RESEARCH ARTICLE

ORAL HEALTH ASSESSMENTOF ORPHANAGE RAISED AND FAMILY RAISED CHILDREN OF LUCKNOW CITY: A CROSS- SECTIONAL STUDY

Vandana Singh[1], Subash Singh[2], Sonalika Srivastava[3], Aayushi Bhardwaj[4], Rajlakshmi Mitra[5] and Karina Hyanki[5]

1. Additional Professor Department of Oral Medicine & Radiology Faculty of Dental Sciences, KGMU, Lucknow.
2. Reader Department of Pediatric and Preventive Dentistry BBDCODS, BBDU Lucknow.
3. Senior Lecturer Department of Oral Medicine & Radiology Sardar Patel Postgraduate Institute of Dental & Medical Sciences, Lucknow.
4. Junior Resident 3 Department of Pediatric and Preventive Dentistry BBDCODS, BBDU Lucknow.
5. Senior Resident Department of Oral Medicine & Radiology Faculty of Dental Sciences, KGMU, Lucknow.

Manuscript Info

Abstract

Background: Despite sufficient support, lack of parental care make orphanage raised children vulnerable to various health and psychological problems. Health problems like nutritional deficiencies, compromised oral health and various psychological conditions are the common problems in these children. Considering the various problems faced by orphanage raised children the study is designed to better assess the facts and status of oral health and quality of life in these children.
Aims & Objective: 1. To assess and compare the oral health status in orphanage raised and family raised children of Lucknow City. 2.To compare BMI and correlate with oral health among these children.
Methodology: Eight Hundred Seventy children (342 Family raised and 528 Orphanage raised) were included according to inclusion and exclusion criteria in the study, after obtaining written consent and institutional ethical approval. Comprehensive oral examination was done according to WHO criteria.
Results: Results showed statistically significant poor oral hygiene, higher DMFT score and lower BMI in orphanages raised children. There was no correlation between BMI and DMFT /OHI scores in both the groups.
Conclusion: In conclusion, our study highlights the compromised oral health status of orphanage children compared to family-raised children.

Introduction:-

Based on definition, orphans are children under the age of 18 years old who have lost their mother or father or both.[1] Many children lose their families due to issues such as financial poverty, cultural problems, mental health, or other factors and encounter difficult situations as family deprivation and poor living conditions.[2,3] Though the

Corresponding Author:-Sonalika Srivastava
Address:-Senior Lecturer Department of Oral Medicine & Radiology Sardar Patel Postgraduate Institute of Dental & Medical Sciences, Lucknow.

children get protection, food, and shelter in orphanages, they meet with problematic hygiene, nutritional deficiencies, compromised oral health and psychological conditions due to lack of parental support and care. [4,5,6] Dental caries, periodontal and gingival problems are the most common oral conditions.[4, 7]

Considering this present study was conducted to assess and compare the oral health status and BMI (Body mass index) in family raised children and children living in orphanages of Lucknow city.

Materials and Methods:-

The cross-sectional study was conducted on 870 participants aged 3-16 years, who were selected in the camps that were organised at both orphanages and primary schools. The study was conducted from July 2023 to July 2024. Written informed consent was taken from the parents, school principal and orphanages authorities prior to start observations or examinations. Institutional ethical approval (BBDCODS/IEC/09/2022 dated 16/9/22) was obtained prior to start the study.

The sample size for the present study was calculated on the basis of proportion of unfavorable oral health among orphan and non-orphan groups using the formula:

$$n = d \left(\frac{z_\alpha + z_\beta}{\ln(1-e)} \right)^2 \left[\frac{1-p_1}{p_1} + \frac{1-p_2}{p_2} \right]$$

Where $p_1 = 0.88$ (88%) proportion of unfavorable oral health among orphan group
$p_2 = 0.33$ (33%) proportion of unfavorable oral health among non-orphan group[8]
$e = 0.6(p_1 - p_2)$.

The proportion difference considered to be clinically significant
$d = 2.0$, the design effect
Type I error $\alpha = 5$ %, for the significance level of 95%.
Type II error $\beta = 10$ %, for detecting the results with 90% power of study,

The minimum sample size required **n = 340 each group**
The study sample consisted of two groups based on the upbringing environment. Both orphanage and family raised children were similar in gender distribution and mean age. The exclusion criteria were age less than three years and more than 16 years, lack of cooperation in the examination, systemic disorders, mental or other behavioural disorders. According to inclusion criteria all children of both sex who were in good health, Children between the age of 3-16 years and Children who were cooperative were included in the study. Children who were not physically participating, had enamel/dental defects other than dental caries, and were suspected of having a chronic medical condition (constant use of sugar-containing drugs is mandatory) were excluded.

Intraoral examinations were performed by a trained examiner (postgraduate student) using a mouth mirror and personal protective barriers (gloves and masks). The data were recorded on a standard format. Decayed, Missing, Filled Teeth/Surfaces (DMFT/DMFS) score of teeth was recorded as per World Health Organization (WHO) criteria including the indices of for the permanent teeth and the decayed, missing and filled teeth/surfaces (dmft/dmfs) for the primary teeth. T-test was used to analyze DMFT/DMFS, dmft/dmfs and OHI-S scores. Other soft tissue/hard tissue findings of the oral cavity were recorded according to the pre-set format. As per the World Health Organization (WHO), the anthropometric measurement method of BMI calculation was used for body weight and height measurements using a digital scale of 150 kg and 200 cm of tape. The height of the body is measured with subjects wearing no shoes and their heads contacting the ruler with their line of sight horizontally aligned. As per WHO, the BMI scores are as follows: underweight (18.5), average weight (18.5-24.99), overweight (>25), and obese (>30).[9] The BMI and oral health status assessments were analysed according to aims and objectives of the study. Results were calculated and analysed with suitable statistical tests.

Results were calculated using chi square test for group distributions and associations, ANOVA for correlation between BMI, DMFT and OHI scores and MANN Whitney test to compare BMI in the groups.

Results:-

1.Sample Distribution: A total 870 children were included in the study. 528 individuals (60.7%) were raised in an orphanage, while 342 individuals (39.3%) were family-raised. **(Table1, Figure 1)**

2. Age distribution of the Study Groups

Among children aged three 3-9 years, 372 (70.5%) were from orphanages, while only 138 (40.4%) were family-raised. In contrast, in the 10–16 years age group, 156 (29.5%) were from orphanages compared to 204 (59.6%) from family settings. The chi-square analysis indicated a statistically significant difference in age distribution between the two groups ($\chi^2 = 77.54$, p <0.001)**(Table2, Figure 2)**

3. Sample distribution according to Sex

The sex distribution between orphanage and family-raised groups showed a significant difference. Among those in orphanages, 248 (47.0%) were male and 280 (53.0%) were female. In contrast, within the family-raised group, 189 (55.3%) were male and 153 (44.7%) were female. The chi-square test revealed a statistically significant association between sex and upbringing environment ($\chi^2 = 5.71$, p = 0.017), indicating that males were more prevalent in the family-raised group, while females were more predominant in the orphanage group.**(Table 3, Figure 3)**

4. Oral Hygiene Status

In the orphanage group, 236 (44.7%) individuals had good oral hygiene, 180 (34.1%) had fair hygiene, and 112 (21.2%) had poor hygiene. Conversely, in the family-raised group, 156 (45.6%) had good oral hygiene, 163 (47.7%) had fair hygiene, and only 23 (6.7%) had poor hygiene. The chi-square test showed a highly significant association ($\chi^2 = 37.81$, p < 0.001).
(Table 4, Figure 4)

5. Intergroup Comparison of Orthodontic Problems

The occurrence of orthodontic problems showed no significant difference between orphanage and family-raised groups. Among the orphanage group, 50 (9.5%) individuals had orthodontic problems, while 478 (90.5%) did not. In the family-raised group, 28 (8.2%) had orthodontic issues, and 314 (91.8%) did not. The chi-square test result ($\chi^2 = 0.42$, p = 0.518) indicates that there was no statistically significant association between living environment and the presence of orthodontic problems.**(Table 5, Figure 5)**

6. Intergroup Comparison of Dental Carries

The orphanage group exhibited higher DMFT score for both primary and permanent teeth with mean score (2.3 ± 1.5 and 2.7) than the family-raised group (2.0 and 1.5 ± 0.9), with a z-value of 5.924 and a p-value of <0.001.
(Table 6, Figure 6)

7. Intergroup Comparison of BMI

The comparison of Body Mass Index (BMI) between orphanage and family-raised children, analysed using the Mann-Whitney test, showed a significant difference. The mean BMI for children in the orphanage group was 15.67 ± 1.71, whereas the family-raised group had a higher mean BMI of 16.24 ± 2.71. The test yielded a z-value of 3.783 with a p-value of 0.001, indicating a statistically significant difference. **(Table 7, Figure 7)**

8.Correlation of DMFT Score with BMI

The correlation analysis between Body Mass Index (BMI) and dental caries, measured by DMFT scores (Decayed, Missing, and Filled Teeth), revealed weak and non-significant associations in both orphanage and family-raised groups. For permanent teeth, the overall correlation showed an r-value of -0.055 with a p-value of 0.181, indicating no significant relationship. Similarly, in the orphanage group, the r-value was -0.007 (p = 0.910), and in the family-raised group, it was -0.069 (p = 0.230), both showing no significant correlation. For primary teeth, the overall correlation had an r-value of -0.040 (p = 0.391), with the orphanage group showing an almost negligible r-value of 0.002 (p = 0.977), and the family-raised group also exhibiting no significant relationship (r = -0.002, p = 0.968).
(Table 8)

9. Correlation of BMI with OHIS

The analysis of the relationship between oral hygiene status and Body Mass Index (BMI) using ANOVA revealed no significant differences across the groups. Overall, individuals with good oral hygiene had a mean BMI of 15.81 ±

2.22, those with fair hygiene had a mean BMI of 16.03 ± 2.16, and those with poor hygiene had a mean BMI of 15.81 ± 2.07. The overall F-value was 1.03 with a p-value of 0.359, indicating no statistically significant difference. In the orphanage group, the BMI for individuals with good, fair, and poor oral hygiene was 15.59 ± 1.66, 15.78 ± 1.64, and 15.67 ± 1.92 respectively, with an F-value of 0.59 and a p-value of 0.556, showing no significant variation.

Similarly, in the family-raised group, those with good oral hygiene had a BMI of 16.14 ± 2.85, fair hygiene had 16.30 ± 2.60, and poor hygiene had 16.50 ± 2.65. The F-value of 0.26 and p-value of 0.775 also indicated no significant differences. **(Table 9, Figure8)**

Discussion:-

Oral health is an essential component of general health and well-being, particularly in children, as it influences their nutrition, growth, self-esteem, and quality of life. The World Health Organization (WHO) defines oral health as a state of being free from chronic mouth and facial pain, oral and throat cancer, oral infection and sores, periodontal disease, tooth decay, tooth loss, and other diseases and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychosocial well-being (WHO, 2012).[10] In children, oral diseases such as dental caries, gingivitis, and malocclusion are common and, if left untreated, can have detrimental effects on physical and psychological development.

Multiple factors contribute to the oral health status of children, including genetic predisposition, socioeconomic status, dietary habits, oral hygiene practices, access to dental services, and parental or caregiver involvement (Petersen & Kwan, 2010).[11] In the absence of a stable family environment, orphaned children are often deprived of consistent supervision and care regarding their oral health practices, exacerbating their risk of developing dental problems. Children in orphanages often face many barriers to oral healthcare, including financial constraints of the institution, absence of routine dental check-ups, and limited availability of dental care facilities, particularly in rural or underdeveloped areas. Additionally, orphanage staff may lack adequate training in paediatric oral health management, resulting in inconsistent or insufficient supervision of oral hygiene practices among the children.

Present study was attempted to identify the Oral health status in orphanage children as compare to family raised children. Our study corroborates earlier research by demonstrating that children living in orphanages have a higher prevalence of dental caries, poor oral hygiene status, and lower body mass index (BMI) compared to family-raised children.
Total 872 children were included in the study. This distribution of sample subjects highlighted a higher representation of participants from orphanage settings compared to those raised in a family environment, the distribution was justified statistically as the calculated sample size was 340 subjects(minimum) in each group. The age distribution of participants revealed significant differences between the orphanage and family-raised groups. There were more elder age group (7-16) children in family raised group whereas the orphanage children group consisted more younger group children.

We found a highly significant association between OHI score and both the study groups indicating that poor oral hygiene was notably more prevalent among those in orphanages compared to family-raised children.VinaySuresan et al 2021 also found poor oral hygiene status among orphans in their study.[12]

The DMFT score comparison suggested that orphanage children have a significantly higher prevalence of dental caries in both permanent and primary teeth compared to those raised in family environments.SimilialyNagwa Mohamed Ali Khattab and Mennat Allah Ashraf Abd-Elsabour (2023) also reported significantly high caries index in the governmental orphanage in their study.[13]
A study by Rao et al. (2016) similarly observed a higher prevalence of dental caries and gingival diseases in institutionalized children than in children living with their families in India. The lack of individualized attention in maintaining oral hygiene routines, irregular access to dental care services, and inadequate oral health education programs within orphanage settings contribute substantially to this disparity.[14]
In both the groups there was no significant difference in orthodontic problems. Few studies had suggested high prevalence of oral habits and malocclusion in orphanage children.

Our study showed that orphanage children had significantly lower BMI values compared to family raised group. This finding was in accordance with studies by Naveen et al (2015)and Dosumu et al. (2013), [15, 16]which reported a significant association between low BMI and poor oral health status in institutionalized children. In present study there was no significant correlation found between BMI and DMFT and OHI scores in either group. Contradictory Kunal Jha (2022)et alfound that there was a significant correlation between the OHI and DC in their study.[17] Few studies showed mixed correlation between BMI and oral health status. [18, 19]

The findings of our study clearly showed that children residing in orphanages exhibit significantly compromised oral health status as compared to their counterparts raised in family environments. This disparity may be attributed to multiple interrelated factors, including lack of oral health awareness, nutritional deficiencies, and insufficient psychological and emotional support that typically characterizes a familial setting. Psychological and emotional well-being has been identified as a significant determinant of oral health behaviour and outcomes in children. Family environments typically provide emotional support, affection, and positive reinforcement that encourage the adoption of healthy habits, including proper oral hygiene practices (Locker, 2000). [20]Conversely, orphanage children often experience emotional neglect, stress, and low self-esteem, which may manifest as neglect of personal hygiene, including oral care.

Lack of details regarding comprehensive diet history, analysis of psychological component and oral health knowledge among children and their parents/ caretakers can be considered as drawback of our study, yet the study reflects light on the demand of orphan children for regular professional dental care.

Oral health awareness is a key modifiable determinant of oral health status. In family settings, parents and guardians play a pivotal role in educating children about proper oral hygiene practices, dietary habits, and the importance of regular dental visits. In contrast, children in orphanages often lack access to consistent oral health education programs. For instance, a study by Petersen et al. (2004) in Kenya demonstrated that regular oral health education significantly reduced the prevalence of dental caries and improved oral hygiene among school children.[21]Implementing similar programs in orphanage settings could potentially mitigate the disparities in oral health outcomes observed in our study.

Timely access to professional dental care is essential for the prevention, early detection, and management of oral diseases in children. Family-raised children typically benefit from parental supervision and facilitation of dental visits. In contrast, orphanage children often lack such facilitation due to financial constraints, logistical difficulties, and the prioritization of other health concerns over dental care within institutional settings. Studies by Ramazani (2014) and Kumar et al. (2016) have reported low utilization rates of dental services among institutionalized children, contributing to the accumulation of untreated dental caries and other oral health problems.[22,23] Integrating dental services into routine healthcare programs for orphanages and establishing partnerships with dental schools and community health centres could enhance access to preventive and curative oral healthcare for these children.

The findings of our study emphasize the urgent need for policy interventions and programmatic strategies aimed at improving the oral health status of orphanage children. Key recommendations may include: Implementation of Institution-based Regular Oral Health Screening Programs and Nutritional Support Programs, and training of Caregivers and Orphanage Staff.

Conclusion:-

In conclusion, our study highlights the compromised oral health status of orphanage children compared to family-raised children, attributed primarily to lack of awareness, nutritional deficiencies, and the absence of familial psychological support. Addressing these challenges requires a multifaceted approach encompassing government policies and recommendations for oral health education, improved access to dental care, nutritional support, and psychosocial interventions. Future research should explore the long-term impact of targeted oral health interventions in institutional/orphanages settings and develop evidence-based models for promoting oral health equity among vulnerable child populations.

Tables:
Table 1:- Distribution of Cases according to Group.

Group	No.	%
Group A Orphanage	528	60.7%
Group B Family raised	342	39.3%

Table 2:- Age Distribution of the Groups.

Age	Orphanage		Family raised		Significance	
	No.	%	No.	%	chi sq	p-value
3 - 9 years	372	70.5%	138	40.4%	77.54	**<0.001**
10 - 16 years	156	29.5%	204	59.6%		

Table 3:- Groupwise Distribution of Sex.

Sex	Orphanage		Family raised		Significance	
	No.	%	No.	%	chi sq	p-value
Male	248	47.0%	189	55.3%	5.71	**0.017**
	280	53.0%	153	44.7%		

Table 4:- Intergroup Comparison of OHI.

Oral Hygiene Status	Orphanage		Family raised		Significance	
	No.	%	No.	%	chi sq	p-value
Good	236	44.7%	156	45.6%	37.81	**<0.001**
Fair	180	34.1%	163	47.7%		
Poor	112	21.2%	23	6.7%		

Table 5:- Intergroup Comparison of Orthodontic Problem.

Orthodontic problem	Orphanage		Family raised		Significance	
	No.	%	No.	%	chi sq	p-value
Present	50	9.5%	28	8.2%	0.42	0.518
Not Present	478	90.5%	314	91.8%		

Table 6:- Intergroup Comparison of Dental Caries.

Dental Caries	Orphanage		Family raised		Mann Whitney test	
	Mean	SD	Mean	SD	z-value	p-value
DMFT (Permanent)	2.7	2.1	2.0	1.2	4.993	**<0.001**
DMFT (Primary)	2.3	1.5	1.5	.9	5.924	**<0.001**

Table 7:- Intergroup Comparison of BMI.

Dental Caries	BMI			Mann Whitney test	
	Mean	SD		z-value	p-value
Orphanage	15.67	1.71		3.783	**0.001**
Family raised	16.24	2.71			

Table 8:- Correlation of DMFT Score with BMI.

Correlation with BMI	Overall		Orphanage		Family Raised		
	r-value	p-value	r-value	p-value	r-value	p-value	N
DMFT (PERMANENT)	-.055	.181	-.007	.910	-.069	.230	308
DMFT (primary)	-.040	.391	.002	.977	-.002	.968	303

Table 9:-Correlation of BMI with OHIS.

Group	Oral Hygiene Status	BMI		ANOVA	
		Mean	SD	F-value	p-value
Overall	Good	15.81	2.22	1.03	0.359
	Fair	16.03	2.16		
	Poor	15.81	2.07		
Orphanage	Good	15.59	1.66	0.59	0.556
	Fair	15.78	1.64		
	Poor	15.67	1.92		
	Good	16.14	2.85	0.26	0.775
	Fair	16.30	2.60		
	Poor	16.50	2.65		

Figures:
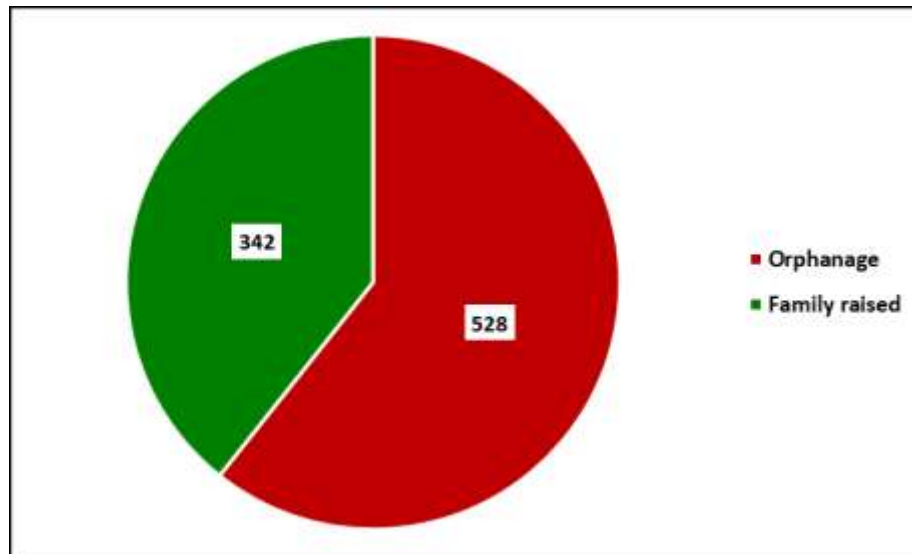
Figure 1:- Distribution of Cases according to Group.
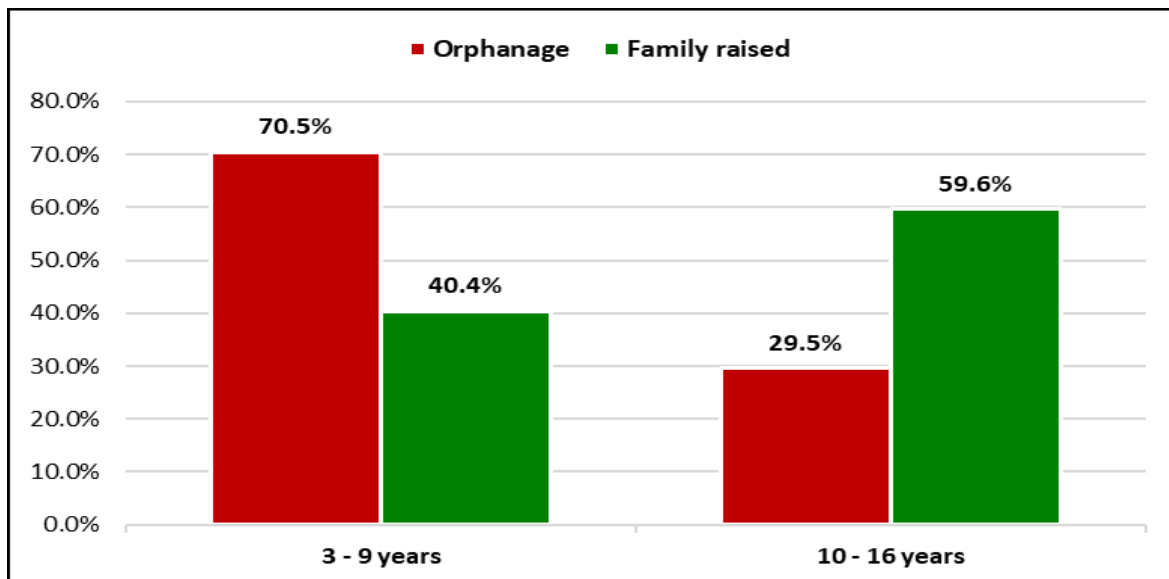
Figure 2:- Age Distribution of the Groups.
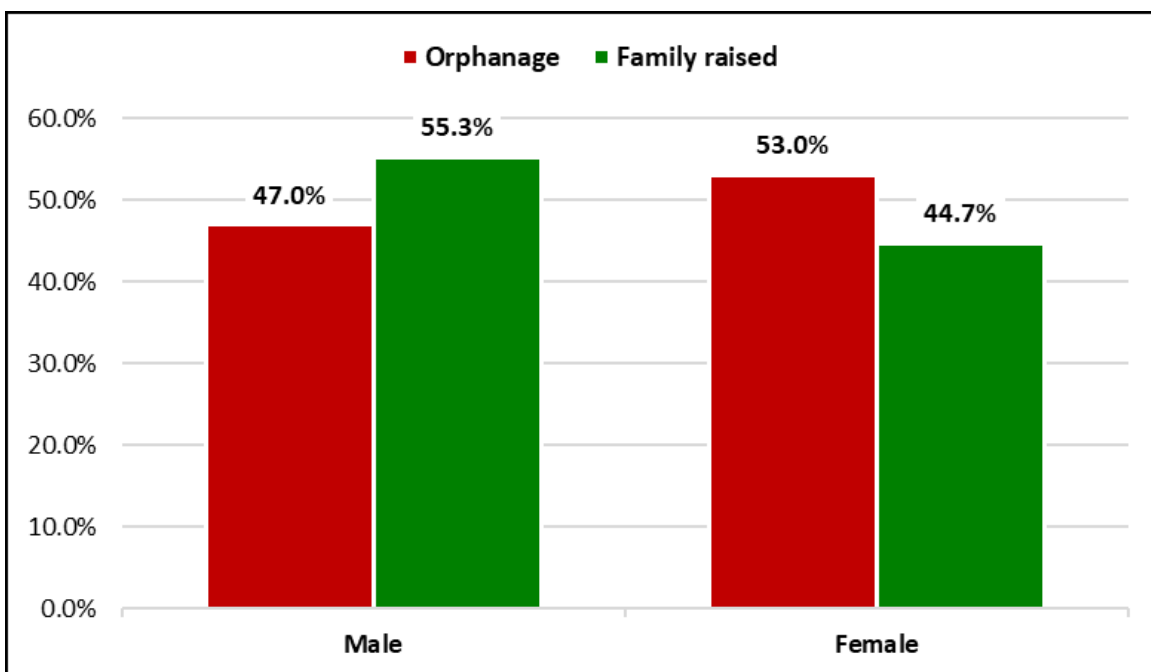
Figure 3:- Groupwise Distribution of Sex.
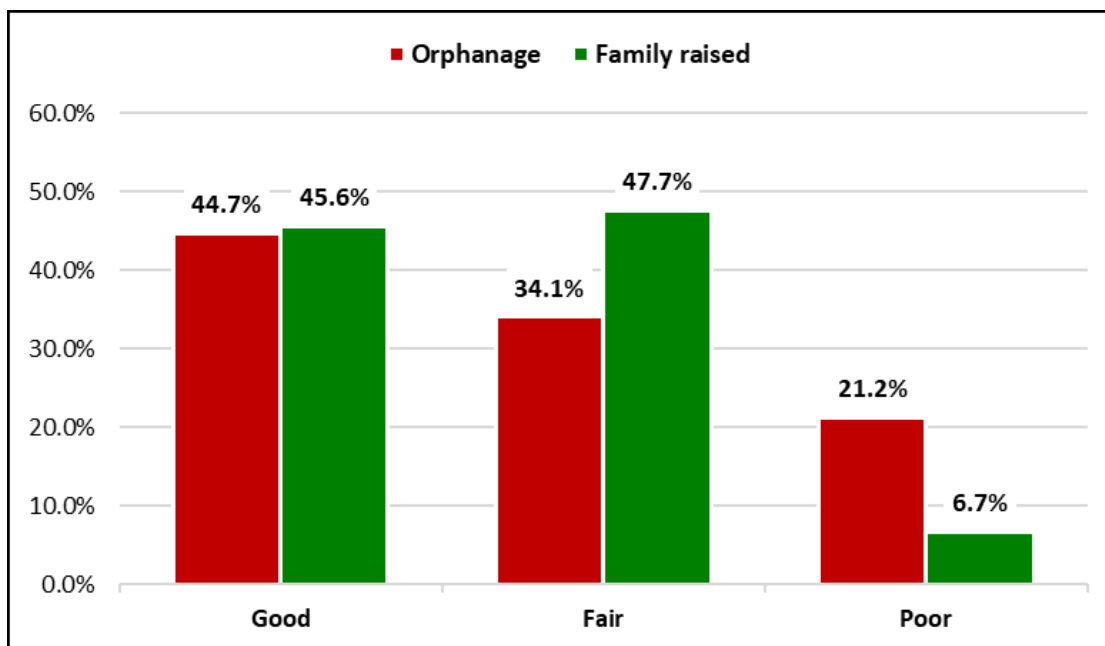
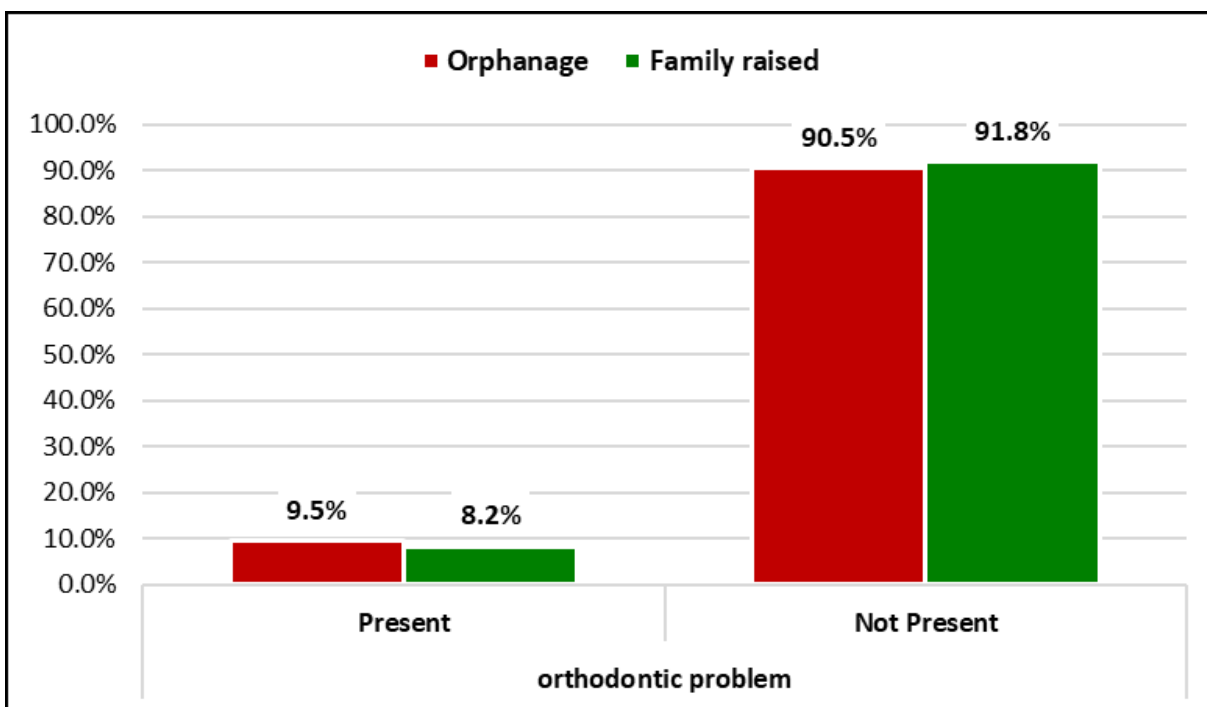

Figure 4:- Intergroup Comparison of OHI.

Figure 5:- Intergroup Comparison of Orthodontic Problem.
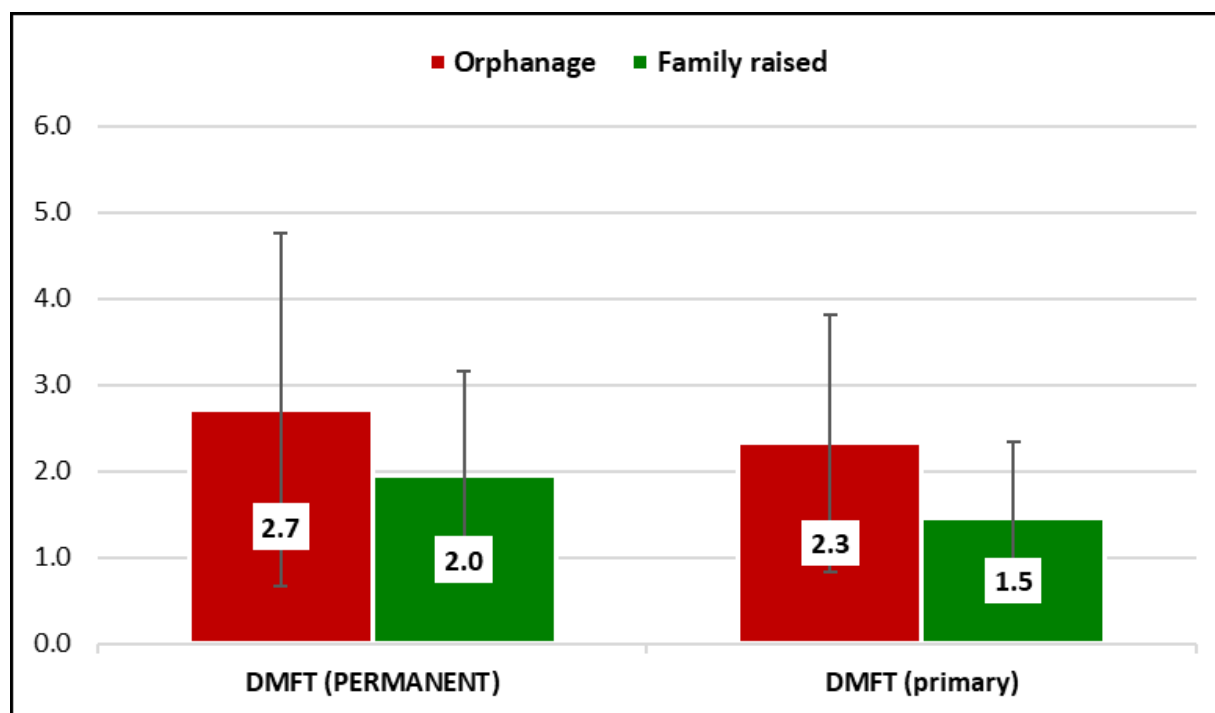

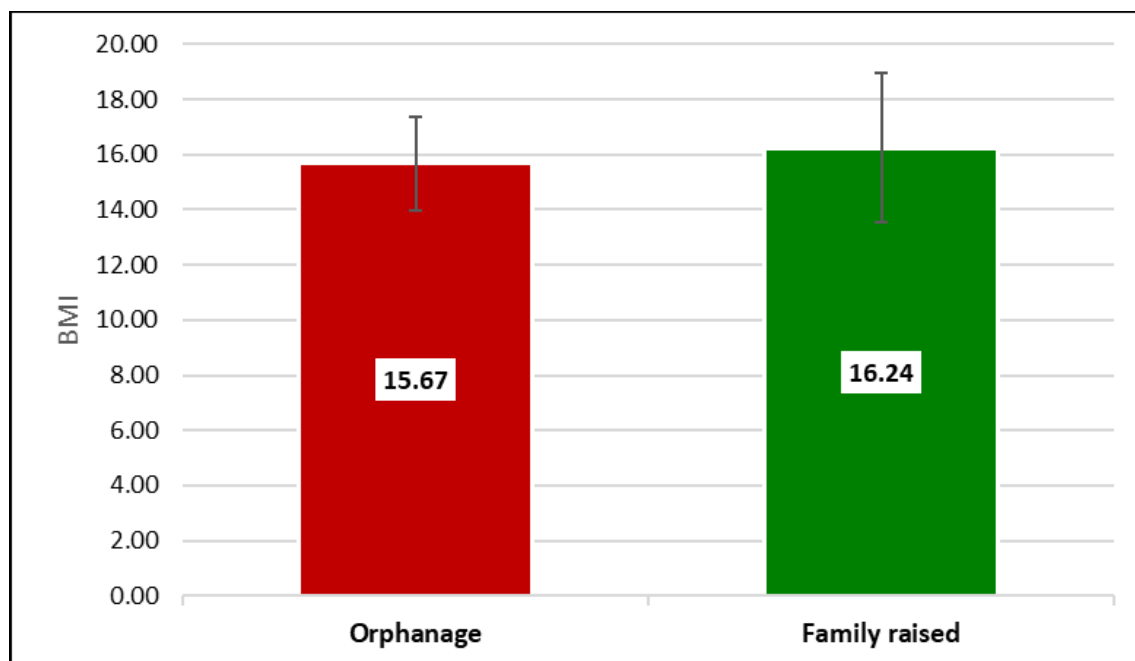**Figure 6:-** Intergroup Comparison of Dental Caries.
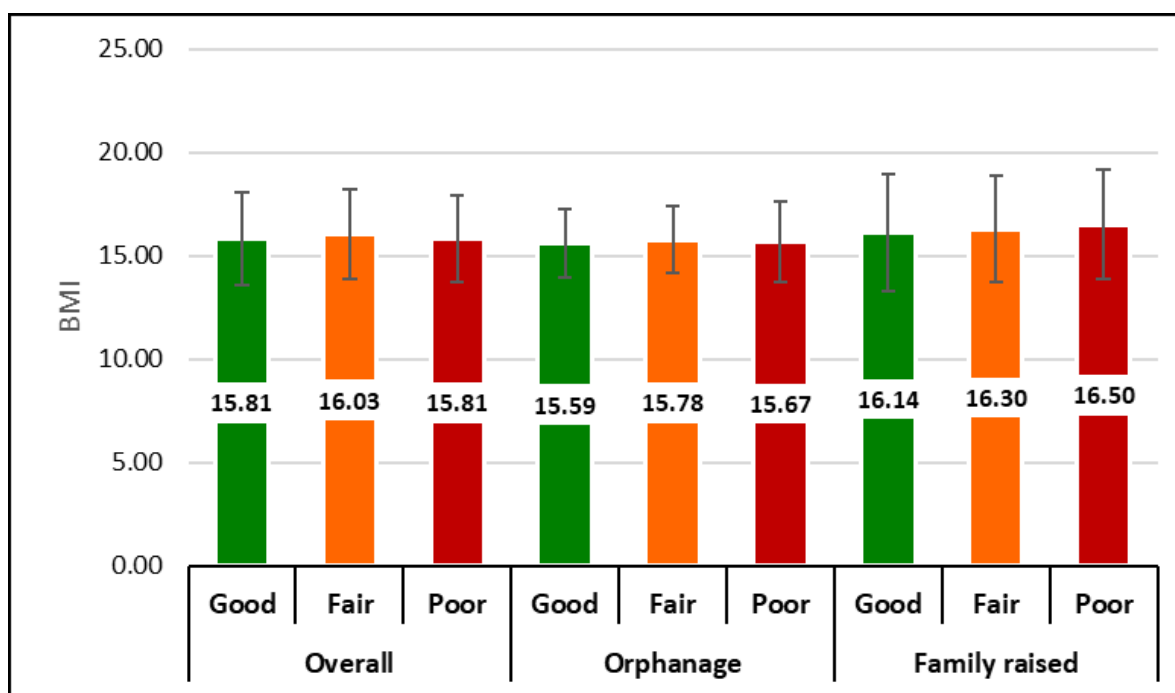
Figure 7:- Intergroup Comparison of BMI.

Figure 8:- Correlation of BMI with OHIS.

List of Abbreviations:

reviation	Definition
1.BMI	Body Mass Index
2.DMFT	Decayed, Missing, Filled Teeth
3.WHO	World Health Organisation
4. BBDCODS	Babu Banarasi Das College of dental sciences
5. DMFS	Decayed, Missing, Filled Surfaces
6. IEC	Institutional Ethical Committe
7. OHI	Oral hygiene index
8. OHI-S	Oral hygiene index-Simplified
9. ANOVA	Analysis of Variance

Acknowledgements:-

Conflicting Interest:
None.

Contribution Details:

Role (Concepts, Design, Definition of intellectual content, investigation, manuscript writing, etc.)	Contributor 1	Contributor 2	Contributor 3	Contributor 4	Contributor 5	Contributor 6
1. Concepts & Design	Dr. Vandana Singh					
2. Definition of intellectual content		Dr. Subash Singh				
3. Manuscript writing	Dr. Vandana Singh		Dr. Sonalika Srivastava			
4. Investigation				Dr. Ayushi Bhardwaj		
5. Data Collection			Dr. Sonalika Srivastava		Dr.Rajlakshmi Mitra	Dr. Karina Hyanki

Ethical policy and Institutional Review board statement:
Institutional ethical approval (BBDCODS/IEC/09/2022 dated 16/9/22) was obtained prior to start the study.

Patient declaration of consent statement:
Written informed consent was taken from the parents, school principal and orphanages authorities prior to start observations or examinations.

Data Availability statement:
N/A

References:-

1. UNICEF. The State of the World's Children 2021: On My Mind – Promoting, protecting and caring for children's mental health. New York: United Nations Children's Fund (UNICEF); 2021.

2. Nair M, Brennan E, Bhattacharya S. A comparison of oral health status between institutionalized and non-institutionalized children: A systematic review. Children. 2020;7(12):248.

3. Sujatha R, Ravi GR. Oral health status of orphan children in Chennai. J Indian Soc PedodPrev Dent. 2014;32(4):274-9.

4. Kumar S, Goyal A, Tadakamadla J, Tibdewal H, Duraiswamy P, Kulkarni S. Oral health status and practices of 6- to 12-year-old children in orphanages in Jaipur, India. Int J Paediatr Dent. 2010;20(3):167–73.

5. Patil S, Shigli AL. Oral health in children residing in orphanages in India: A review. J Clin Pediatr Dent. 2012;36(4):385-90.

6. Indian Council of Medical Research (ICMR). Nutrient Requirements and Recommended Dietary Allowances for Indians. New Delhi: ICMR; 2018.

7. World Health Organization (WHO). Oral health. Geneva: WHO; 2020. Available from: https://www.who.int/news-room/fact-sheets/detail/oral-health

8. Meshki R, Basir L, Motaghi S, Kazempour M. Oral health status among orphan and non-orphan children in Mashhad: a case-control study. J Med Life. 2022 Sep;15(9):1198-1201

9. World Health Organization. BMI classification. Geneva: WHO; 2020. Available from: https://www.who.int/data/gho/indicator-metadata-registry/imr-details/26

10. World Health Organization. Oral health. Geneva: WHO; 2012. Available from: https://www.who.int/news-room/fact-sheets/detail/oral-health

11. Petersen PE, Kwan S. The burden of oral disease: challenges to improving oral health in the 21st century. Bull World Health Organ. 2005;83(1):3–5.

12. Suresan V, Muthu MS, Mohan A, Rathna PV, Kirubakaran R, Selvaraju G. Oral health status of children in orphanages in Chennai, India. J Indian Soc PedodPrev Dent. 2021;39(2):123–7

13. Khattab NMA, Abd-Elsabour MAA. Oral health status and treatment needs among institutionalized orphan children in Cairo, Egypt: a cross-sectional study. F1000Research. 2023;12:95.

14. Rao A, Sequeira SP, Peter S. Prevalence of dental caries and gingivitis among 6–13-year-old children in orphanages in Mangalore City. J Indian Soc PedodPrev Dent. 2016;34(2):133–7.

15. Naveen N, Reddy CVK, Ramesh T, Kiranmayi M. Association between body mass index and dental caries among institutionalized orphan children. J Indian Soc PedodPrev Dent. 2015;33(4):292–6.

16. Dosumu EB, Ayanbadejo PO, Nwhator SO, Umeizudike KA, Oginni AO. Oral health status of orphanage children in Lagos State, Nigeria. Niger Postgrad Med J. 2013;20(3):188–93.

17. Jha K, Bhatia HP, Thakur S, Jha M. Correlation between body mass index and oral hygiene index among school children in Patna, India. Int J Contemp Med Res. 2022;9(2):B1–B4.

18. Alm A, Wendt LK, Koch G, Birkhed D. Body adiposity status in teenagers and snacking habits in early childhood in relation to approximal caries at 15 years of age. Int J Paediatr Dent. 2008;18(3):189–96.

19. Willershausen B, Haas G, Krummenauer F, Hohenfellner K. Relationship between high weight and caries frequency in German school children. Eur J Med Res. 2004;9(8):400–4.

20.Locker D. Self-esteem and socioeconomic disparities in self-perceived oral health. J Public Health Dent. 2000;60(2):78–84.

21. Petersen PE, Hobo B, Yayes A, Kikwilu E. Oral health status and oral health behavior of school children in Kenya, Tanzania, and Uganda. Bull World Health Organ. 2004;82(9):637–44.

22. Ramazani N. Child dental neglect: a short review. Int J High Risk Behav Addict. 2014;3(4):e21861.

23. Kumar S, Goyal A, Tadakamadla J, Tibdewal H, Duraiswamy P, Kulkarni S. Oral health status and practices of 6- to 12-year-old children in orphanages in Jaipur, India. Int J Paediatr Dent. 2016;26(5):373–9.