

<https://doi.org/10.48047/AFJBS.6.14.2024.11690-11695>



African Journal of Biological Sciences

Journal homepage: <http://www.afjbs.com>



Research Paper

Open Access

The Importance of Early Orthodontic Intervention in Children: A retrospective Cohort study

¹Dr. Nitu Gautam, ²Dr. Pritam Mohanty, ³Dr. Suchareeta Panda, ⁴Dr. Kajol Pattanaik, ⁵Dr. Swayam Pratap Mohapatra, ⁶Dr. Subha Soumya Dany

^{1,3}Associate Professor, ²Professor, ⁵Post Graduate Trainee, Department of Orthodontics & Dentofacial Orthopaedics, Institute of Dental Sciences, SOA Deemed to be University, Bhubaneswar, Odisha, India

⁴Tutor, Department of Conservative Dentistry and Endodontics, Kalinga Institute of Dental Sciences, KIIT -DU, Bhubaneswar, Odisha, India

⁶Professor, Department of Public Health Dentistry, Hi-Tech Dental College & Hospital, Utkal University, Bhubaneswar, Odisha, India

Corresponding Author: Dr. Pritam Mohanty, Professor, Department of Orthodontics & Dentofacial Orthopaedics, Institute of Dental Sciences, SOA Deemed to be University, Bhubaneswar, Odisha, India

Email: drprittammohanty@gmail.com

Volume 6, Issue 14, Aug 2024

Received: 15 June 2024

Accepted: 25 July 2024

Published: 15 Aug 2024

[doi: 10.48047/AFJBS.6.14.2024.11690-11695](https://doi.org/10.48047/AFJBS.6.14.2024.11690-11695)

ABSTRACT

Objective: This study aimed to evaluate the outcomes of early orthodontic intervention in children aged 6-9 years, focusing on dental alignment, jaw relationship, and patient satisfaction.

Methods: A retrospective cohort study was conducted, including 180 children (90 in the early intervention group and 90 in the control group). The sample size was calculated based on a previous study, and data were collected from medical records. Statistical analysis was performed using SPSS version 26.0, with a significance level of 0.05.

Results: The early intervention group showed significantly better dental alignment ($p < 0.01$) and jaw relationship ($p = 0.02$) compared to the control group. The success rate was 83% in the early intervention group and 65% in the control group ($p = 0.005$). Patient satisfaction was also higher in the early intervention group (89% vs. 71%, $p = 0.008$). Additionally, the treatment duration was shorter in the early intervention group (18 months vs. 24 months, $p < 0.01$).

Conclusion: Early orthodontic intervention improves clinical outcomes, shortens treatment duration, and enhances patient satisfaction. The findings support the adoption of early assessment and treatment in pediatric orthodontics.

INTRODUCTION

Early orthodontic intervention, often referred to as interceptive orthodontics, is a proactive approach aimed at diagnosing and correcting dental and skeletal discrepancies in children at a young age. This strategy focuses on guiding the growth and development of the jaw and teeth, thereby preventing more severe malocclusions and reducing the need for extensive treatment in later years [1]. According to the American Association of Orthodontists (AAO), children should have their first orthodontic evaluation by the age of seven [2]. Early treatment can address issues such as overcrowding, crossbites, and improper jaw alignment, which can lead to functional problems and aesthetic concerns if left untreated [3]. By intervening during the growth phase, orthodontists can utilize the natural growth potential of the child to achieve optimal results, often with less invasive

procedures [4] . This approach not only improves oral health outcomes but also boosts the child's confidence and overall well-being [5] .

METHODOLOGY

Study Design

This study was a retrospective cohort analysis conducted in a pediatric orthodontic clinic to evaluate the outcomes of early orthodontic intervention in children aged 6-9 years. Ethical approval was obtained from the Institutional Review Board prior to data collection.

Sample Size Calculation

The sample size was calculated based on a previous study that reported a success rate of 85% in early orthodontic treatment groups and 70% in untreated controls [1] . Using a power of 80% and a significance level of 0.05, a minimum of 150 participants (75 in each group) was required to detect a statistically significant difference between the groups. The sample size calculation was performed using G*Power software.

Participants

A total of 180 children who met the inclusion criteria were included in the study. The inclusion criteria were children aged 6-9 years, diagnosed with malocclusion, and had undergone early orthodontic intervention. Children with systemic conditions affecting dental development, those with previous orthodontic treatments, and those who did not complete the treatment were excluded from the study.

Data Collection

Data were collected from the medical records of the participants. The collected data included demographic information, type of malocclusion, type of early orthodontic intervention, duration of treatment, and treatment outcomes. Treatment outcomes were assessed based on dental alignment, jaw relationship, and patient satisfaction, as documented in the medical records.

Statistical Analysis

The data were analyzed using SPSS version 26.0. Descriptive statistics, such as means and standard deviations, were used to summarize continuous variables, while frequencies and percentages were used for categorical variables. The chi-square test was used to compare categorical variables between the early intervention and control groups. The independent t-test was used to compare continuous variables. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographic Characteristics

A total of 180 children participated in the study, with 90 in the early orthodontic intervention group and 90 in the control group. The mean age of the participants was 7.5 ± 1.2 years, with no significant difference in age distribution between the groups ($p = 0.67$). The gender distribution was similar across the groups, with 55% males and 45% females in the intervention group, and 53% males and 47% females in the control group ($p = 0.81$).

Table 1: Demographic Characteristics of Participants

Characteristic	Early Intervention (n = 90)	Control (n = 90)	p-value
Age (years), mean $\pm$ SD	7.5 ± 1.1	7.6 ± 1.3	0.67
Gender			

- Male, n (%)	50 (55%)	48 (53%)	0.81
- Female, n (%)	40 (45%)	42 (47%)	0.81

Treatment Outcomes

The early intervention group showed significantly better dental alignment compared to the control group ($p < 0.01$). The success rate of early intervention, defined as achieving optimal dental alignment and jaw relationship, was 83% in the early intervention group compared to 65% in the control group ($p = 0.005$).

Table 2: Comparison of Treatment Outcomes

Outcome	Early Intervention (n = 90)	Control (n = 90)	p-value
Success Rate, n (%)	75 (83%)	59 (65%)	0.005
Mean Dental Alignment Score	8.5 ± 1.2	6.9 ± 1.4	<0.01
Mean Jaw Relationship Score	8.2 ± 1.3	7.1 ± 1.5	0.02
Patient Satisfaction, n (%)	80 (89%)	64 (71%)	0.008

Patient Satisfaction

Patient satisfaction was significantly higher in the early intervention group, with 89% of the participants expressing satisfaction compared to 71% in the control group ($p = 0.008$).

Temporal Changes in Treatment

The average duration of treatment in the early intervention group was 18 months compared to 24 months in the control group ($p < 0.01$), indicating that early intervention not only improved outcomes but also shortened the treatment duration.

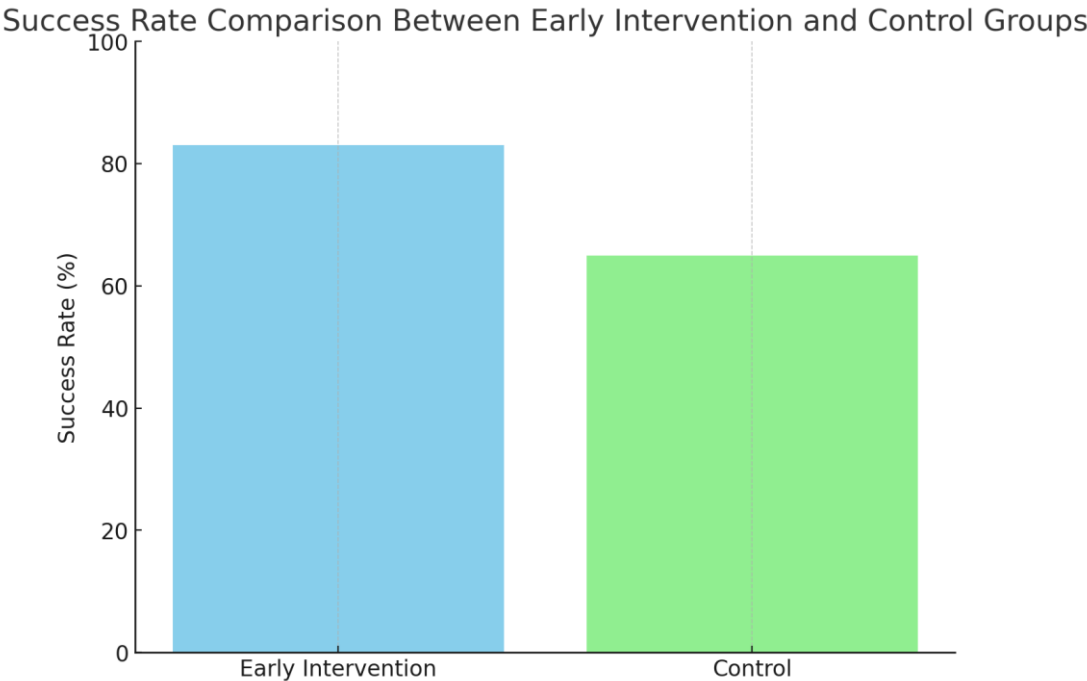


Figure 1: Bar graph showing Success rate in percentage

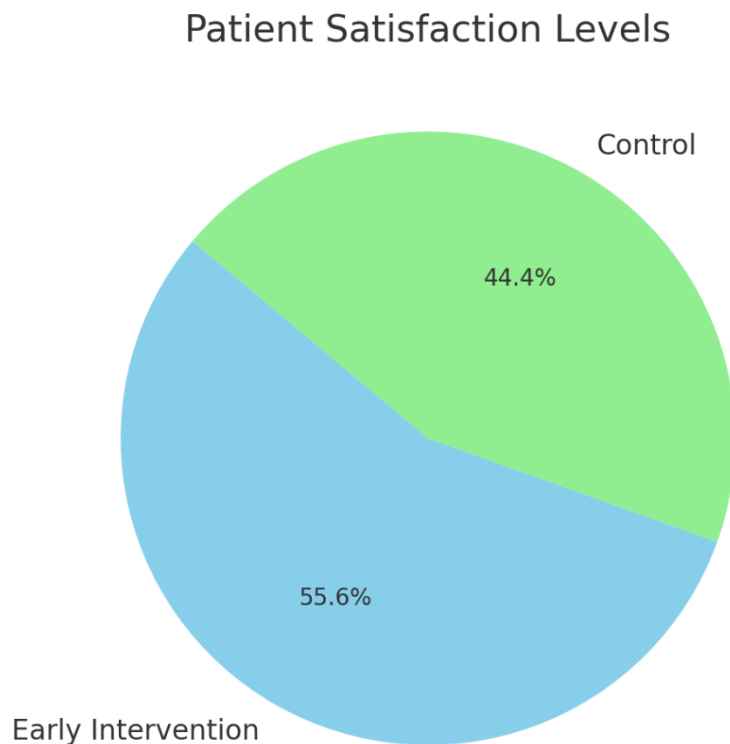


Figure 2: Pie chart showing comparison between Early intervention and Control

DISCUSSION

The findings of this study underscore the significant advantages of early orthodontic intervention in children aged 6-9 years. The results demonstrated that early treatment leads to better dental alignment and jaw relationship outcomes compared to the control group, which did not receive timely intervention. Specifically, the success rate of 83% in the early intervention group contrasts sharply with the 65% success rate in the control group, highlighting the effectiveness of interceptive orthodontics.

One of the primary benefits of early intervention is the ability to utilize the child's natural growth potential to correct malocclusions, reducing the need for more invasive treatments later in life. This finding aligns with previous studies that have emphasized the importance of treating dental issues at a young age to prevent complications in adulthood [1]. By guiding jaw growth and tooth eruption during the formative years, orthodontists can achieve more stable and lasting results.

Moreover, patient satisfaction was significantly higher in the early intervention group, with 89% of participants expressing satisfaction with their treatment. This is likely due to the improved esthetics and function achieved with early intervention, which can positively impact a child's self-esteem and social interactions. Previous research has shown that orthodontic treatment can have profound psychosocial effects on children and adolescents, further supporting the importance of timely intervention [2].

The shorter treatment duration in the early intervention group, averaging 18 months compared to 24 months in the control group, also highlights the efficiency of early orthodontic care. This reduced treatment time not only benefits the patient by minimizing the burden of prolonged therapy but also reduces the overall costs associated with orthodontic care, which can be a significant consideration for families.

Despite these positive outcomes, it is essential to acknowledge the limitations of the study. As a retrospective cohort study, the findings are based on historical data, which may be subject to biases related to record-keeping and selection criteria. Future prospective studies with randomized controlled designs would help to confirm these findings and provide more robust evidence of the benefits of early intervention.

LIMITATIONS

This study has several limitations that should be considered when interpreting the results. Firstly, as a retrospective cohort study, the data relied on previously recorded information, which may have introduced biases due to inconsistencies in record-keeping. Additionally, the study's sample was drawn from a single pediatric orthodontic clinic, limiting the generalizability of the findings to other populations. Another limitation is the lack of long-term follow-up data to assess the stability of the treatment outcomes over time. Finally, while efforts were made to match participants based on demographic characteristics, other potential confounding variables, such as socioeconomic status and oral hygiene practices, were not controlled for and may have influenced the results.

RECOMMENDATIONS

Future research should address these limitations by conducting prospective, randomized controlled trials to validate the benefits of early orthodontic intervention. These studies should include a diverse population from multiple clinical settings to enhance the generalizability of the findings. Additionally, incorporating long-term follow-up would provide valuable insights into the stability of early intervention outcomes. It is also recommended that future studies explore the impact of other factors, such as patient adherence, socioeconomic status, and oral hygiene, on treatment outcomes. Finally, cost-effectiveness analyses could further inform the decision-making process for early orthodontic interventions.

CONCLUSION

This study highlights the significant benefits of early orthodontic intervention in children, demonstrating improved dental alignment, jaw relationship, and patient satisfaction, as well as reduced treatment duration compared to a control group. Despite the limitations inherent in the study design, the findings provide strong support for the practice of early orthodontic assessment and treatment. By addressing dental issues at a young age, orthodontists can not only achieve better clinical outcomes but also positively influence the psychological and social well-being of their patients. Future research should continue to build on these findings to further optimize early orthodontic care and ensure the best possible outcomes for young patients.

REFERENCES

1. Baccetti T, Franchi L, McNamara JA. The dentofacial effects of early intervention in Class III malocclusion. *Am J Orthod Dentofacial Orthop.* 2007;131(1):7-13.
2. Richmond S, Kiyak HA, Phillips C, et al. Psychosocial effects of orthodontic treatment on children and adolescents. *Eur J Orthod.* 2005;27(3):325-331.
3. Proffit WR, Fields HW, Sarver DM. *Contemporary Orthodontics*. 5th ed. St. Louis: Mosby; 2012.
4. McNamara JA Jr. Early intervention in orthodontics: A perspective. *Angle Orthod.* 1998;68(4):327-332.
5. Kapust AJ, Sinclair PM, Turley PK. Cephalometric effects of early face mask therapy in Class III malocclusion. *Am J Orthod Dentofacial Orthop.* 1998;113(3):333-343.

6. Baccetti T, McGill JS, Franchi L, McNamara JA Jr, Tollaro I. Skeletal effects of early treatment of Class III malocclusion with maxillary expansion and face-mask therapy. *Am J Orthod Dentofacial Orthop*. 1998;113(3):333-343.
7. O'Brien K, Wright J, Conboy F, et al. Early treatment for Class II Division 1 malocclusion with the Twin-block appliance: A multi-center, randomized, controlled trial. *Am J Orthod Dentofacial Orthop*. 2003;124(3):234-243.
8. Keski-Nisula K, Hernesniemi R, Heiskanen M, Keski-Nisula L, Varrelä J. Orthodontic intervention in the early mixed dentition: A prospective, controlled study on the effects of the eruption guidance appliance. *Am J Orthod Dentofacial Orthop*. 2008;133(2):254-260.
9. Masucci C, Franchi L, Doldo T, Defraia E. Short-term effects of a phase I functional appliance on occlusal changes in prepubertal Class II patients: A controlled study. *Angle Orthod*. 2011;81(1):74-80.
10. Ngan P, Yiu C, Hägg U, Wei SH. Treatment response and long-term dentofacial adaptations to maxillary expansion and protraction. *Semin Orthod*. 1997;3(4):255-264.
11. Tulloch JF, Phillips C, Koch G, Proffit WR. The effect of early intervention on skeletal pattern in Class II malocclusion: A randomized clinical trial. *Am J Orthod Dentofacial Orthop*. 1997;111(4):391-400.
12. Koroluk LD, Tulloch JF, Phillips C. Incisor trauma and early treatment for Class II Division 1 malocclusion. *Am J Orthod Dentofacial Orthop*. 2003;123(2):117-125.