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Original Research

Prevalence of malocclusion, contributing factors, and orthodontic awareness among 8-12-year-old children in Kadapa district, Andhra Pradesh: A cross-sectional study

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ABSTRACT:

Aim: To assess the prevalence of malocclusion, predominant etiologies, and dominant orthodontic problems in mixed dentition among school children aged 8-12 years in Kadapa, Andhra Pradesh, India. This study also evaluated brushing methods and awareness about orthodontic problems among the study participants. **Materials and Methods**: This cross-sectional study included 258 school children aged 8-12 from Kadapa, Andhra Pradesh. Clinical examinations were performed to assess malocclusion using molar relation and malocclusion grading. Various etiological factors for malocclusion were recorded. Information regarding brushing methods was collected. A questionnaire was administered to assess awareness about orthodontic problems and treatment. Data was analyzed using descriptive statistics and a chi-square test. **Results:** The study included 144 males (56%) and 114 females (44%) with a mean age of 9.8 years. Class II molar relation was most prevalent (53.1%), followed by Class I (45.3%) and Class III (1.6%). Grade 2 malocclusion was most common (43.4%), followed by Grade 1 (41.5%), Grade 3 (9.7%), Grade 4 (3.1%), Grade 5 (1.9%), and Grade 6 (0.4%). The most common etiological factors were dental caries (41%), overjet (39%), tongue thrust (34%), and crowding (33%). Horizontal scrub was the predominant brushing method (63%). Regarding awareness, 74% had seen people wearing braces, but only 8% had visited an orthodontist, and 87% were unaware that early orthodontic treatment could improve facial appearance. **Conclusion:** The study revealed a high prevalence of Angle'sClass II malocclusion among school children in Kadapa, with dental caries, overjet, tongue thrust, and crowding as predominant etiological factors. The level of awareness about orthodontic problems and treatment was low, underscoring the need for educational programs targeting children and parents to enhance their understanding of orthodontic issues, their consequences, and the importance of early intervention.

Keywords: Malocclusion, Mixed dentition, Etiological factors, Brushing methods, Orthodontic awareness, School children.

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INTRODUCTION

Malocclusion refers to irregularities in tooth position, beyond the normal range, that may be associated with abnormalities in skeletal relationships.[1] It is considered one of the most prevalent oral health problems affecting various age groups worldwide, particularly children in the mixed dentition stage. The mixed dentition period, typically occurring between 6-12 years of age, represents a critical developmental stage characterized by the presence of both primary and permanent teeth. This transitional phase is often associated with the emergence of various dental irregularities and malocclusions that may significantly impact a child's oral function, aesthetics, and psychological well-being.[1]

Early identification and intervention of malocclusion are crucial as orthodontic problems can adversely affect oral functions such as mastication, speech, and temporomandibular joint health.[2] Furthermore, malocclusion can negatively impact facial aesthetics, potentially leading to psychological and social issues among affected individuals, particularly children. The

etiology of malocclusion is multifactorial, involving genetic predisposition and environmental factors such as early loss of primary teeth, prolonged retention of primary teeth, oral habits, dental caries, and abnormal oral functions.[3]

While numerous epidemiological studies have investigated the prevalence of malocclusion in different populations worldwide, limited research has been conducted in the Kadapa district of Andhra Pradesh, India. Additionally, few studies have comprehensively examined the relationship between malocclusion, its etiological factors, brushing methods, and awareness about orthodontic problems in the same population. Understanding these relationships is essential for developing targeted preventive and interceptive strategies to address malocclusion effectively.

Therefore, the present study aimed to assess the prevalence of malocclusion, identify predominant etiologies, evaluate dominant orthodontic problems in mixed dentition, examine brushing methods, and assess awareness about orthodontic problems among school children aged 8-12years in Kadapa, Andhra Pradesh. The findings of this study would provide valuable insights into the prevalence of malocclusion and associated factors in this specific population, thereby facilitating the development of appropriate preventive and treatment strategies.

MATERIALS AND METHODS

Study Design and Population

This cross-sectional study was conducted among school children aged 8-12 years in Kadapa, Andhra Pradesh, India. The study was approved by the Institutional Ethics Committee.

Sample Size and Sampling Technique

A total of 258 school children (144 males and 114 females) aged 8-12 years were included in the study using a convenience sampling technique. Children with mixed dentition, without any history of orthodontic treatment, and those willing to participate were included. Children with special healthcare needs, systemic diseases, or those undergoing or having a history of orthodontic treatment were excluded.

Data Collection

Clinical Examination

Clinical examinations were performed by a single calibrated examiner under natural daylight using a mouth mirror and probe. The following parameters were assessed:

1. Number of teeth erupted: _____
2. Medical History: _____
3. Previous Dental Visit: _____
4. Parent's occupation:
   Father-_____
   Mother-_____
5. Nutritional status: _____
6. Brushing Method: _____ YES NO
7. Aesthetic harmony:
   Frontal photograph: ☐ ☐
   Lateral photograph: ☐ ☐
   Smile:
8. Type of malocclusion: _____
   Flush terminal plane: ☐ ☐
   Mesial step: ☐ ☐
   Distal step: ☐ ☐
9. Severity of malocclusion: _____
10. Psycho-social problems: _____
11. Abnormalities:
    Tooth abnormalities: ☐ ☐
    Absent permanent tooth: ☐ ☐
    Active frenum: ☐ ☐
    Lip incompetent: ☐ ☐
    Caries: ☐ ☐
    Early loss of primary tooth: ☐ ☐
    Prolonged retention of primary tooth: ☐ ☐
    Tongue thrust: ☐ ☐
    Thumb sucking: ☐ ☐
    Crowding: ☐ ☐
    Anterior crossbite: ☐ ☐
    Deep bite: ☐ ☐
    First permanent molar relationship: ☐ ☐
    Overjet: ☐ ☐
    First permanent molar tipping: ☐ ☐
    Posterior crossbite/scissors bite: ☐ ☐
    Ectopic eruption of permanent tooth: ☐ ☐
    First permanent molar rotation: ☐ ☐
    Spacing: ☐ ☐
    Open bite: ☐ ☐
    Cleft lip and palate: ☐ ☐
    Syndromes: ☐ ☐
12. Any other abnormalities:

Figure 1: Data collection form utilized in the study.

Questionnaire

A structured questionnaire consisting of 14 questions was administered to assess awareness about orthodontic problems and treatment. The questionnaire included items related to awareness about orthodontic treatment, crooked teeth, facial appearance, chewing ability, and treatment procedures. Responses were recorded as "Yes" or "No."

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using SPSS version 21.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies and percentages, were calculated for all variables. The chi-square test was used to analyze the association between gender and various orthodontic parameters. A p-value of <0.05 was considered statistically significant.

RESULTS

Demographic Characteristics

The study included 258 school children aged 8-12 years, with 144 males (56%) and 114 females (44%). The age distribution revealed that 40% of participants were 10 years old, followed by 9 years (32%), 11 years (21%), 8 years (5%), and 12 years (2%). (Fig. 2)

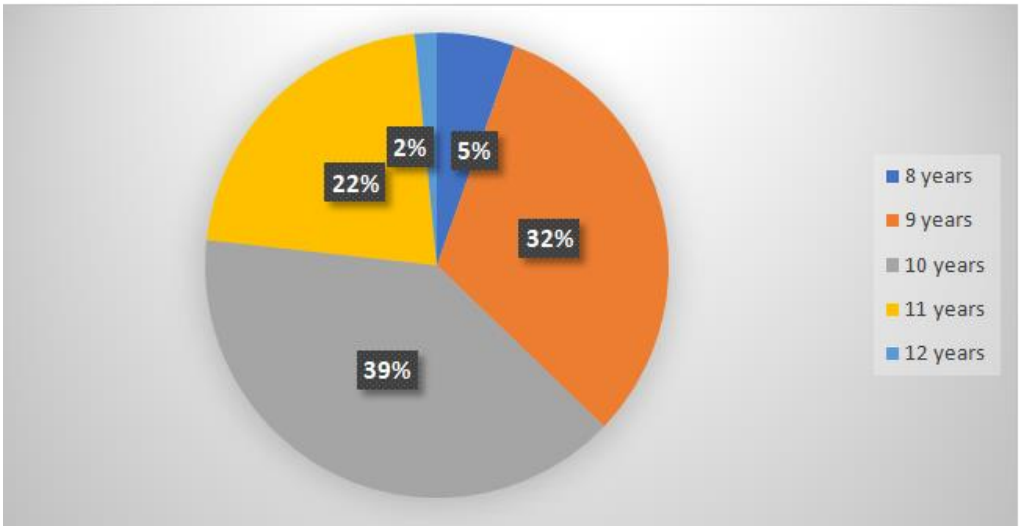

Figure 2: Age-wise distribution of the study population.

Brushing Methods

Regarding brushing methods, the horizontal scrub method was most prevalent (63%), followed by the circular method (24%), the vertical method (9%), andthe ModifiedBass method (4%). (Fig. 3).

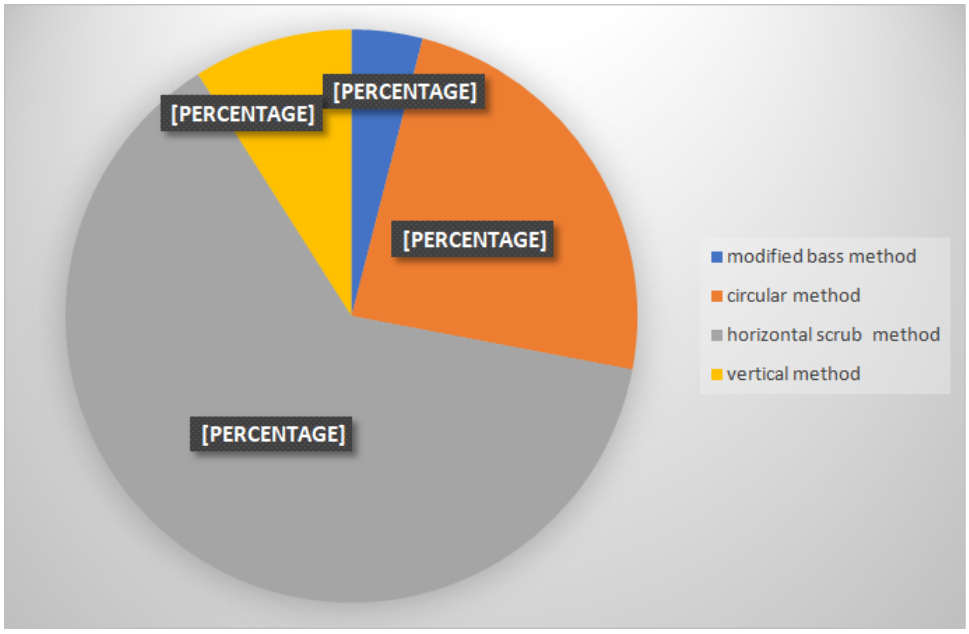

Figure 3: Distribution of brushing methods.

Frenal Attachment
Frenal attachment was absent in 84.9% of participants and present in 15.1%. Among males, 18.1% had a frenal attachment present compared to 11.4% among females. The difference was not statistically significant (Chi-square = 2.194, p = 0.139).

Permanent Molar Relation
Class II molar relation was most prevalent (53.1%), followed by Class I (45.3%) and Class III (1.6%). The distribution of molar relations was similar between males and females, with no statistically significant difference (Chi-square = 0.850, p = 0.654).

Severity of Malocclusion
Grade 2 malocclusion was most common (43.4%), followed by Grade 1 (41.5%), Grade 3 (9.7%), Grade 4 (3.1%), Grade 5 (1.9%), and Grade 6 (0.4%). A higher proportion of females had Grade 3 malocclusion (14.9%) compared to males (5.6%), although the overall gender difference was not statistically significant (Chi-square = 8.816, p = 0.117).

Etiological Factors
The most prevalent etiological factors for malocclusion were dental caries (41%), overjet (39%), tongue thrust (34%), and crowding (33%). Other common factors included deep bite (32%), spacing (26%), absent permanent molar (25%), lip competence (24%), anterior crossbite (24%), prolonged retention of primary tooth (24%), and first permanent molar tipping (23%)

Awareness of Orthodontic Problems and Treatments
The questionnaire revealed varying levels of awareness about orthodontic problems and treatment. While 74% of participants had seen people wearing braces, only 8% had visited an orthodontist. Approximately 46% had heard of clip treatment, and only 32% were aware that orthodontic treatment could align teeth. About 56% had noticed people with crooked teeth, but only 27% thought crooked teeth could affect facial appearance, and 36% believed irregular teeth could affect chewing ability. Notably, 87% were unaware that early orthodontic treatment could improve facial appearance.

DISCUSSION
This cross-sectional study assessed the prevalence of malocclusion, predominant etiologies, dominant orthodontic problems, brushing methods, and awareness about orthodontic problems among school children aged 8-12 years in Kadapa, Andhra Pradesh. The findings revealed a high prevalence of malocclusion, particularly Class II molar relation and Grade 2 malocclusion, with dental caries, overjet, tongue thrust, and crowding as the predominant etiological factors. Additionally, the study highlighted a general lack of awareness about orthodontic problems and treatment among the study participants.

Demographic Characteristics and Malocclusion Prevalence
The study included 258 school children with a male predominance (56%), which is consistent with similar studies conducted in India. The mean age of participants was 9.8 years, representing the mixed dentition stage, which is a critical period for the development of malocclusion.
The prevalence of Class II molar relation (53.1%) was higher than that of Class I (45.3%) and Class III (1.6%), which differs from some previous studies in Indian populations that reported a higher prevalence of Class I malocclusion. For example, Trehan et al. reported a Class I molar relation prevalence of 78.8% among school children in Himachal Pradesh, significantly exceeding our findings.[2] The higher prevalence of Class II malocclusion in our study could be due to regional differences, genetic factors, or environmental influences specific to the Kadapa population.
Regarding malocclusion severity, Grade 2 malocclusion was most common (43.4%), followed by Grade 1 (41.5%). Severe malocclusion (Grades 3-6) was seen in 15.1% of participants, indicating a need for intervention. Although more females showed Grade 3 malocclusion (14.9% versus 5.6% in males), the overall gender difference was not statistically significant. This suggests that malocclusion impacts both genders similarly, consistent with previous research by Kaur et al. and Dhar et al.[2]

Etiological Factors
The etiology of malocclusion is multifactorial, involving both genetic and environmental factors. In our study, dental caries emerged as the most prevalent etiological factor (41%), aligning with findings from other Indian studies. Dental caries can lead to the premature loss of primary teeth or their prolonged retention, both of which can disrupt the normal eruption pattern of permanent teeth and potentially result in malocclusion.[4]
Overjet (39%), tongue thrust (34%), and crowding (33%) were other common etiological factors identified. These findings emphasize the significant role of environmental factors in the development of malocclusion. Particularly, tongue thrust is a parafunctional habit that, when persistent, can lead to an anterior open bite and increased overjet.[5] Similarly, crowding often results from a discrepancy between tooth size and arch length, which can be influenced by both genetic and environmental factors.
The presence of multiple etiological factors in many participants highlights the complex and multifactorial nature of malocclusion, necessitating a comprehensive approach to its prevention and management.

Brushing Methods

Our findings revealed that the horizontal scrub method was the predominant brushing technique (63%) among participants, followed by the circular method (24%). Only 4% of children used the Modified Bass method, which is considered more effective for plaque removal, particularly at the gingival margin.[7] The prevalence of the horizontal scrub method may be attributed to its simplicity and ease of adoption by children. However, this technique is less effective for cleaning interdental areas and may contribute to gingival recession and enamel abrasion if applied with excessive force.[6]

The limited use of more effective brushing techniques like the Modified Bass method highlights the need for oral hygiene education among school children and their parents. Proper brushing techniques not only prevent dental caries, which was identified as a major etiological factor for malocclusion, but also contribute to overall oral health.

Awareness about Orthodontic Problems and Treatment

The questionnaire revealed varying levels of awareness about orthodontic problems and treatment among the study participants. While a significant proportion (74%) had seen people wearing braces, indicating visual familiarity with orthodontic appliances, only 8% had actually visited an orthodontist. This discrepancy suggests that while children recognize orthodontic appliances, they have limited access to orthodontic care or lack understanding of its importance.[8]

Only 32% of participants were aware that orthodontic treatment could align teeth, and merely 13% knew that early orthodontic treatment could improve facial appearance. These findings highlight a significant knowledge gap regarding the benefits and timing of orthodontic treatment among the study population.[9]

Furthermore, the awareness about the impact of malocclusion on function and aesthetics was also limited. Only 36% believed irregular teeth could affect chewing ability, and just 27% thought crooked teeth could affect facial appearance. This lack of awareness may partly explain the low orthodontic treatment-seeking behaviour observed in the study.

Interestingly, 89% of participants correctly identified that orthodontic treatment is not limited to young individuals, suggesting some understanding about the universal applicability of orthodontic care across age groups.

Clinical Implications

The findings of this study have several clinical implications. First, the high prevalence of malocclusion, particularly Class II molar relation and Grade 2 malocclusion, highlights the need for early screening and intervention programs in schools. Second, the identification of predominant etiological factors like dental caries, overjet, tongue thrust, and crowding provides direction for targeted preventive strategies.[10] For instance, dental caries prevention through proper oral hygiene, fluoride application, and dietary counselling could indirectly reduce the prevalence of malocclusion.

The limited awareness about orthodontic problems and treatment underscores the importance of educational programs targeting both children and parents. Such programs should focus on raising awareness about the impact of malocclusion on function, aesthetics, and psychosocial well-being, as well as the benefits of early orthodontic intervention.

Furthermore, the predominance of less effective brushing techniques emphasizes the need for oral hygiene education as part of school health programs. Teaching children proper brushing techniques from an early age could contribute significantly to caries prevention and, consequently, reduce one of the major etiological factors for malocclusion.

Limitations and Future Directions

This study has several limitations that should be considered when interpreting the findings. First, the convenience sampling technique limits the generalizability of results to the broader population. Second, the cross-sectional design precludes the establishment of causal relationships between etiological factors and malocclusion.

Future research should utilize probability sampling techniques and longitudinal designs to enhance understanding of malocclusion development and assess the effectiveness of early interventions. Additionally, qualitative studies examining barriers to orthodontic care utilization among children and parents would offer valuable insights for crafting targeted educational interventions.

CONCLUSION

This cross-sectional study revealed a high prevalence of malocclusion among school children aged 8-12 years in Kadapa, Andhra Pradesh, with Class II molar relation and Grade 2 malocclusion being the most common. Dental caries, overjet, tongue thrust, and crowding emerged as predominant etiological factors. The horizontal scrub method was the most prevalent brushing technique, while awareness about orthodontic problems and treatment was generally low among the study participants.

These findings highlight the need for:

1. Early screening and intervention programs for malocclusion in schools.
2. Targeted preventive strategies addressing the identified etiological factors, particularly dental caries.
3. Educational programs to improve awareness about orthodontic problems, their consequences, and the importance of early intervention.
4. Oral hygiene education promoting more effective brushing techniques.

By addressing these aspects through a comprehensive approach that involves dental professionals and parents, the burden of malocclusion among schoolchildren could be significantly reduced, contributing to improved oral health and quality of life in this population.

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