ORIGINAL ARTICLE

Using DMFT and CPI Scores as Indicators of Oral Health Status of Orphan Children Residing in Selected Orphanages in Dhaka City, Bangladesh

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ABSTRACT

Background: DMFT (Decayed, Missing and Filled Teeth) score helps us measure the dental caries situation/ status, while CPI (Community Periodontal Index) score is a standard tool for screening periodontal disease. ***Objective:*** To assess oral health status of orphan children residing in selected orphanages in Dhaka City, Bangladesh, using DMFT and CPI scores. ***Methods:*** This cross-sectional study was conducted among conveniently selected 371 orphan children in Dhaka City, Bangladesh, between January and December of 2023. Dental examination included observation of all permanent teeth with a metallic periodontal probe i.e., CPI probe and a plane mouth mirror under adequate illumination. ***Results:*** The mean age of the participants was 10.96±2.52 years. 87.33% were boys and 12.67% were girls; male-female ratio was 6.9:1. Among the respondents, 96% were Muslims. 46.6% of the participants were from class-I to class-IV, while 41.5% were from class-V to class-VIII. 48% of them were from urban area, while 45% were from rural area; however, 7% did not know anything about their home district. 48.5% of the children's duration of stay in the orphanage was less than 2 years, while 35% of them were staying in the orphanage between 2 and 5 years. On clinical examination, most of the respondents were diagnosed with dental caries (59.3%), while 68.5% children had no wiggling teeth and 7.5% of them had one or more filled teeth in their oral cavity. Only 34% children had 'no decayed, missing or filled teeth' (DMFT score 0). 44.7% children had DMFT score 1 to 3, which indicates moderate dental problems, while 21.3% had DMFT score >3, which indicates severe dental problems. 91.6% respondents had normal gingival condition, while 7% had slight change in colour but no bleeding on probing. Only 0.8% had periodontal pocket 4-5 mm (CPI score 3), while 22.1% were diagnosed with presence of calculus in their oral cavity (CPI score 2). 42.3% respondents had gum bleeding (CPI score 1), and 34.8% had healthy gingiva (CPI score 0). A significant association was observed between age of the respondents and their DMFT score (p=0.001). ***Conclusion:*** Children residing in orphanages are marginalized population having an unmet oral health need. Implementation of targeted health education and prevention programs through proactive oral care approach must be in place to allow access to oral healthcare along with early detection and intervention.

Keywords: Oral health, DMFT score, CPI score, orphan children, Bangladesh

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INTRODUCTION

In the recent decade, there has been increased attention on oral health and the global public health burden of oral diseases in public health discussion.[1,2] Oral health is essential to general health and quality of life. Oral diseases in children including dental caries (tooth cavity) and (gum disease) limit their capacity to bite, chew, smile and speak; consequences of chronic untreated oral diseases are often severe and can include unremitting pain, sepsis, lost school days, disruption to family and social life, which ultimately affects quality of life and psychosocial wellbeing.[1,2] According to the analysis of the global burden of diseases, injuries, and risk factors, oral disorders affect approximately 3.5 billion people worldwide, with caries being the most common

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condition, followed by periodontal diseases.[3] Although oral diseases are largely preventable, they persist with high prevalence, reflecting widespread social and economic inequalities and inadequate funding for prevention and treatment, particularly in low-income and middle-income countries (LMICs).[1]

Like many other diseases, oral disease primarily affects the poor and socially marginalized population.[1,4] Children from disadvantaged backgrounds have little or no access to oral health information and services for several reasons, e.g., lack of information and accessibility or the nature of their disadvantage, which may require the involvement of reform in oral health policy of the country.[4,5] Orphanage resident children are considered as socially marginalized population in our South Asian region and known to have unmet oral health needs.[6-8] We selected to research on orphanage resident children in our country based on our understanding about the importance of the social consequences of diseases and interventions that are intended to increase their access to healthcare and improve quality of life.

Decayed, Missing and Filled Teeth (DMFT) is the sum of the number of decayed, missing due to caries, and filled teeth in the permanent teeth and the mean number of DMFT is the sum of individual DMFT values divided by the sum of the population. This indicator belongs to a set of indicators whose purpose is to measure the dental caries situation/status.[9] Besides, community periodontal index (CPI) was created by the World Health Organization (WHO) to provide a global standard for screening periodontal disease.[9] However, it is an index only and does not replace the need for a comprehensive periodontal examination, when indicated. Those two above-mentioned tools are readily available for any epidemiological screening and research.[9] Taking all those considerations in account, our study aims to assess oral health status of orphan children residing in selected orphanages in Dhaka City, Bangladesh, using DMFT and CPI scores.

METHODS

The cross-sectional study was conducted among 371 orphan children aged between 6 and 17 years of four different institutions in Dhaka city, Bangladesh, between January and December of 2023. The participants were selected by convenient sampling methods from *SOS Children's Village Dhaka* at Shamoli, Mirpur Road, *Mohammadi Ashraful Madaris & Etimkhana* at Mohammadpur, *Jamia Islamia Baitul Aman* at Adabor, and Etimkhana and *Jamia Islamia Baitul Falah (Madrashah & Yatimkhana)*, Mohammadpur. A structured questionnaire and clinical examination checklist were used to collect data. Data was collected by face-to-face interview and oral examination of the participants.

The examination for dental caries included observation of all permanent teeth with a metallic periodontal probe i.e., CPI probe and a plane mouth mirror under adequate illumination. The permanent dentition status of each tooth (crown and root) is recorded as a score from 0 to 9. Individual DMFT value was recorded as the sum of the number of D (Decayed), M (Missing) due to caries, and F (Filled) teeth. The D component includes all teeth with codes 1 or 2. The M component comprises teeth coded 4 in subjects under 30 years of age. The F component includes only teeth with code 3.[9] Moreover, CPI score was recorded as: 0: healthy gingiva; 1: bleeding from gum; 2: calculus present; 3: periodontal pocket 4-5 mm.[9]

Data was collected, compiled, checked and later analyzed by using Statistical Package for Social Sciences (SPSS) version 27.0 for Windows. Data was expressed as frequency and percentage in tabulated form. As inferential statistics, Chi-square test was done to find significant associations. A p-value <0.05 was considered as statistically significant.

RESULTS

The mean age of the participants was 10.96±2.52 years. 87.33% were boys and 12.67% were girls; male-female ratio was 6.9:1. Among the respondents, 96% were Muslims. 46.6% of the participants had studentship in from class-I to class-IV, while 41.5% were from class-V to class-VIII. 48% of them were from urban area, while 45% were from rural area; however, 7% did not know anything about their home district. 48.5% of the children's duration of stay in the orphanage was less than 2 years, while 35% of them were staying in the orphanage between 2 and 5 years (Table 1). On clinical examination, most of the respondents were diagnosed with dental caries (59.3%), while 68.5% children had no wiggling teeth and 7.5% of them had one or more filled teeth in their oral cavity (Table 2). Only 34%

children had 'no decayed, missing or filled teeth' (DMFT score 0). 44.7% children had DMFT score 1 to 3, which indicates moderate dental problems, while 21.3% had DMFT score >3, which indicates severe dental problems. 91.6% respondents had normal gingival condition, while 7% had slight change in colour but no bleeding on probing. Only 0.8% had periodontal pocket 4-5 mm (CPI score 3), while 22.1% were diagnosed with presence of calculus in their oral cavity (CPI score 2). 42.3% respondents had gum bleeding (CPI score 1), and 34.8% had healthy gingiva (CPI score 0) (Table 3). A significant association was observed between age of the respondents and their DMFT score (p=0.001) (Table 4).

Table 1: Sociodemographic characteristics of the participants (n=371)

Variables	Category	Frequency	Percentage
Age group	6 to 9 years	102	27.5
	10 to 13 years	217	58.5
	14 to 17 years	52	14.0
Gender	Male	324	87.33
	Female	47	12.67
Religion	Muslim	356	96
	Non-Muslim	15	4
Studentship	Class I to IV	173	46.6
	Class V to VIII	154	41.5
	Class IX to XII	44	11.9
Habitat	Urban	178	48
	Rural	167	45
	Do not know	26	7
Duration of stay in the orphanage	<2 years	180	48.5
	2 to 5 years	130	35.0
	5 to 8 years	28	7.5
	>8 years	33	8.9

Table 2: Clinical assessment using DMFT (n=371)

Variables	Frequency	Percentage
Presence of dental caries (decayed teeth)		
Present	220	59.3
Absent	151	40.7
Presence of missing teeth		
Present	117	31.5
Absent	254	68.5
Presence of filled teeth		
Present	28	7.5
Absent	343	92.5

Table 3: Assessment of oral health condition of the participants through clinical examination (n=371)

Variables	Category	Frequency	Percentage
DMFT score	0	126	34
	1 to 3	166	44.7
	>3	79	21.3
Condition of the gingiva	Normal	340	91.6
	Slight change in colour, but no bleeding on probing	26	7.0
	Redness and oedema, bleeding on probing	5	1.3
Presence of calculi	Present	82	22.1
	Absent	289	77.9
Periodontal status by CPI score	0	129	34.8
	1	157	42.3
	2	82	22.1
	3	3	0.8

Table 4: Association between age of the respondents and their DMFT score (n=371)

Age group	DMFT Score Frequency			Total
	0	1 to 3	>3	
6 to 9 years	21 (20.6%)	35 (34.3%)	46 (45.1%)	102 (100%)
10 to 13 years	76 (35.0%)	109 (50.2%)	32 (14.7%)	217 (100%)
14 to 17 years	29 (55.8%)	22 (42.3%)	1 (1.9%)	52 (100%)
Total	126 (34.0%)	166 (44.7%)	79 (21.3%)	371 (100%)
Test of Significance	$\chi 2$= 57.408, df= 4, p=0.001[S]			

p-value reached from Chi-square test; S=significant.

DISCUSSION

The World Health Assembly approved a Resolution on oral health in 2021, which affirms that oral health should be firmly embedded within the non-communicable disease (NCD) agenda and that oral healthcare interventions should be included in universal health coverage programs.[10] Therefore, epidemiological studies on oral health must be routinely conducted to monitor the trends and risks of oral diseases and impactful research will facilitate interventions and policy. The following discussion based on previous studies done in different countries of South Asia revealed more or less the same picture of oral health status of the children residing in orphanages (as disadvantaged group of population).

In our study, the mean age of the participants was 10.96±2.52 years. 87.33% were boys and 12.67% were girls; male-female ratio was 6.9:1. Dental caries was evident in 59.3%, while 68.5% children had no wiggling teeth and 7.5% of them had one or more filled teeth in their oral cavity. Only 34% children had 'no decayed, missing or filled teeth' (DMFT score 0). 44.7% children had DMFT score 1 to 3, which indicates moderate dental problems, while 21.3% had DMFT score >3, which indicates severe dental problems. Only 0.8% had periodontal pocket 4-5 mm (CPI score 3), while 22.1% were diagnosed with presence of calculus in their oral cavity (CPI score 2). 42.3% respondents had gum bleeding (CPI score 1), and 34.8% had healthy gingiva (CPI score 0).

Khare et al.[6] studied on 923 orphan inmates of both genders from Udaipur district, Rajasthan, India, and found the prevalence of dental caries in primary teeth was found to be 49.6% and in permanent teeth was 41%.

Shah et al.[7] studied on 1,664 children that included 1,201 boys and 463 girls from registered orphanages in the state of Jammu and Kashmir, India, and found that caries prevalence in primary dentition was higher in subjects' ≤6 years of age where the prevalence was 50.9%; in subjects 7 to 11 years of age, the prevalence was 25.2%. Caries prevalence in permanent dentition within the age group 7 to 11 was 69.1%, while in subjects' ≥12 years, the prevalence was 66.2%.

Kamran et al.[8] studied on 753 children from Rawalpindi and Islamabad, Pakistan, aged between 4 and 17 years with mean age of 10.5 years. Males were 72.1% and 27.9% were females. Children ages found mean DMFT score 1.04±0.23.

Christian et al.[11] studied on 1,137 children residing in 31 orphanages across the State of Kerala in India. They reported that (Female children made up 82% of the sample) in 6-year-old children the prevalence of caries was 77% and the mean DMFT score was 3.60±3.50, while in 12-year-old children the prevalence of caries was 44% and the mean DMFT score was 1.35±1.96. Among 12-year-old children, those who reported being shown how to clean their teeth were less likely to have caries (OR=0.62; 95% CI: 0.38-0.95).

Kumar et al.[12] found DMFT score 1.44±1.45 among 257 orphan children from Udaypur, India. He also observed that children residing in orphanages pose a special problem as many of the children in the orphanages are previously street children, which caused them having a worse oral health status.

Soni et al.[13] studied on 1005 orphan children from Jaipur district in Rajasthan, India, comprising 65.37% males and 34.53% females in 3-18 years age group. The prevalence of dental caries in primary teeth was found to be 12.77% and 15.85% male and females, respectively, while in permanent teeth, it was 0.36% and 21.33%, respectively. Gingival status revealed that 77.61% of had healthy gums, while bleeding on probing was detected in 22.39%.

Karki et al.[14] evaluated the oral health of Nepalese school children from18 randomly selected districts of Nepal aged between 5 and 15 years. The caries index was recorded using DMFT index. The mean was observed 5-6-years group 5.0±4.22, while in 12- and 15-years groups 1.3±1.77 and 1.9±2.28 respectively.

Apart from that, in Nepal, Khanal et al.[14] and in Bangladesh, Sony et al.[15] showed similar trends in oral health status including prevalence of dental caries among children in different regions

of Nepal and in a rural area of Bangladesh, respectively.

From the above-mentioned studies, it was observed that oral health problems are quite prevalent in children living in orphanages. Therefore, oral health status needs to be improved overall in LMICs, especially for marginalized group of population (e.g., orphan inmates) through increase availability of access to oral healthcare and health education.[16] Our study had a small sample size and from only one city of Bangladesh; further studies on a larger representative sample from different regions of the country could provide a clearer picture on the epidemiologic prevalence and influence of various factors on oral health status of orphanage resident children.

CONCLUSION

Our data emphasized the connection between oral health and overall well-being, dental caries, periodontal disease, inadequate oral hygiene, Critical to avoiding the onset of oral conditions impacting individuals' psychophysical health especially in socially disadvantaged group (e.g., orphanage resident children) is the implementation of targeted health education and prevention programs through proactive oral care approach involving improved access to oral healthcare and early detection and intervention.

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Ethical declaration: The study was approved by the Institutional Review Board of the National Institute of Preventive and Social Medicine (NIPSOM), Dhaka, Bangladesh (NIPSOM/IRB/2023/06).

Authors' contribution: Concept and design: GNT; data collection, compilation, editing and analysis: GNT, MD, RI and RS; manuscript writing and revision: GNT, MD, RI, and RS; MAA supervised the study, verified the data and edited the manuscript. All authors approved the final manuscript.

REFERENCES

1. Peres MA, Macpherson LMD, Weyant RJ, Daly B, Venturelli R, Mathur MR, et al. Oral diseases: a global public health challenge. Lancet. 2019;394(10194):249-60.
2. Watt RG, Daly B, Allison P, Macpherson LMD, Venturelli R, Listl S, et al. Ending the neglect of global oral health: time for radical action. Lancet. 2019;394(10194):261-72.
3. GBD 2017 Oral Disorders Collaborators; Bernabe E, Marcenes W, Hernandez CR, Bailey J, Abreu LG, et al. Global, regional, and national levels and trends in burden of oral conditions from 1990 to 2017: a systematic analysis for the global burden of disease 2017 study. J Dent Res. 2020;99(4):362-73.
4. Northridge ME, Kumar A, Kaur R. Disparities in access to oral health care. Annu Rev Public Health. 2020;41:513-35.
5. Watt RG, Mathur MR, Aida J, Bönecker M, Venturelli R, Gansky SA. Oral health disparities in children: a canary in the coalmine? Pediatr Clin North Am. 2018;65(5):965-79.
6. Khare V, Koshy A, Rani PJ, Srilatha S, Kapse SC, Agrawal A. Prevalence of dental caries and treatment needs among the orphan children and adolescents of Udaipur district, Rajasthan, India. J Contemp Dent Pract. 2012;13(2):182-7.
7. Shah AF, Tangade P, Ravishankar TL, Tirth A, Pal S, Batra M. Dental caries status of institutionalized orphan children from Jammu and Kashmir, India. Int J Clin Pediatr Dent. 2016;9(4):364-71.
8. Kamran R, Farooq W, Faisal MR, Jahangir F. Clinical consequences of untreated dental caries assessed

using PUFA index and its covariates in children residing in orphanages of Pakistan. BMC Oral Health. 2017;17(1):108.

9. World Health Organization (WHO). Oral health surveys: basic methods. 5th edition. Paris, France: WHO; 2013. Retrieved from: https://iris.who.int/bitstream/handle/10665/97035/9789241548649_eng.pdf (Accessed January 19, 2023).
10. World Health Organization (WHO). Resolution on oral health. 74th World Health Assembly. May 31, 2021. Retrieved from: https://apps.who.int/gb/ebwha/pdf_files/WHA74/A74_R5-en.pdf (Accessed January 11, 2023).
11. Christian B, Ummer-Christian R, Blinkhorn A, Hegde V, Nandakumar K, Marino R, et al. An epidemiological study of dental caries and associated factors among children residing in orphanages in Kerala, India: Health in Orphanages Project (HOPe). Int Dent J. 2019;69(2):113-8.
12. Kumar S, Goyal A, Tadakamadla J, Tibdewal H, Duraiswamy P, Kulkarni S. Oral health related quality of life among children with parents and those with no parents. Community Dent Health. 2011;28(3):227-31.
13. Soni A, Sharma H, Motghare V, Verma S. Assessment of oral health status in orphanage inmates of north-eastern part of Rajasthan: A descriptive cross-sectional study. J Indian Assoc Public Health Dent. 2020;18(2):139-42.
14. Khanal S, Shah P, Ghimire P. burden of dental caries in the nepalese children: a literature review. J Nepal Assoc Ped Dent. 2021;2(2):90-6.
15. Sony SA, Haseen F, Islam SS, Jahan I. Prevalence and assessment of experience of dental caries among school going adolescents in a rural area of Sylhet, Bangladesh. Int J Hum Health Sci (IJHHS). 2021;5(3):336-40.
16. Petersen PE. Global policy for improvement of oral health in the 21st century – implications to oral health research of World Health Assembly 2007, World Health Organization. Community Dent Oral Epidemiol. 2009;37(1):1-8.