clinical depth, as also noted by Inchingolo et al. (2024), who reported that although clear aligners are widely recognized, their appropriate application in growing patients requires careful case selection and professional supervision.[4]

However, when compared to conventional appliances, certain limitations exist. Bruni et al. (2024) found that although clear aligners increase palatal volume and surface area, rapid palatal expanders may produce more significant skeletal changes.[5]

Early orthodontic intervention during mixed dentition plays a crucial role in guiding craniofacial growth and preventing the progression of malocclusion. This is strongly supported by Oancea et al. (2019), who emphasized the importance of early diagnosis and interceptive orthodontics in improving long-term outcomes[6]. In the present study, a considerable proportion of parents were able to identify malocclusion early, which reflects increasing awareness; however, knowledge regarding the timing and specific indications of Invisalign therapy was still limited.

Rutili et al. (2022) concluded that both rapid maxillary expansion (RME) and slow maxillary expansion (SME) are generally well accepted by growing patients. However, slow maxillary expansion was associated with better patient-reported outcomes, including less pain and discomfort, while achieving comparable treatment effectiveness.[7]

Similarly Ozsoy et al. (2024) highlighted that traditional expansion techniques (rapid or slow maxillary expansion) may provide superior skeletal outcomes compared to aligners, which are primarily effective for dentoalveolar movements. These findings emphasize the importance of appropriate case selection and realistic treatment expectations.[8]

Gonçalves et al. (2023) concluded that Invisalign First® is effective in achieving maxillary arch expansion during the mixed dentition stage. It provides a predictable and clinically efficient method for correcting mild to moderate transverse discrepancies in growing children.[9]

Blevins described the use of Invisalign First for Phase I orthodontic treatment in growing children. This approach offers a removable and aesthetic option for managing selected developing malocclusions during mixed dentition. However, treatment selection and appliance

wear compliance remain important considerations.[10] Staderini et al. reported the use of clear aligners for early correction of anterior crossbite through a case series. Their findings suggest that aligners may be considered for selected cases requiring early incisor correction. As this was a case series, larger controlled studies are needed to establish comparative effectiveness.[11]

Levrini et al. evaluated changes in maxillary arch dimensions following Invisalign First treatment in 20 children. The study assessed arch width, perimeter, depth, molar inclination and alveolar expansion. The authors suggested that clear aligners may be an alternative for mild crowding or limited transverse maxillary deficiency.[12]

Lione et al. prospectively evaluated maxillary transverse changes in 23 children treated with Invisalign First. The study examined changes in interdental widths using digital dental models. This research provides clinical evidence regarding the expansion potential of aligners in early mixed dentition, although the relatively small sample limits generalisation.[13] The study compared maxillary arch changes following rapid maxillary expansion and Invisalign First treatment. It used geometric morphometric analysis to assess arch-shape changes. The retrospective design limits the strength of the findings.[14] The study evaluated gingival-margin changes in 18 children treated with Invisalign First. Changes in gingival-margin height and deciduous canine inclination were observed. Further studies are needed to confirm these preliminary findings.[15]

The study compared clear aligners with 2 × 4 fixed appliances for maxillary incisor correction. Both methods showed similar treatment efficacy and duration. Appliance selection may depend on clinical needs and patient preference.[16] This pilot study evaluated clear aligners for lower-incisor crowding in 13 children. It explored changes in crowding and arch dimensions. The small sample size limits the generalisability of its findings.[17] This randomised trial compared clear aligners with a removable inclined plane for anterior crossbite correction. Both treatments were effective, with differences in certain dental and arch measurements. Clear aligners may be useful in selected cases.[18] This scoping review examined clear-aligner therapy in children with mixed dentition. It highlighted potential applications in selected malocclusions and the importance of compliance. More high-quality clinical studies are needed.[19]

The study compared clear aligners with a Z-spring appliance for anterior crossbite correction. Both methods were effective, while the Z-spring showed a shorter treatment duration. Appliance choice should consider clinical requirements and treatment time.[20] This retrospective study evaluated Invisalign First expansion in children with mixed dentition. Increases in maxillary arch dimensions and reduced crowding were reported. Further studies are needed to confirm these results.[21]

Overall, the findings of the present study are consistent with current evidence, which supports the use of clear aligners in mixed dentition for selected cases while acknowledging their limitations. The increasing parental preference for aligners reflects a shift toward more esthetic and comfortable treatment options. However, the presence of knowledge gaps and cost concerns underscores the need for enhanced patient education and effective communication. Integrating clinical evidence with proper counseling can improve treatment acceptance, compliance, and overall orthodontic outcomes in children.

CONCLUSION

The study revealed that parents generally exhibit a positive attitude and favorable perception toward Invisalign therapy in children, especially due to its esthetic appeal, comfort, and adaptability during the mixed dentition stage. Parents increasingly prefer aligners over traditional braces, driven by concerns for esthetic, less visible, and removable treatment options. Despite this positive outlook, gaps remain in awareness regarding indications, duration, and cost of treatment. Targeted education and clear communication by dental professionals can address these gaps, improve treatment acceptance and compliance, and ultimately contribute to more effective and satisfactory orthodontic outcomes in pediatric patients.

Clinical Significance

The findings indicate that although Invisalign therapy is well accepted among parents due to its esthetics and comfort, gaps in knowledge and misconceptions regarding its indications and cost persist.

Parental awareness significantly influences treatment acceptance and compliance; therefore, pediatric dentists play a key role in providing accurate information and appropriate case selection. Clear aligners should be recommended judiciously during mixed dentition, ensuring realistic expectations and optimal orthodontic outcomes.

Conflicts of interest

There are no conflicts of interest.

REFERENCE

1. Kim CH, Moon SJ, Kang CM, Song JS. The predictability of arch expansion with the Invisalign First system in children with mixed dentition: a retrospective study. Journal of Clinical Pediatric Dentistry, 2024 Jan 1; 48(1).
2. Kalaoglu EE, Dumanli Gok G. Comparison of acceptability of orthodontic appliances in children in mixed dentition treated with removable acrylic appliances and Invisalign first: a cross-sectional study. BMC Oral Health, 2024 Oct 23; 24(1): 1270.

3. Levrini L, Zecca PA, Borgese M, Scurati EI, Deppieri A, Saran S, Caccia M, Carganico A. Efficacy of maxillary expansion with clear aligner in the mixed dentition: a systematic review. Applied Sciences, 2025 Jun 27; 15 (13): 7233.
4. Inchingolo AD, Dipalma G, Ferrara I, Viapiano F, Netti A, Ciocia AM, Mancini A, Malcangi G, Palermo A, Inchingolo AM, Inchingolo F. Clear aligners in the growing patient: a systematic review. Children, 2024 Mar 23; 11(4): 385.
5. Bruni, A.; Ferrillo, M.; Gallo, V.; Parrini, S.; Garino, F.; Castroflorio, T.; Deregibus, A. Efficacy of clear aligners vs. rapid palatal expanders on palatal volume and surface area in mixed dentition patients: A randomized controlled trial. Am. J. Orthod. Dentofac. Orthop, 2024, 166, 203–214.
6. Oancea, R.; Funieru, C.; Sfeatcu, R.; Jumanca, D. Interceptive Orthodontics in Primary and Mixed Dentition: The Importance of Early Diagnosis. Jurnalul Pediatrului, 2019; 18.
7. Rutili, V.; Nieri, M.; Franceschi, D.; Pierleoni, F.; Giuntini, V.; Franchi, L. Comparison of rapid versus slow maxillary expansionon patient-reported outcome measures in growing patients: A systematic review and meta-analysis. Prog. Orthod, 2022; 23: 47.
8. Ozsoy, S.; Aksoy, P.C.; Polat Ozsoy, O. Evaluation of maxillary dimensional changes in the mixed dentition: Clear aligners vs. acrylic expanders. Angle Orthod, 2024; 94: 392–399.
9. Goncalves, A.; Ayache, S.; Monteiro, F.; Silva, F.S.; Pinho, T. Efficiency of Invisalign First(R) to promote expansion movement in mixed dentition: A retrospective study and systematic review. Eur. J. Paediatr. Dent, 2023; 24: 112–123.
10. Blevins R. Phase I orthodontic treatment using Invisalign First. J Clin Orthod, 2019; 53(2): 73–83.
11. Staderini E, Patini R, Meuli S, Camodeca A, Guglielmi F, Gallenzi P. Indication of clear aligners in the early treatment of anterior crossbite: a case series. Dental Press J Orthod, 2020; 25(4): 33–43. doi:10.1590/2177-6709.25.4.033-043.oar.
12. Levrini L, Carganico A, Abbate L. Maxillary expansion with clear aligners in the mixed dentition: a preliminary study with Invisalign First system. Eur J Paediatr Dent, 2021; 22(2): 125–128. doi:10.23804/ejpd.2021.22.02.7.
13. Lione R, Cretella Lombardo E, Paoloni V, Meuli S, Pavoni C, Cozza P. Upper arch dimensional changes with clear aligners in the early mixed dentition: a prospective study. J Orofac Orthop, 2023; 84(1): 33–40. doi:10.1007/s00056-021-00332-z.
14. Cretella Lombardo E, Paoloni V, Fanelli S, Pavoni C, Gazzani F, Cozza P. Evaluation of the upper arch morphological changes after two different protocols of expansion in early mixed dentition: rapid maxillary expansion and Invisalign First system. Life (Basel), 2022; 12(9): 1323. doi:10.3390/life12091323.
15. Lione R, Gazzani F, Moretti S, Danesi C, Cretella Lombardo E, Pavoni C. Gingival margins' modifications during orthodontic treatment with Invisalign First: a preliminary study. Children (Basel), 2022; 9(10): 1423. doi:10.3390/children9101423.
16. da Silva VM, Ayub PV, Massaro C, Janson G, Garib D. Comparison between clear aligners and 2 × 4 mechanics in the mixed dentition: a randomized clinical trial. Angle Orthod, 2023; 93(1): 3–10. doi:10.2319/032322-237.1.
17. Gazzani F, Pavoni C, Loberto S, Caruso S, Cozza P. Severe crowding associated with lower canine premature resorption: interceptive treatment with clear aligners—a pilot study. Children (Basel), 2024; 11(4): 451. doi:10.3390/children11040451.
18. Salem AS, Albelasy NF, El-Bialy AA. Effectiveness of clear aligner versus removable inclined plane in treatment of anterior crossbite in mixed dentition: a randomized clinical trial. J World Fed Orthod, 2025; 14(3): 125–130. doi:10.1016/j.ejwf.2024.11.001.
19. Rai K, Kote AR, Priya K, et al. Effectiveness of clear aligner therapy in orthodontic management for children with mixed dentition: a scoping review. Int J Clin Pediatr Dent, 2025; 18(10): 1294–1304. doi:10.5005/jp-journals-10005-3280.
20. Gok BN, Gungor AY, Erken Gungor O. Effect of clear aligners and Z-spring appliance on anterior crossbite correction and quality of life in the mixed dentition: a randomized clinical trial. Angle Orthod, 2026; 96(1): 41–52. doi:10.2319/022125-154.1.
21. Wang Q, Wang C, Chen Y, Fu Y, Shi J. Skeletal and dental-alveolar changes with Invisalign First expansion system in the mixed dentition: a retrospective study. Orthod Craniofac Res, 2026; 29(2): 237–246. doi:10.1111/ocr.70069.
22. Sipiyaruk K, Chintavalakorn R, Nakornnoi T. Clear aligner therapy for early orthodontic treatment in children aged 6–13 years: a scoping review of clinical performance and evidence gaps. J World Fed Orthod, 2026; 15(4): 339–353. doi:10.1016/j.ejwf.2026.06.001