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A COMPARISON OF CARIES EXPERIENCE AMONG ORPHANAGE CHILDREN WITH NON-ORPHANS ATTENDING GOVERNMENT SCHOOL OF INDORE CITY

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ABSTRACT

INTRODUCTION. Oral health is an imperative to general health. It is important in many aspects of child development, as poor oral health can lead to problems with nutrition, speech development and self-esteem. Children living in orphanage are considered vulnerable to oral diseases.
OBJECTIVE. To identify and compare the caries experience of children between the ages of 6 and 15 living in orphanages with children attending school in the city of Indore.
METHODS. A descriptive cross-sectional study was conducted among 6-15 years aged orphanage children and children studying in schools located in the same geographical area of the Indore city. A total of 200 children in each group were taken under the study. The data collected were oral hygiene practice and dentition status on WHO form 2013 for adults. The data was then analysed to determine mean DMFT and deft score.
RESULTS. A statistically significant (p=0.001) difference in mean DMFT between orphans and non-orphans was observed. The decayed and missing component shows a statistically significant (p=0.001) difference between the orphans and non-orphans. For the primary dentition, the results show that the mean deft of orphans (0.28±0.84) was significantly higher (p=0.001) than non-orphans.
CONCLUSIONS. Based on the results of the present study, it can be concluded that the dental caries experience of orphans living in government-funded orphanage homes was found to be better than non-orphans studying in government school

Key words: *caries experience, orphans, school children*

INTRODUCTION

Children are regarded as building blocks for the development of a nation's present and future. Children in their families get every possible benefit through their parents to keep them healthy and have the opportunities they need to reach their full potential.

Oral health is really important for general well-being of a person as most oral health conditions share common risk factors with other chronic diseases. Also, health is strongly influenced by various underlying social determinants, such as education, employment, income and other social factors. It is important to have a check on oral hygiene of a child during the phase of development, as poor oral health can lead to problems with nutrition, speech development and self-esteem. Certain children are considered vulnerable to oral diseases.

The Global Burden of Disease Study 2016 estimated that dental caries is the most prevalent condition in permanent teeth with oral diseases affecting half of the world's population (3.58 billion people). Globally, it is estimated that 2.4 billion people suffer from caries of permanent teeth and 486 million children suffer from caries of primary teeth (1).

Some children are thought to be vulnerable to dental disease. It is not easy to measure vulnerability, but some factors can be seen such as parental death or desertion, severe chronic illness of parent(s), illness of child, impairment/disability/handicap in the child poverty, including access to grants, poor/hazardous physical and biological environment, housing, basic sanitation, water supply, access to social care, health care, and schooling (2). According to UNICEF and the global partners an orphan is defined as a child of age less than 18 years and has lost one or both parents due to any cause of death (3). They have been indulged, overlooked, vitrified, or hidden in the community.

In 2015 globally, there were nearly 140 million orphans, including 61 million in Asia, 52 million in

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Africa, 10 million in Latin America and the Caribbean, and 7.3 million in Eastern Europe and Central Asia as stated by UNICEF (3). With a population of 1.2 billion, India is the second most populated country in the world. Even if the exact number of orphans is unknown, the seriousness of the situation can be assessed by the fact that the population of orphans in India is about 2 million, which accounts for 6.8% of the total population (4).

The prevalence of caries in institutionalized children worldwide has been reported to be higher than among those children who live with their families (5-10). While few studies have shown a higher prevalence of caries in non-orphan school children (11, 12). The literature on the oral health status of orphan children is limited and contradictory. Also, there was no such study was done on the orphans in the region of central India, so the present study was conducted with the aim to determine caries experience of children between the ages of 6 and 15 living in orphanages with children attending school in the city of Indore.

METHODS

A descriptive cross-sectional study was conducted among orphans living in orphanage homes regulated by the government and non-orphan children studying in schools regulated by the government located in the same geographical area of the Indore City. The study was conducted for a period of 7 months from April 2018 to October 2018. The study included orphan children in orphanage homes of age 6- 15 years, school children who attended regular government schools of age 6-15 years. Children who were residing in the orphanage for a minimum of one year.

Exclusion included children having physical or mental disabilities, any systemic disorders or any other oral condition contraindicating oral examination, parents/caregiver not providing informed written consent, orphan children who were residing in the orphanage for less than one year

The sample size is calculated on the basis of the pilot study conducted in the orphanage home. The prevalence of dental caries among orphanages was found to be 46% and the prevalence of dental caries among school children according to national oral health survey fluoride mapping 2003 (M.P.) was found to be 60%.

Sample size is calculated by EpiInfo software using the formula:

$$n = \frac{Z^2 \times p\,(1-p)}{m^2}$$

where,

n = required sample size
Z = confidence level at 95% (standard value of 1.96)
P = estimated prevalence

This was found to the 48% for the present study which was expressed as 0.48.

M = margin of error at 5% (standard value of 0.05) = 155, 20% anticipated non response rate = 186 which was rounded off to 200.

Final sample size will comprise of 200 orphan home children and 200 school children of same age for comparison.

The orphans were age-stratified for 6-15 years which resulted in a total strength of 240 children in 6 orphanages. A proportionality random sampling was employed to select 200 samples from a total of 240 orphans.

The government schools located near orphanage homes were listed and approached for permission. Six regular government schools for six orphanage locations were selected. In each of six schools, stratified proportional random sampling was employed to attain a total sample size of 200 children. Training and calibration of single investigator was done in the department under the supervision of experts.

Ethical clearance was obtained from the institutional ethical committee of Sri Aurobindo University. A structured proforma was designed to record information about the subject's sociodemographic characteristics, oral hygiene practices, and dental caries status data on WHO Proforma for Children 2013 (12). The data recorded on caries was then converted into DMFT (Decayed, Missing, Filled Teeth) and deft (Decayed, Exfoliated/Missing, Filled Teeth). Informed consent was obtained from parents of school children and caretakers of orphan children before the start of the study.

Statistical analysis was done using Statistical Package for Social Sciences (SPSS, IBM version 22.0). The level of significance was fixed at 5% and $p \leq 0.05$ was considered statistically significant. Descriptive statistics were used to find the frequency, mean, and standard deviation of variables considered in the study. The chi-square test was used to compare categorical variables. An unpaired t-test was performed for quantitative variables.

RESULTS

The present study was conducted among 6-15 years old institutionalized orphan children and non-orphan children studying in government schools. The results are based on data.

Table 1 shows the distribution of study subjects with respect to age, gender. Among the 200 orphan children living in orphanage homes 55 (42.3%) were

Table 1. Distribution of study subjects according to Demographic Variables

Variables	Category	Groups		Total n=400
		Orphans n=200	Non Orphans n=200	
Gender	Male	55(42.3)	75(57.7)	130(32.5)
	Female	145(53.7)	125(46.3)	270(67.5)
Age	6-8 Yrs	21(35)	39(65)	60(15)
	9-12 Yrs	61(35.9)	109(64.1)	170(42.5)
	13-15 Yrs	118(69.4)	52(30.6)	170(42.5)
Caries	Permanent	69(35.9)	123(64.06)	192(48)
	Deciduous	102(35.17)	188(64.8)	290(72.5)

male and 145 (53.7%) were female, while among 200 school children studying in government schools 75 (57.7%) were male and 125 (46.3%) were female. Among the orphanage group, 21 (35%) were under the age of 6-8 years, 61 (35.9%) were in the age group of 9-11 years and 118 (69.4%) were in the age group of 13-15 years. Among the non-orphans, 39 (65%) were in the age group of 6-8 years, 109 (64.1%) in 9-12 years, and 52 (30.6%) were in the age group of 13-15 years.

The comparison of caries experience in permanent and primary teeth was accessed through mean DMFT and mean deft among orphans and non-orphans is shown in Table 2. In the present study for the caries experience in permanent teeth, a highly statistically significant (p=0.001) difference was found between the mean DMFT of orphans (1.70±2.02) and non-orphans (0.84±1.58). The DT component shows a statistically significant (p=0.001) difference between the orphans (1.54±1.98) and non-orphans (0.71±1.46), the significant difference (p=0.003) was also found in the missing component of orphans (0.20±0.61) and non-orphans (0.05±0.29).

For the primary dentition, the results show that the mean deft of orphans (0.28±0.84) was significantly higher (p=0.001) than non-orphans (1.03±1.62). The dt component show a statistically significant (p=0.001) difference between the orphans (0.28±0.84) and non-orphans (0.99±1.54), the significant difference (p=0.05) was also found in the missing component of orphans (0.00±0.00) and non-orphans (0.03±0.18).

Table 3 shows the comparison of mean DMFT and mean deft score among orphans and non-orphans with respect to gender. In this study, it was found that for the permanent dentition, there was a statistically significant difference (p=0.01) found between the means of orphans (1.58±1.54) and non-orphans (0.98±1.89) in the decayed component. There was no statistical difference found in missing and filled components. The mean DMFT in orphans (1.58±1.54) was significantly higher (p=0.01) than the mean DMFT in non-orphans (1.13±2.06). When the comparison was done for primary dentition mean of decayed component of non-orphan (1.46±1.87) males was significantly higher (p=0.01) than the mean of orphans (0.60±0.78). There were no significant differences in exfoliated and filled components of deft among orphans and non-orphans. Overall mean deft for non-orphans (1.03±1.62) was found to be significantly higher (p=0.01) than the mean deft of orphans (0.60±0.78).

With respect to the female present study for permanent dentition, it was found in the present study that the mean of decayed component of DMFT in orphan females (1.28±1.63) was statistically significantly higher (p=0.01) than non-orphan females (0.68±1.21). There was a significant difference (p=0.01) in the mean of missing components of DMFT among orphan females (0.26±0.70) and non-orphan females

Table 2. Comparison of mean DMFT and mean deft score among orphans and non-orphans

Caries Experience	Orphans(mean±SD)	Non-orphans(mean±SD)	p value
DT	1.54±1.98	0.71±1.46	0.01*
MT	0.20±0.61	0.05±0.29	0.01*
FT	0.02±0.14	0.02±0.14	1.00
DMFT	1.70±2.02	0.84±1.58	0.01*
dt	0.28±0.84	0.99±1.54	0.01*
et	0.00±0.00	0.03±0.18	0.05*
ft	0.00±0.00	0.02±0.12	0.08
deft	0.28±0.84	1.03±1.62	0.01*

Table 3. Comparison of mean DMFT and mean deft among orphans and non-orphans with respect to gender

Caries experience	Male			Female		
	Orphans (mean±SD)	Non-orphans (mean±SD)	p value	Orphans (mean±SD)	Non-orphans (mean±SD)	p value
DT	1.58±1.54	0.98±1.89	0.01*	1.28±1.63	0.68±1.21	0.01*
MT	0.00±0.00	0.02±0.23	0.21	0.26±0.70	0.06±0.32	0.01*
FT	0.00±0.00	0.01±0.11	0.19	0.02±0.16	0.04±0.21	0.36
DMFT	1.58±1.54	1.13±2.06	0.01*	1.53±1.77	0.84±1.29	0.01*
Dt	0.60±0.78	1.46±1.87	0.01*	0.15±0.83	0.71±1.23	0.01*
Et	0.00±0.00	0.01±0.11	0.20	0.00±0.00	0.03±0.21	0.07
Ft	0.00±0.00	0.00±0.00	-	0.00±0.00	0.02±0.15	0.05*
deft	0.60±0.78	1.03±1.62	0.01*	0.15±0.83	0.80±1.30	0.01*

Table 4. Comparison of mean DMFT and mean deft score among orphans and non-orphans with respect to age

Age	Group	Caries Experience							
		DT	MT	FT	DMFT	dt	et	ft	deft
6-8 years	Orphans (mean±SD)	0.30±0.68	0.24±0.66	0.00±0.00	0.54±0.86	2.06±2.17	0.09±0.38	0.00±0.00	1.23±1.99
	Non-orphans (mean±SD)	0.00±0.00	0.15±0.53	0.00±0.00	0.35±1.36	2.87±1.94	0.07±0.35	0.02±0.16	3.17±2.11
	p value	0.01*	0.53	-	0.10	0.87	0.36	0.05*	0.01*
9-12 years	Orphans (mean±SD)	1.26±1.58	0.27±0.63	0.00±0.00	1.54±1.79	0.29±0.61	0.00±0.00	0.00±0.00	0.29±0.61
	Non-orphans (mean±SD)	0.52±0.97	0.03±0.23	0.02±0.16	0.64±1.05	0.71±1.11	0.00±0.00	0.00±0.00	0.66±0.99
	p value	0.01*	0.01*	0.19	0.01*	0.01*	-	-	0.01*
13-15 years	Orphans (mean±SD)	1.58±1.68	0.11±0.55	0.03±0.81	1.67±1.75	0.09±0.36	0.00±0.00	0.00±0.00	0.09±0.36
	Non-orphans (mean±SD)	1.96±2.20	0.00±0.00	0.07±0.26	2.03±2.21	0.17±0.55	0.00±0.00	0.00±0.00	0.17±0.55
	p value	0.22	0.12	0.22	0.25	0.26	-	-	0.10

(0.06±0.32). No significant difference was found in the filled component among groups. The mean DMFT score also shows a significant difference (p=0.01) among orphans (1.53±1.77) and non-orphan females (0.84±1.29). For the primary dentition, the mean of the decayed component of deft is significantly higher (p=001) in non-orphan females (0.71±1.23) than in orphan orphans (0.15±0.83).

The mean DMFT and mean deft score in permanent and primary dentition with respect to the age group are shown in Table 4. Among the age group of 6-8 years, the present study reported a significant difference (p=0.01) in the mean DT score of orphans and non-orphans. There were no filling components in orphans and non-orphans. There was no significant difference in missing components and mean DMFT scores among two groups. In the primary dentition, a statistically significant difference was found in mean deft score (p=0.01) among orphans (1.23) and non-orphans (3.17).

Among the age group of 9-12 years, the present study shows that the mean DMFT score is significantly higher (p=0.01) in orphans (1.54) than in non-orphans (0.64). The mean decayed component of orphans (1.26) and non-orphans (0.52), and the mean missing component of orphans (0.27) and non-orphans (0.03) showed a significant difference (p=0.01). In the primary dentition, there was no exfoliated and filling component in both orphans and non-orphans. The present study showed a significant difference in decayed components among orphans (0.29) and non-orphans (0.71).

DISUSSION

The present study was conducted to compare the oral health status among orphan and non-orphan school going children. In the present study, it was found that there were 145 (72.5%) females and 45 (27.5%) males

in the orphan group. This is in accordance with a study conducted by Srinivas et al. (2012) (13), who found 74.9% of girls and 25.1% of boys in the orphanages of Guntur. The reason for more female children in orphanage homes can be that in countries like India, there is more preference for boy children which leads to girl child being more vulnerable to abandonment and homelessness. Most of the children in the orphanage home are living there for 1-5 years which means they are old enough to understand at the time when they are forced to become an orphan, the most prevalent reason for this may be that many people cannot afford food and shelter to their children due to poverty, so due to lack of resources children get abandonment by their parents and get homeless. The study findings are similar to the findings of Pratap et al. (2016) (14), who conducted a study on orphans of Bengaluru.

In the present study, the prevalence of dental caries in permanent dentition was found to be 48%. Khare et al. (2012) (15), found a caries prevalence of 41% in orphan children of the Udaipur district which is comparable to the prevalence found in the present study. Kavyashree G et al. (2019) (16), found a 30.47% prevalence of dental caries in permanent dentition in orphanage children of 6-14 years of age in Hassan City, which was less than that of the present study. Studies conducted by Al-Maweri et al. (2014) (17), among institutionalized orphans of Sana City, Yemen showed a very higher caries prevalence of 84.7% in permanent dentition when compared to the present study. The prevalence of dental caries in primary dentition was found to be 72.5% in the present study. Kavyashree G et al. (2019) (16), found a 26% prevalence of dental caries in primary dentition in orphanage children of Hassan City, which is very less than the present study. Khare et al. (2012) (15) and Pratap et al. (2016) (14) conducted a study on orphans children of Udaipur district and orphans children of Bengaluru city respectively found the caries prevalence in primary dentition as 49.6% and 40.5%, which are less than the results of the present study. Variation in caries prevalence among different studies can be due to geographical variation and differences in dietary patterns.

The study results are in contrast with a study conducted by Thetakela et al. (2017) (10), on orphans and government school children in Mysore city (non-orphans – 59.7% and orphans – 50.2%), and Gaur A et al. (2014) (11), on institutionalized juvenile home children in Vadodara City. A lower prevalence of dental caries in orphans can be because of defined dietary patterns in orphanages and a lack of frequent sneaking between meals. Studies that are a contrast to our study findings are conducted by Al-Jobair AM et al. (2013) (6), and Mohan A et al. (2014) (7), in Riyadh, Saudi Arabia, and Lucknow respectively, in their studies, authors found significant higher carious prevalence among orphans compared to control children.

In the present study, the mean deft in non-orphans (1.03) was found significantly higher than in orphans (0.28). These results are in accordance with the study conducted by AL-Mewari et al. (2014) in the orphanage of Yemen (17). The study conducted by Camacho et al. on orphan girls in Mexico, Dixit et al., on orphan children of Pune, and Mazhari et al., on orphanages, and children of Mashhad city (18-20) shows high deft than the present study among orphans. In contrast to this study, less deft (0.70) was reported in a study conducted by Srinivas R et al. (2012) (13), on institutionalized street children of Andhra Pradesh. The mean deft score in the age group of 6-8 years is found significantly high in non-orphans (3.17) than in orphans (1.23). The mean deft of orphans is comparable to the study conducted by Shah et al. (2016) (21), in Jammu and Kashmir institutionalized children.

The mean DMFT score in orphans (1.70) was found to be more than non-orphans. These study's results are similar to the study conducted by Al-Mewari et al. (2014), Singh A et al. (2011) and Dixit et al. (2009) on disadvantaged children in the Udupi district, Karnataka, institutionalized children in Yemen and orphans in Nepal respectively (17, 22, 23). The mean DMFT of the present study was comparable to the study conducted by Hans et al. (2014) (4), on orphans of Udaipur (1.40) and Khare et al. (2012) on orphanage children of Udaipur (1.16) (15). The mean DMFT was found higher (2.28) than present study in a study conducted by Al- Mewari et al. (2014) in orphans of Yemen (17), Al-Zobair et al. (2013) (6) in orphan children of central Saudi Arabia (2.80) and Al Majeed et al. (2017) (24), in institutionalized orphans of Baghdad city (2.44). The mean DMFT score was found less (0.41) than the present study conducted by Kavyashree G et al. (2019) (16) on the orphanage of Hassan City. The mean DMFT score in orphans ranges from 0.96 to 3.56 in different parts of India, while it was found zero in Romanian orphans (25).

In the present study caries experience for both gender found more in orphans than in non-orphans in permanent dentition and less in primary dentition. In the present study mean DMFT in orphan males (1.58) is found significantly higher than non-orphan males (0.98) – this may be due to the lack of treatment facilities available to them. For the primary teeth mean deft for non-orphan males (1.03) is significantly higher than for orphan males (0.60). The possible cause may be that because of regular diet orphans are less exposed to sugar than non-orphans. The deft score in orphan males was in accordance with the study conducted

by Srinivas et al. (2012) (13) in orphanage children of Guntur. Khare et al. (2012) (15) showed less mean deft score among orphan males of the Udaipur district than the present study. Christian et al. (2018) (26) and Mazhari et al. (2006) (20) showed higher mean deft scores among orphan males residing in orphanage homes of Chennai and Mashhad respectively in comparison to the present study. This study showed a mean deft score of 0.15 among orphan females which in accordance with Khare et al. (2012) (15) showed a higher deft score in females, who conducted a study on orphans of Udaipur City. The mean DMFT score of male and females in the present study are similar to studies conducted by Christian et al. (2018) (26), Mazhari et al. (2006) (20), and Khare et al. (2012) (15). The mean DMFT and mean deft in female is found less than in male in both orphans and non-orphans. The reason behind this may be that females are more conscious about health and aesthetics.

The mean deft score of non-orphans (3.17) was found significantly higher than orphans (1.23) in the age group of 5-8 years. A comparable deft score was found by Shah et al (21) in the <6 years of age group in orphans of Jammu and Kashmir. In the age group of 9-12 years mean DMFT score (1.54) of orphans was found significantly higher than non-orphans (0.64). The mean DMFT score of our study is comparable to the study conducted by Khare et al. (2012) (15), and Shah et al. (2016) (21) in orphans of Udaipur and Jammu and Kashmir respectively.

Limitations. There are certain limitations in the study, the data regarding dietary habit and sugar consumption had not been taken, which may influence the caries experience. The fluoride level of water supply and previous residence of orphans was also not accessed, so the reason for fluorosis cannot be mentioned in the study.

CONCLUSIONS

Based on the results of the present study, it can be concluded that the dental caries experience of orphans living in government funded orphanage homes was found to be better than non-orphans studying in government schools for primary teeth while caries experience for permanent teeth is better in non-orphans. The result of the present study reveals a need for planning and implementing oral health programs and preventive measures for both orphans as well as government school children. The government and dental colleges should put some effort to improve and promote the oral health status of orphans and government school children.

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