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Occurrence of Malocclusion and Its Relationship with Happiness and Oral Health-Related Quality of Life Among 12-Year-Old Students in Government Schools of Bangalore South: A Cross-Sectional Analysis

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Abstract

Introduction: Optimal occlusion plays a vital role in ensuring efficient chewing, clear speech, and balanced facial aesthetics. Malocclusion, a widespread dental condition, is increasingly recognized as a public health issue due to its significant impact on oral health-related quality of life (OHRQoL). However, its relationship with children's overall well-being remains underexplored. This study aims to assess the prevalence of malocclusion and examine its association with OHRQoL and happiness among 12-year-old students attending government schools in Bangalore South. Methods A cross-sectional study was conducted among 1,059 twelve-year-old students enrolled in government schools across Bangalore South. Clinical assessments were performed using the Dental Aesthetic Index (DAI) to evaluate malocclusion. Self-administered, validated questionnaires were used to measure oral health-related quality of life (OHRQoL) and perceived happiness. Statistical analyses were applied to determine the prevalence of malocclusion and explore its associations with OHRQoL and happiness levels via SPSS. Results: Malocclusion prevalence was 50.4%, with common concerns including bad breath (36.7%), tooth pain (23.8%), and bleeding gums (50%). Functional limitations affected chewing (31.4%), speech clarity (21.1%), and breathing (18.7%). Emotional distress was evident, with 60.5% feeling upset and 39.5% experiencing shyness. Social consequences included school absenteeism (18.4%), peer teasing (23.7%), and limited participation in activities (29.2%). The happiness scale indicated that 57.7% reported lower overall happiness and 40.3% felt less happy than their peers. Conclusion: Malocclusion significantly compromises OHRQoL and psychological well-being, leading to diminished happiness. The high prevalence underscores the need for early intervention and school-based dental health programs to enhance children's quality of life.

KEYWORDS

Malocclusion, Oral health-related quality of life, Psychological impact, Schoolchildren

1 | INTRODUCTION

Occlusion denotes the positioning and contacts of teeth within the masticatory system, playing a vital role in effective chewing, articulate speech, and harmonious facial appearance. Proper occlusion supports oral and systemic health, while malocclusion—misalignment between the upper and lower arches—can cause functional and aesthetic issues[1,2]. Malocclusion—encompassing crowding, spacing, overjet, overbite, crossbite, and open bite—impacts both oral health and overall well-being. It may contribute to periodontal disease, higher caries risk, temporomandibular disorders, and persistent discomfort. Beyond functional concerns, malocclusion impacts self-esteem and social interactions, potentially causing anxiety, bullying, and psychological distress in children and adolescents[3]. In India, malocclusion prevalence exhibits considerable variation, with reported rates ranging from 11.4% to 73.7% across diverse population groups.[4] The most common anomalies among Indian children include crowding and maxillary overjet.[5] Early assessment and intervention are crucial in preventing complications and improving oral health outcomes. Standardized indices like the Dental Aesthetic Index (DAI) objectively assesses malocclusion severity and guide orthodontic treatment needs.[6] Malocclusion influences

Oral Health-Related Quality of Life (OHRQoL) by impairing comfort, oral functionality, and psychological well-being, extending its impact beyond mere physical manifestations.[7] Prompt orthodontic care for malocclusion enhances both oral health and overall quality of life, highlighting the importance of early diagnosis and strategic treatment planning.[8] This study seeks to evaluate the prevalence of malocclusion and its relationship with happiness and oral health-related quality of life (OHRQoL) among 12-year-old students attending government schools in South Bangalore. Objectives of the study: (1) To determine the prevalence of malocclusion using the Dental Aesthetic Index (DAI), in accordance with WHO guidelines (1989). (2) To measure subjective happiness levels using the Subjective Happiness Scale developed by Lyubomirsky and Lepper (1999). (3) To assess oral health-related quality of life (OHRQoL) through the Child Perception Questionnaire (CPQ11-14) by Jokovic, Locker, and Guyatt (2002). This study examines the influence of malocclusion on happiness and oral health-related quality of life (OHRQoL), emphasizing the broader implications of dental health for overall well-being. It underscores the importance of orthodontic intervention in improving both physical function and psychological resilience among children.

2 | METHODOLOGY

A cross-sectional survey was carried out between February and May 2018 among 12-year-old students from government schools located in both urban and rural areas of Bangalore South. The study aimed to determine the prevalence of malocclusion and examine its impact on oral health-related quality of life (OHRQoL) and subjective well-being. Data collection involved a structured questionnaire and clinical examination. OHRQoL was assessed using the Child Perception Questionnaire (CPQ11-14), which evaluates four domains—oral symptoms, functional limitations, emotional well-being, and social well-being—using a 5-point Likert scale. Subjective well-being was measured through the Subjective Happiness Scale (Lyubomirsky & Lepper, 1999), comprising four items rated on a 7-point scale. Malocclusion was evaluated using the Dental Aesthetic Index (DAI), following the guidelines of the World Health Organization (WHO, 1989). To ensure linguistic accuracy and cultural relevance, the questionnaire was translated into Kannada by language experts and subsequently back-translated into English. A pilot study involving 50 students was conducted to confirm the clarity, reliability, and feasibility of the instrument. The investigator underwent training and calibration to ensure reliability in data collection. A calibration exercise was performed with 30 adolescents, ensuring consistency by comparing findings with those of a gold standard examiner. The inter-examiner reliability was assessed using Cohen's kappa and the Intraclass Correlation Coefficient, yielding substantial agreement ($\kappa > 0.80$). Clinical examinations were performed in designated school rooms under natural light using sterilized instruments. The investigator conducted all examinations, while a trained assistant recorded findings in a structured proforma. Regular cross-checking ensured accurate documentation, and infection control measures, including the use of gloves, masks, and disinfectants, were strictly followed. Seventeen government schools across Bangalore South were randomly selected to ensure balanced representation from both urban and rural settings through simple stratified randomization. The required sample size was attained by enrolling eligible students from each institution. Data entry was performed using SPSS software, and statistical analyses—including the Chi-Square test, Fisher's Exact test, and Kruskal-Wallis test—were employed to examine associations between malocclusion, oral health-related quality of life (OHRQoL), and subjective well-being. The study spanned four months, with systematic data collection procedures and strict adherence to ethical standards throughout.

3 | RESULT

The study identified a high prevalence of malocclusion and other dental health concerns among 12-year-old students in government schools across Bangalore South. Dental caries were notably widespread, with a considerable proportion of children presenting with untreated decay, missing teeth, and signs of periodontal disease. The majority of participants showed signs of severe malocclusion, necessitating orthodontic intervention. Furthermore, indicators of oral health-related quality of life revealed that a substantial number of children faced challenges with chewing, speech, and oral hygiene maintenance—factors that may adversely affect their overall well-being and sense of happiness. These findings underscore the need for targeted oral health interventions and orthodontic treatment to improve the oral health and quality of life of schoolchildren in the region. The study included 1,059 twelve-year-old schoolchildren, comprising 447 boys (42.2%) and 612 girls (57.8%). In terms of missing teeth due to caries, 363 (34.3%) had at least one missing tooth, 112 (10.6%) had two missing teeth, and 28 (2.6%) had three missing teeth, while 556 (52.5%) had no missing teeth. Enamel fluorosis was observed in 279 (26.3%) participants as questionable, 251 (23.7%) as very mild, and 84 (7.9%) as mild, whereas 445 (42%) had no signs. Dental erosion was absent in 975 (92.1%) participants, while 84 (7.9%) had mild erosion. A total of 139 (13.1%) participants had experienced dental trauma limited to enamel (Ellis Class 1 fracture), while 920 (86.9%) had no trauma. Mucosal lesions were found in 84 (7.9%) participants, with ulcers on intraoral soft tissues located at the commissures (28; 2.6%), lips (26; 2.3%), and sulci (30; 2.9%), whereas 975 (92.1%) had no mucosal lesions. Most participants (975; 92.1%) did not require intervention, while 7.9% required it primarily due to oral ulcers.

Malocclusion analysis using the Dental Aesthetic Index (DAI)

The findings revealed that 388 children (36.7%) exhibited severe malocclusion warranting highly desirable treatment, while 147 (13.7%) presented with very severe or handicapping malocclusion necessitating mandatory intervention. Additionally, 375 children (35.5%) had DAI scores below 25, and 149 (14.1%) fell within the score range of 26 to 30. Oral Health-Related Quality of Life (OHRQoL) indicators

TABLE 1 Oral Health Survey Summary

Category	Subgroup/ Condition	Count	Percentage
Gender	Boys	447	42.2%
	Girls	612	57.8%
Missing Teeth (Caries)	None	556	52.50%
	1 tooth missing	363	34.30%
	2 teeth missing	112	10.60%
	3 teeth missing	28	2.60%
Enamel Flourosis	None	445	42.00%
	Questionable	279	26.30%
	Very Mild	251	23.70%
	Mild	84	7.90%
Dental Erosion	Absent	975	92.10%
	Mild	84	7.90%
	None	920	86.90%
Mucosal Lesions	Commissures (Ulcer)	28	2.60%
	Lips (Ulcers)	26	2.30%
	Sulci (Ulcers)	30	2.90%
Intervention Need	No Intervention	975	92.10%
	Required (Primarily due to oral ulcers)	84	7.90%

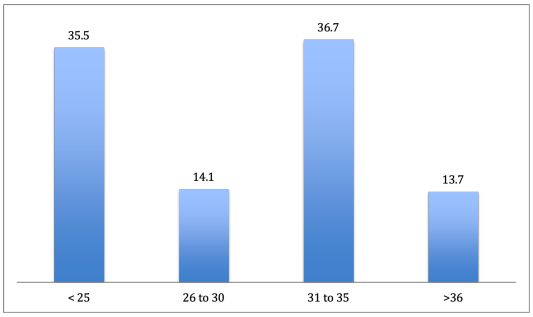

FIGURE 1 DAI scores in the total sample showing distribution of malocclusion severity levels.

showed that 389 (36.7%) participants reported bad breath, while 670 (63.3%) did not. Tooth pain was absent in 807 (76.2%) participants, while 252 (23.8%) reported mild pain. Food impaction was reported by 279 (26.3%), whereas 780 (73.7%) did not experience it. Bleeding gums were reported by 529 (50%), while 530 (50%) did not experience it. Difficulty eating was reported by 392 (37%), whereas 667 (63%) had no issues. A total of 333 (31.4%) participants had difficulty chewing firm foods, while 726 (68.6%) did not. Difficulty opening the mouth wide was observed in 180 (17%), whereas 879 (83%) had no issues. Mouth breathing was present in 198 (18.7%) participants, while 861 (81.3%) did not exhibit this habit. Unclear speech was reported by 223 (21.1%) participants, whereas 836 (78.9%) had no speech difficulties. Lastly, 335 (31.6%) participants reported eating slowly, while 724 (68.4%) did not.

4 | DISCUSSION

Oral health constitutes a fundamental component of overall health, and neglecting dental diseases can lead to substantial personal, economic, and societal consequences. Physical appearance plays a crucial role in shaping personal identity, making adolescents particularly conscious of their dentofacial aesthetics and its maintenance[9,10]. Despite global oral health progress, disparities persist in underserved areas. Malocclusion, though not life-threatening, affects chewing, speech, aesthetics, and social function. Epidemiological data reveal service gaps and guide treatment needs.[1] Malocclusion is measured using indices like Angle's classification, IOTN, and DAI, while dental aesthetics perception is assessed through PIDAQ, IOTN's Aesthetic Component, and OASIS. Oral health-related quality of life in children is evaluated with COHIP, OHIP, OIDP, and CPQ 11-14.[11,12,13] Among these, the CPQ 11-14 by Jokovic, Locker, and Guyatt is considered the most simplified and comprehensible tool.[14] Malocclusion has a notable impact on an individual's happiness, underscoring the importance of assessing subjective well-being in affected populations. The Subjective Happiness Scale, developed by Lyubomirsky and Lepper (1999),[15] is widely employed for this purpose. This study aimed to evaluate self-perception of dental aesthetics, the presence and severity of malocclusion, oral health-related quality of life (OHRQoL), and happiness among 12-year-old schoolchildren in Bangalore. Assessments were conducted using the Dental Aesthetic Index (DAI), the Child Perception Questionnaire (CPQ11–14), and the Subjective Happiness Scale. The severity of malocclusion was measured using the DAI, developed by Cons, Jenny, and Kohout,[13] as recommended by the World Health Organization. Notably, there is a paucity of research examining the interrelationship among these variables in school-aged children. The oral health status of participants was evaluated using the Oral Health Assessment Form for Children (by tooth surface), 2013. Malocclusion severity was measured using the Dental Aesthetic Index (DAI),[14] while its impact on oral health-related quality of life (OHRQoL) was assessed through the Child Perception Questionnaire (CPQ11–14). Subjective happiness levels were gauged using the Subjective Happiness Scale developed by Lyubomirsky and Lepper (1999).[15] Malocclusion, widely studied in dental research, is understood as a continuum of occlusal variations rather than a discrete disease entity. The DAI evaluates the severity of malocclusion and orthodontic

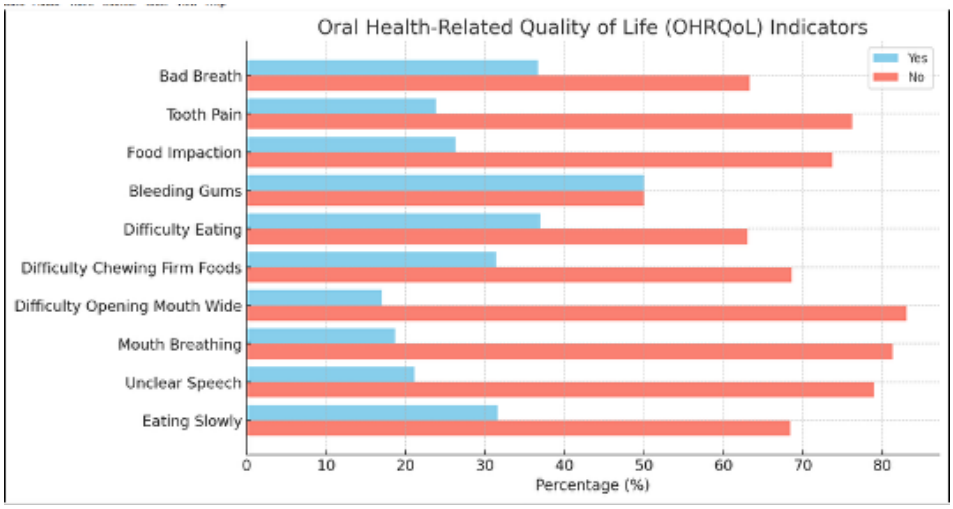

FIGURE 2 Horizontal bar chart representing the Oral Health-Related Quality of Life (OHRQoL) indicators. The blue bars indicate the percentage of participants who reported experiencing the condition ("Yes"), while the red bars show those who did not ("No").

treatment needs based on ten occlusal traits, including missing anterior teeth, crowding, spacing, midline diastema, maxillary and mandibular irregularities, overjet, open bite, and molar relationship. In this study, 36.7% of participants recorded Dental Aesthetic Index (DAI) scores between 31 and 35, indicating a high prevalence of severe malocclusion requiring prompt orthodontic intervention. In contrast, a study conducted by Shivakumar KM in Davangere reported a lower prevalence of severe malocclusion at 19.9%,[16] suggesting regional disparities. The elevated rates observed in Bangalore South may be attributed to limited awareness and access to orthodontic care among schoolchildren. In addition to malocclusion, the study evaluated dental caries experience (DMFT), periodontal status (Modified CPI), dental trauma, dental fluorosis, and treatment urgency using the WHO Oral Health Assessment Form for Children (2013), with assessments conducted through visual and tactile examination techniques. In the present study, 73% of participants exhibited at least one decayed tooth, reflecting a notably high prevalence of dental caries among 12-year-old schoolchildren in Bangalore South. Comparative findings from Sharma et al. reported a caries prevalence of 56% among preschool children in Bangalore, while Azher et al. documented a rate of 49.25% in 12-year-olds.[17] Similarly, Singhal et al. observed a prevalence of 64.2% among preschool children in Udupi Taluk.[18] The elevated caries burden observed in this cohort may reflect underlying factors such as dietary habits, oral hygiene practices, and access to preventive dental care. Although socio-economic status was not measured in this study, previous research[30] has consistently shown that lower SES is associated with higher caries prevalence, suggesting that similar mechanisms could be relevant here. Gingivitis is prevalent among schoolchildren, with severity varying by case. Periodontal attachment loss is also noted in teenagers, with prevalence differing across studies. In this study, around 50% of participants had at least one site with bleeding on probing, aligning with Petersen et al.'s findings, where 49.5% had a CPI score of 2.[19] Varenne et al. found a CPI score of 2 in 60% of participants[20]. In a study conducted by Abu and Abbas on 15-year-old Qatari students, 36.33% had a healthy periodontium, while the remaining participants exhibited bleeding (39.73%), calculus (20.26%), and periodontal pockets (3.58%)[21]. Chu et al. reported CPI scores of 1 and 2 in 47.5% and 40.0% of participants in Myanmar, respectively.[22] The high prevalence of periodontal conditions observed in this study may be attributed, in part, to inadequate oral hygiene practices among the participants. Dental fluorosis is primarily caused by excessive fluoride intake through drinking water, with additional exposure from tea consumption and locally grown crops in high-fluoride regions further intensifying its effects. In India, groundwater serves as the primary source of drinking water—meeting over 85% of rural and 50% of urban demand. Fluorosis is endemic in 17 states, including Karnataka, posing a significant public health concern in affected areas[23]. In this study, 26.3% had questionable enamel fluorosis, 23.7% very mild, 7.9% mild, and 42% showed no fluorosis. Similarly, Pereira et al. found 58.9% fluorosis in Brazilian children, with 44.4% very mild, 11.9% mild, 2.4% moderate, and 0.2% severe cases[24]. These results indicate similar fluorosis prevalence globally. Facial trauma causing fractured, displaced, or lost teeth affects function, aesthetics, and psychology, highlighting the need for public education on prevention and treatment. In the present study, 13.1% of participants reported experiencing dental trauma, all of which were limited to enamel fractures. The prevalence of dental trauma among adolescents aged 12 to 15 years has been reported to range from 4% to 35% in Asia and from 15% to 21% in Africa.[25]. Data on the prevalence of dental trauma in India remain limited. However, Baldava and Anup reported a prevalence rate of 14.9% for traumatic dental injuries among 14- to 16-year-old NCC cadets in Udupi district, Karnataka.[26]. Oral mucosal lesions are commonly associated with various diseases, with local trauma and aphthous stomatitis being the primary causes. In the present study, 92.1% of participants showed no signs of oral mucosal lesions, while 7.9% presented with ulcers. In comparison,

a study conducted by Gherunpong and Tsakos among Thai schoolchildren reported a significantly higher prevalence of oral ulcers at 25.8%.[25]. The Child Perceptions Questionnaire (CPQ11–14) is a validated tool for assessing Child Oral Health-Related Quality of Life (COHRQoL), measuring oral symptoms, functional limitations, emotional well-being, and social well-being (Jokovic & Locker, 2002). Its reliability coefficients range from 0.71 to 0.83.[14]. Oral symptoms reported include bad breath (36.7%), toothache (23.8%), and bleeding gums (50%), comparable to Rosa & Thomazoni (2018)[7], who found similar prevalence (bad breath 38%, toothache 22%, bleeding gums 52%). Functional limitations were observed in eating difficulties (37%), chewing problems (31.4%), and unclear speech (21.1%). Dawoodbhoy & Bernabe (2019)[27] reported lower values in Saudi children, likely due to better dental care access. Emotional well-being concerns included irritation (26.6%), worry about appearance (34.4%), and nervousness (39.5%), findings consistent with Kolawole & Otuyemi (2016)[28]. Social impact involved school absenteeism (18.4%), teasing (23.7%), and difficulty participating in activities (29.2%), comparable to Marques & Ramos-Jorge (2017)[29]. Happiness scale results indicated lower happiness levels among children with malocclusion (57.7% less happy, 40.33% less happy than peers), aligning with Rosa & Tomazoni (2018)[7]. The study confirms that malocclusion negatively impacts COHRQoL and self-esteem. Early diagnosis and intervention can mitigate its effects.

5 | CONCLUSION

The study underscores the substantial burden of oral health issues—including malocclusion, dental caries, periodontal disease, fluorosis, and dental trauma—among 12-year-old schoolchildren in Bangalore South. The findings highlight the clinical burden of malocclusion and untreated caries among schoolchildren in Bangalore South. Although OHRQoL and happiness were not statistically assessed in this study, prior literature[31,32,33] suggests that malocclusion can negatively influence children's self-esteem and social interactions, warranting early preventive and corrective interventions.

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