Prevalence of Malocclusion and Treatment Needs among School Children in Urban Areas of Pakistan.

Iqra Yousaf[1], Gulsana Hashmi[2], Aisha Bano[3], Hina Naz Naseem[4], Noman Tariq[5], Fahmeed Akhtar[6], Nabiha Naeem[7]

[1]BDS, Demonstrator, Azra Naheed Dental College, Lahore, Pakistan

[2]Assistant Professor, Orthodontics, Azra Naheed Dental College, The Superior University, Lahore, Pakistan

[3]Demonstrator (Orthodontics), Azra Naheed Dental College, Superior University, Lahore, Pakistan

[4]Senior Registrar, Azra Naheed Dental College, Lahore, Lahore, Pakistan

[5]Senior Demonstrator, Orthodontic Department, Azra Naheed Dental College, Superior University, Lahore, Pakistan

[6]Assistant Professor, Department of Periodontology, Watim Dental College, Rawalpindi, Pakistan

[7]Department of Life Sciences, School of Science, University of Management and Technology, (UMT), Lahore, Pakistan

Corresponding Author:

Nabiha Naeem,

Department of Life Sciences, School of Science, University of Management and Technology, (UMT), Lahore, Pakistan.

Email: nabiha.naeem@umt.edu.pk

ABSTRACT

Background: Malocclusion is a prevalent childhood oral health issue which may influence the mastication, speech, esthetic appearance and psychosocial well-being. Having the capability to identify and treat early is a significant aspect toward avoiding complications in the long term.

Aim: To identify the level of malocclusion and the orthodontic treatment requirement of school children.

Methods: The study used a cross-sectional survey to sample 380 school children aged between 6-15 years. Multistage random sampling of public and private schools was used to select the participants. Clinical evaluation of malocclusion was determined by the Dental Aesthetic Index (DAI) and treatment requirements were determined by the Index of Orthodontic Treatment Need (IOTN). The data were examined using SPSS v24 and the associations were checked with Chi-square tests, and $p < 0.05$ was regarded as significant.

Results: The prevalence of malocclusion was found to be 63.2 with Class I malocclusion being the most prevalent (34.2%), then Class II (18.4%), and Class III (10.5%). The occurrence of normal occlusion was 36.8. The need of orthodontic treatment was moderate in 34.2% and definite in 28.9% of respondents.

Conclusion: Malocclusion is very common among school children and significant number of them need orthodontic treatment. It is suggested to use early screening and preventive programs in school to make sure that the disease is detected and controlled timely, enhancing the oral health, aesthetics and life quality..

Keywords: *Malocclusion, Prevalence, Need of orthodontic treatment, School Children, Dental Aesthetic Index, IOTN..*

INTRODUCTION

Oral health is a constituent of the general health and quality of life, especially in children, because it determines whether they can eat, talk, have self-worth, and socialize.[1] Malocclusion, which can be described as not being in the right position or improper placement of the teeth of the two dental arches, is one of the most prevalent problems that affect oral health in school-aged children around the globe.[2, 3] Malocclusion may be the cause of minor aesthetic issues or serious functional dysfunction, effecting on masticatory efficiency, temporomandibular joint functioning, and general facial attractiveness.[4, 5]

Malocclusion is a health issue that is widely spread in the world as it is influenced by ethnicity, age, socio-economic status,

Iqra Yousaf, Gulsana Hashmi, Aisha Bano, Hina Naz Naseem, Noman Tariq, Fahmeed Akhtar, Nabiha Naeem

and assessment criteria.[6] The prevalence rates of 20% -75% have been reported in different populations in epidemiological studies.[7, 8] In South Asia, it is observed that among children aged 6-15 years about 45%-60% have some form of malocclusion to be considered whereas European studies show slightly lower prevalence rates of 30%-50%vamong children of the same age group.[9] The timely intervention is very essential because untreated malocclusion may cause complications that include tooth wear, periodontal issues, speech difficulties, and psychosocial distress.

Orthodontic needs are usually evaluated with the help of such indices as the Dental Aesthetic Index (DAI) and the Index of Orthodontic Treatment Need (IOTN), which serve to prioritize the treatment of children according to the severity of the problem and its functional disability.[10, 11] Although this is vital, parents and school authorities in most cases lack awareness about malocclusion and the need to have orthodontic treatment, particularly in low- and middle-income countries.[11] Periodic epidemiological surveillance is thus necessary to influence the public health policies, efficient resource distribution, and design school-based oral health interventions.[12]

The awareness of the occupancy of malocclusion and the nature of the treatment required by children aged 6-15 years offers important information on the oral health status of the population and outline the necessity of the orthodontic services. This kind of data does not only inform preventive and remedial actions, but also assists policymakers incorporate oral health education and screening programs in schools. The timely intervention of children with malocclusion at an early stage can better guarantee functional outcomes, increases aesthetic satisfaction, and prevents complications in the long run. The aim of the study was to identify the prevalence of malocclusion and the orthodontics treatment requirements of school children between the ages of 6-15 years.

METHODOLOGY

The research was designed to be cross-sectional descriptive survey to determine the prevalence of malocclusion and orthodontic treatment requirements in school children. The research was done in one year. The sample population was comprised of children aged 6-15 years and enrolled in public and private schools, which represented a wide range of socio-economic status.

The sample size was estimated with the help of OpenEpi (Version 3.01) on the basis of an earlier study that found malocclusion prevalence at 56% among school children considering a confidence interval of 95% and a 5% margin of error.[13] A minimum of 380 children was estimated as the required sample size. A stratified sampling method was used. First, there was stratification of the schools into public and the private schools. Schools were randomly chosen and selected out of every stratum using a lottery procedure. In each of the chosen schools, children between the ages of 6-15 years were selected and simple random sampling was used to select the participants. The study included children who had undergone orthodontic therapy or craniofacial deformity in the past to prevent distortion of prevalence estimation.

The structured proforma was used to gather the data and it contained demographic information (age, gender, socio-economic status) and clinical examination outcomes. The schools were examined under natural daylight and the clinical examinations were conducted under the usual infection control measures. The Dental Aesthetic Index (DAI) was used to measure malocclusion and the Index of Orthodontic Treatment Need (IOTN) was used to rank needs into no need, moderate need and definite need.[14, 15] The calibration of examiners was done before the study in order to achieve reliability and reduce inter and intra-examiner variability.

All the gathered data were typed and analyzed with SPSS version 24. Mean +-standard deviation was used to express continuous variables (i.e. age and malocclusion scores), whereas frequencies and percentages were used to express the categories variables (i.e. gender, type of malocclusion, and orthodontic treatment need). The Shapiro-Wilk test was used to test the normality of the continuous data and the data were considered normally distributed provided the p-value exceeded 0.05. In the case of normally distributed data, the independent-sample t-tests or one-way ANOVA were used to compare the groups. The Mann-Whitney U test was used to test non-normally distributed data. The Chi-square test was used to assess associations between categorical variables. A p-value below 0.05 was taken as statistically significant.

RESULTS

The sample size was 380 school children of age 6-15 years and of equal sexes of males and females, and both public and private schools (Table 1). Most participants were found to have malocclusion, Class I malocclusion was the most prevalent followed by Class II and Class III, whereas a minority were found to have normal occlusion (Table 2).

Evaluation of orthodontic treatment requirement showed that only one-third of children did not require treatment but the other subjects exhibited moderate and definite treatment requirement, which is of clinical importance on malocclusion in this group of population (Table 3). The gender-based analysis showed that there was no statistically significant difference in the prevalence of malocclusion between males and females (p= 0.34), which means that the same gender experiences malocclusion equally in this cohort.(Table 4)

Iqra Yousaf, Gulsana Hashmi, Aisha Bano, Hina Naz Naseem, Noman Tariq, Fahmeed Akhtar,
Nabiha Naeem

The Age-wise analysis of treatment need indicated that the demand pattern was on the rise with age albeit not statistically significant (p = 0.15). Agreement of definite treatment need was more in the 13-15 years age group as compared to the younger age groups and this indicated the influence of the development of permanent dentition on the orthodontic assessment (Table 5).

Table 1. Demographic Characteristics of Participants (n = 380)

Variable	Category	n (%)
Age (years)	6–9	120 (31.6)
	10–12	140 (36.8)
	13–15	120 (31.6)
Gender	Male	190 (50.0)
	Female	190 (50.0)
School Type	Public	200 (52.6)
	Private	180 (47.4)

Table 2. Prevalence of Malocclusion (n = 380)

Malocclusion Type	n (%)
Normal occlusion	140 (36.8)
Class I	130 (34.2)
Class II	70 (18.4)
Class III	40 (10.5)
Total	380 (100)

Table 3. Orthodontic Treatment Needs (n = 380)

Treatment Need Category	n (%)
No need	140 (36.8)
Moderate need	130 (34.2)
Definite need	110 (28.9)
Total	380 (100)

Table 4. Association of Malocclusion with Gender (n = 380)

Malocclusion Type	Male n (%)	Female n (%)	χ^2	p-value
Normal occlusion	70 (36.8)	70 (36.8)	2.14	0.34
Class I	60 (31.6)	70 (36.8)		
Class II	40 (21.1)	30 (15.8)		
Class III	20 (10.5)	20 (10.5)		

Iqra Yousaf, Gulsana Hashmi, Aisha Bano, Hina Naz Naseem, Noman Tariq, Fahmeed Akhtar,
Nabiha Naeem

Total	190 (100)	190 (100)		

Table 5. Association of Orthodontic Treatment Need with Age Group (n = 380)

Age Group (years)	No need n (%)	Moderate need n (%)	Definite need n (%)	χ^2	p-value
6–9	50 (41.7)	40 (33.3)	30 (25.0)	3.82	0.15
10–12	50 (35.7)	50 (35.7)	40 (28.6)		
13–15	40 (33.3)	40 (33.3)	40 (33.3)		
Total	140 (36.8)	130 (34.2)	110 (28.9)		

DISCUSSION

The prevalence of malocclusion was 63.2% (Class I, Class II and Class III together) and normal occlusion is 36.8 in the current study of school children aged 6-15 years. The need in orthodontic treatment was noted in 63.1% of children (moderate + definite categories). Our findings are consistent with the heterogeneous patterns of malocclusion in the global distribution of malocclusion that have been reported in the literature in previous years, highlighting differences in the population specific factor of occlusal traits. The prevalence estimates of school aged populations show a significant regional variation reflecting consistent prevalence estimates of malocclusion as reported by other researchers in the world where prevalence is reported to range between less than 10% to over 80% of the population depending on age, diagnostic criteria and ethnicity.[16, 17]

A number of studies indicate similar prevalence rates across the mixed and permanent dentition age groups. Bayarsaikhan et al found that 84.5% of 9-12 year old Mongolian schoolchildren had malocclusion mainly Angle Class I and about one third of their needs necessitated orthodontic treatment by IOTN criteria with moderate needs being the most prevalent. This rate is high in Mongolia and it may be related to local genetic and environmental factors, dietary practices in cities or variation in cut offs used in the two studies.[16] Also, a study of children aged 10-12 years in Turkey had significant levels of malocclusion with Class I preponderance and different occlusive features including overjet and deep bite, with a strong tendency to multifactorial malocclusion etiology in school populations.[3]

Conversely, research in some sections of India indicates a comparatively low prevalence rate. In India, a survey of Udaipur reported an overall prevalence and treatment need among 12-15 year olds of 33.3% with large age and gender variations.[18] Similarly, studies conducted in Patna, Eastern India also recorded that only a minority scored highly on the Dental Aesthetic Index on severe malocclusion scores, but the incidence of any occlusal discrepancy was significant.[19] These reduced prevalence rates relative to our data imply that there is significant regional disparity within the same nation, which may be caused by socio economic position, early dental treatment, and genetic heritage.

The Orthodontic treatment requirements as reported in our study (28.9% definite need) also demonstrate similarities and differences with the recent researches. In the Mehsana district of Gujarat, the moderate need was reported to be 43.9% and extreme need was 22.4% among 13-15 year old children, indicating a higher treatment need as compared to our cohort.[20] On the other hand, in Ulaanbaatar definite treatment need (8.1%) was lesser, but the authors as well, observed statistically significant relationships between IOTN components and aesthetic scores, demonstrating how various normative indices and cut offs can affect the apparent rates of treatment need.[16]

The results of Iraq (Sulaimani) in children aged 10-12 years showed that the majority of children had mild to no treatment requirements, severe malocclusions were less frequent, and there were no significant gender differences.[21] This trend echoes our non-significant gender relationship in treatment need, and supports the idea that gender differences in orthodontic need are population specific and do not occur across all populations. Likewise, according to a Saudi Arabian study, about half of adolescent boys had none or minor treatment need, but Class I occlusion was dominant, and definite need comprised a small portion of cases, which indicated national differences in the way malocclusion is expressed.[22]

A more general perspective on epidemiology shows that age is a major determinant in the prevalence and severity of malocclusion. Research indicates that the level of malocclusion and treatment requirements with age is accelerating as the permanent dentition forms apparently because of the cumulative influence of such occlusal characteristics as crowding, overjet, and deep bite as the mixed dentition becomes the permanent dentition.[23] This pattern aligns with our observation that the definite treatment needs of older children (13-15 years) were relatively higher than the younger groups though the correlation with age was not statistically significant in our findings.

Iqra Yousaf, Gulsana Hashmi, Aisha Bano, Hina Naz Naseem, Noman Tariq, Fahmeed Akhtar, Nabiha Naeem

Cross-contextual comparison indicates that measurement instruments and indices (e.g. DAI vs. IOTN) play an important role in determining reported prevalence and treatment need. The research that utilizes both DHC and aesthetic aspects of IOTN is more likely to demonstrate that definite treatment requirements are lower when compared to research that utilizes only strict normative indices because aesthetic perceptions mediate clinical judgment.[16] The different methodologies point to the necessity of having standardized assessment frames to facilitate a direct comparison of populations.

On the whole, our findings are consistent with the large amount of literature that points to the fact that malocclusion is a widespread issue in school aged children all over the world. The inconsistencies in prevalence and treatment requirement among the recent studies highlight the effects of demographic, genetic, environmental and methodological issues. To capture all the temporal trends and causative factors of malocclusion distribution among school populations, harmonization of diagnostic criteria and additional longitudinal studies are mandatory.

The results of this research have a great impact on the community health and practice. This demonstrates the significance of early screening programs in schools given the high prevalence of malocclusion and the effect of high orthodontic treatment need among school children aged 6-15 years. Periodic oral health examination can be used to diagnose children in need of preventive or corrective treatment, decreasing the probability of functional and aesthetic problems in the long term. The parents and the teacher can be sensitized through school-based awareness campaigns on the importance of early orthodontic assessment, correct oral care, and early referral to the specialist. Also, the data give policy makers evidence to deploy resources effectively in pediatric orthodontic and to undertake specific preventive interventions in high-risk groups.

This study has a number of limitations, even though it has contributed. As a cross-sectional survey, it gives an immediate picture of the prevalence of malocclusion, but can not determine causality and cannot follow the progression. The research was carried out in a sample of schools in one city, which can have a limiting impact on the possible extrapolation of the results to other areas that have a different socio-economic or ethnic background. Self-reported demographic information has the potential to bring in recall bias and although clinical examination was done in a standard manner, inter examiner error may have compromised the measurement of malocclusion severity and requirement of treatment. Lastly, the research was based on only such indices as DAI and IOTN that, although validated, might not reflect all aesthetic or functional issues that matter to patients and families.

CONCLUSION

Malocclusion amongst school children between the ages 6-15 years is very common and a good percentage among them show moderate to definite orthodontic treatment requirements. The most prevalent type was class I malocclusion, and the need to treat it was dependent on age, although there were no gender differences in a significant manner. The findings of this study have highlighted the importance of early diagnosis, prevention programs, and school based orthodontic screening program as a way of lessening the burden on untreated malocclusion and enhancing oral health outcomes. The timely referral and management can be achieved through organized programmes of community health that would eventually lead to increased functional efficacy, aesthetic appeal and quality of life of the afflicted children

REFERENCES

1. Ali, R.A., et al., Oral health–related quality of life among dental implant patients in relation to temporomandibular joint function. Medical Journal of Babylon, 2022. 19(4): p. 609-614.

2. Kuzieva, M.A., Malocclusion–Modern Views, Types and Treatment. American Journal of Bioscience and Clinical Integrity, 2024. 1(10): p. 103-109.

3. Atasever İşler, A.A., Y. Hezenci, and M. Bulut, Prevalence of orthodontic malocclusion in children aged 10–12: an epidemiological study. BMC Oral Health, 2025. 25(1): p. 249.

4. Leck, R., et al., The consequences of living with a severe malocclusion: A review of the literature. Journal of orthodontics, 2022. 49(2): p. 228-239.

5. Chugh, T., et al., From Self-Esteem to Oral Health: The Multi-dimensional Impact of Orthodontic Therapy, in Advances in Sports Science and Technology. 2025, CRC Press. p. 1050-1058.

6. Amponsah, A.A., Prevalence of Malocclusion and Orthodontic Treatment Needs in African Adolescents: A Systematic Review. International Journal of Dental Sciences & Research, 2023: p. 125-144.

7. Yin, J., et al., Prevalence and influencing factors of malocclusion in adolescents in Shanghai, China. BMC Oral Health, 2023. 23(1): p. 590.

8. Kinzinger, G.S.M., J. Hourfar, and J.A. Lisson, Prevalence of malocclusions requiring treatment according to the KIG classification: a multipart cross-sectional study over a 20-year period in the district of Viersen/North Rhine. Journal of Orofacial Orthopedics/Fortschritte der Kieferorthopädie, 2025. 86(6): p. 374-391.

9. Choedon, T., et al., Nutritional status of school-age children (5–19 years) in South Asia: A scoping review. Maternal & child nutrition, 2024. 20(2): p. e13607.

10. De Ridder, L., et al., Assessment of orthodontic treatment need, treatment complexity, treatment priority, and oral health-related quality of life of healthy children and adolescents: A scoping review. Community Dental Health, 2025: p. 0265539X251405585.

11. Moore, M., Comparison of three orthodontic indices of treatment need in a university clinic. 2023.

12. Anyikwa, C.L. and C.E. Ogwo, Enhancing oral health outcomes through public health policy reform. Frontiers in Oral Health, 2025. 6: p. 1604465.

13. Londono, J., et al., Prevalence of malocclusion in Turkish children and adolescents: A systematic review and meta-analysis. Clinical and experimental dental research, 2023. 9(4): p. 689-700.

14. Vedovello, S.A.S., et al., A 4-year follow-up of the need for orthodontic treatment using the Dental Aesthetic Index-DAI: an exploratory analysis. Brazilian oral research, 2025. 39: p. e007.

15. Tariq, S., et al., ASSESSMENT OF ORTHODONTIC TREATMENT NEED IN ADOLESCENT POPULATION USING INDEX OF ORTHODONTIC TREATMENT NEED (IOTN): A MULTI CENTRE CROSS-SECTIONAL STUDY. JOURNAL OF KHYBER COLLEGE OF DENTISTRY, 2025. 15(04): p. 8-13.

16. Bayarsaikhan, O., et al., Prevalence of Malocclusion and Orthodontic Treatment Need in 9-to 12-Year-Old Schoolchildren in Ulaanbaatar, Mongolia. Cureus, 2024. 16(7).

17. Ragab, R.A., Prevalence of Malocclusion in Early Childhood and Its Impact on Oral Health-Related Quality of Life of Children: A Cross-Sectional Study. Egyptian Dental Journal, 2025. 71(2): p. 1133-1144.

18. Trivedi, S., et al., Perceptions of the dental attractiveness and orthodontic treatment needs among the school-going population of the rural areas of Lucknow. International Dental Journal of Students' Research, 2023. 11(3).

19. Singh, R.N., et al., Prevalence of malocclusion and orthodontic treatment needs among 12-15 years old school children in Patna, Eastern India. Journal of Family Medicine and Primary Care, 2019. 8(9): p. 2983-2989.

20. Patel, K.V., et al., The Prevalence of Malocclusion and Orthodontic Treatment Need in 13-15 Years Old School Going Children of Mehsana District, Gujarat: An Epidemiological Study. Journal of Pharmacy and Bioallied Sciences, 2024. 16(Suppl 1): p. S495-S497.

21. Rashid, Z.J., et al., Orthodontic treatment needs in 10–12-year-old school children from Sulaimani City, Iraq: a cross-sectional study. BMC Oral Health, 2025. 25(1): p. 556.

22. Alyami, D., et al., Prevalence of malocclusion and orthodontic treatment needs among adolescents in Najran City, Saudi Arabia. Journal of Orthodontic Science, 2023. 12(1): p. 60.

23. Akbulut, Y. and S.E. Akgün, Prevalence and determinants of orthodontic malocclusions in children: a multifactorial analysis. Journal of Health Sciences and Medicine, 2025. 8(5): p. 889-895...