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Assessment of dental caries prevalence, severity and consequences among institutionalized orphans in Kano state, Nigeria

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Abstract
Objectives: Dental caries still persist among majority of the World's population with high prevalence of untreated cases seen among vulnerable groups. The study seeks to assess dental caries prevalence, severity and consequences among institutionalized orphans in Kano State, Nigeria.
Methods: A cross-sectional descriptive survey of five orphanages with disproportionate distribution. Multi-stage sampling technique was used to screened participants for dental caries using dmft/DMFT, and PUFA/pufa indices, and International Caries Detection Assessment System (ICDAS) codes.
Results: The study had 152 children; 102 (67.1%) males, 50 (32.9%) females (M/F 2.04:1), age range of 4-17 years and mean age of 11.36±3.62 years. Dental caries prevalence was 34 (22.4%) with mean dmft/DMFT score of 0.21 ± 0.41/0.14 ± 0.35 (M/F ratios 0.19 ± 0.59/0.18 ± 0.45: 0.21 ± 0.66/0.80 ± 0.27). The ICDAS code 6 (44.4%) was prominent followed by code 2 (22.2%). PUFA/pufa prevalence was 18.4% with mean score of 0.30 ± 0.46/0.22 ± 0.50 and P/p (42.6%) component had highest value. The untreated caries PUFA/pufa ratio was 51.9% while the decayed tooth without pulp involvement was 48.1%.
Conclusion: Dental caries was more prevalent in deciduous dentition and female subjects; with advanced lesion higher than early carious lesion.

Keywords: dental caries, dentition, institutionalized, orphanage, orphans

Introduction

Dental caries affects majority of the world's population and has been implicated in child's restricted activities at school and home thus causing lost school hours, distraction from learning and play, and it is the most important cause of tooth loss in children and young people [1, 2, 3]. Caries prevalence varies significantly within and between countries among different socio-economic strata, cultures, ethnic, gender, age groups, and causing great pain, suffering and burden if left untreated [2, 3, 5, 6]. This is particularly so among the vulnerable and socially marginalized children in both developing and developed countries [7, 8].

There are about four hundred million orphaned-children worldwide [9] and estimated 17.5 million classified as Orphans and Vulnerable Children (O.V.C) in Nigeria with HIV/AIDS accounting for majority of cases [10, 11]. An orphan is a child aged zero to 17-years who has lost one or both parents [12]. Parenthood is a known reinforcing factor that exert powerful influence on child's healthy development and healthy oral hygiene practices [13]. In orphanages, full unfolding of potentials can be hampered by certain social elements such as parental inadequacy with low care-giver to child ratio [11], environmental deprivation, inadequate oral healthcare materials, poor nutrition, and emotional disturbances have led to increased risk of preventable diseases including dental caries [14-20]. The consequences of dental caries on the community is considerable and treatment often provided as emergency [16, 17, 21-23].

The study seeks to assess dental caries prevalence, severity and consequences in institution-dwelling orphans in Kano State.

Methods

This was a descriptive cross-sectional survey conducted on children aged 2-17-years living in five (5) orphanage homes in Kano state, Nigeria. Recruited for the study were orphans within the sample frame, available and were willing to participate during the study. However, those who declined to participate and/or critically ill were excluded. Multi-stage sampling method was used; stratified random sampling with proportionate allocation, systematic random sampling technique for subject selection and simple random sampling by balloting to choose a starting point.

The WHO 2013 Oral Health Assessment Form for Children was adapted to include socio-demography and indices such as dmft/DMFT, ICDAS and PUFA/pufa [24-28]. Participants screened for dental caries were seated on a chair with full illumination of intra-oral structures under natural daylight. The diagnostic criteria for dental caries correspond to ICDAS code 2. The *d/D* component of dmft/DMFT was used to determine dental caries prevalence, ICDAS for caries severity and PUFA/pufa for consequences of untreated dental caries. The interview-administered questionnaires were filled by paired dental therapists as dentists communicate intra-oral findings to them. Inter-examiner variability was done using 20 children at the Child Dental Department clinic with kappa statistics set at 0.75. Statistical analysis was done using SPSS version 17.0 (SPSS Inc. Chicago, IL, USA). A confidence interval of 95% was

used in this study and a p-value ≤ 0.05 was considered statistically significant.

Ethical approval was received from Aminu Kano Teaching Hospital Research and Ethics Committee, and permissions from Kano State Ministry of Women Affairs and Social Development and orphanage authorities.

Results

The study had 152 children; 102 (67.1%) male and 50 (32.9%) female participants with age range of 4-17 years and mean age of 11.36±3.62 years. The mean ages for male /female subjects were 11.83±3.74/10.38±3.19 years respectively. The prominent age category was 14-17 years and majority (66.4%) of the subjects were at their primary level of education.

Dental caries prevalence was 34 (22.4%) with mean dmft/DMFT score of 0.21 ± 0.41/0.14 ± 0.35. The male/female mean dmft/DMFT scores ratios are 0.19 ± 0.59/0.18 ± 0.45 and 0.21 ± 0.66/0.80 ± 0.27 respectively. Dental caries increased with increasing age with statistical significant difference observed. The d/D component was the main contributor to dmft/DMFT with the second deciduous (35.2%) and first permanent molars (33.3%) mostly affected.

The most frequent ICDAS was code 6 (44.4%) and followed by code 2 (22.2%). The prevalence of PUFA/pufa among the subjects was 18.4% with PUFA/pufa mean score of 0.30 ± 0.46/0.22 ± 0.50. Teeth with pulp involvement (P/p) teeth had the highest mean value of 0.24/0.19, followed by abscessed (A/a) teeth with mean score of 0.06/0.04 while no ulceration and fistula were observed. The untreated caries PUFA/pufa ratio was 51.9% while the decayed teeth without pupal involvement were 48.1% teeth.

Discussion

Dental caries when left untreated, could lead to more serious dento-facial health problems such as toothache, dental abscess, facial space cellulitis and septicaemia [3]. These consequences have reflected among children as poor schools' attendance, eating problems, speaking and learning problems [1,4]. Anecdotal evidences opined that the socially marginalised, vulnerable, and disadvantaged/under-priviledged groups bear much of health burdens in both developed and developing countries [2-8].

The study had more male participants which might not be unrelated to girls being given out early for marriage in the study environment. Ojahanon *et al* [13], Arpita *et al*. [21], Raskesh *et al*. [22], and Abhishek *et al*. [23] had earlier reported similar ratio whereas other researchers [10, 28, 29]. Observed more female than male subjects in similar environment. Although the dominant age category was 14-17-years, however, majority of the children were in their primary level of education. This finding does not reflect the educational status of children of similar age group children who live with their parents or those from southern part of Nigeria [30].

Dental caries prevalence (22.4%) was found to be affected by demographic factors [31]; with higher dmft/DMFT scores in females than their male counterpart, and increasing along age gradient. This can be attributed to girls' inclination to consume sugary diets that encourage bacterial growth which may lead to development of dental caries [4, 31]. More so, refined sugars are readily available and sold at cheap rates in the study area [31, 34]. Furthermore, increased intra-oral time predispose susceptible tooth to dental caries [1, 23, 27, 32, 33]. The study recorded low dental caries prevalence among the children which can be attributed to the non-cariogenic nature of orphanage children's diets as reported by other researchers [21, 28, 35, 36]. Although, higher prevalence rates were reported among school children of similar age category in urban and rural area of Southern Nigeria [29].

The total mean dmft/DMFT was found to be lower than the WHO 1.5DMFT target set for children of similar age categories in orphanages [22, 27, 36, 37], and schools [31, 35]. The decayed component (DT/dt) accounted for 98% of DMFT/dmft score, indicative of poor utilization of restorative care and/or sign of oral preventive care negligence. Shanbog *et al* [27] and Rehman *et al* [32] reported similar finding and opined that subjects from socio-economically disadvantaged background have high dental caries prevalence which they attributed to low dental care service utilization. The severity of untreated carious lesions found were in their advanced stage similar to those with low utilization of dental services, [38, 39]. This was evident as 51.9% of the decayed teeth found had progressed to the pulp. The large contribution of decayed permanent to PUFA index may lead to tooth fatality, hence an issue of dental public health concern among these vulnerable children. This shows high index of unmet restorative care needs among these institutionalised children. Earlier reports from developing countries revealed that most carious lesion remain untreated and often present as dental emergencies in children's hospital [27, 40]. Care-giver negligence and poor supervision of the children's oral hygiene practices may be responsible for this trend. Parents are known to be the primary motivating factor to their wards as they closely monitor, mentor and supervise their children oral hygiene practices. Such children tend to have high met restorative care needs than children from the orphanages [13, 22, 23, 27, 36].

We therefore recommend that attention be paid to provision of Oral dentifrices by caregivers and visitors as they care for these children. Furthermore, we encourage future studies on the Oral hygiene practices of the orphanage caregivers so as to increase their Oral health awareness and help reinforce positive Oral hygiene practices as preventive measures.

Conclusions

Although dental caries prevalence was low among the respondents, however the high number of untreated decayed component showed high unmet restorative care needs in these children. We therefore recommend regular dental clinic visits for the children, regular Oral health promotion/outreaches by Oral health professionals to increase oral healthcare awareness, and intervention aimed towards prevention as contained in the WHO Basic Package of Oral Care (BPOC) for this vulnerable children. However, there is need for further study on the Oral health knowledge, attitude and practices of their caregivers so as to model the children.

Table 1: The mean dmft/DMFT against gender and age category

	No of subjects	Mean dmft ± SD Σ(dmft)	Mean DMFT ± SD Σ(DMFT)
Gender Male	102	0.19 ± 0.59	0.18 ± 0.45
Female	50	0.21 ± 0.66	0.80 ± 0.27
Total	152	0.21 ± 0.41	0.14 ± 0.35
p-value		0.518	0.169
Age category			
2 – 5 years	8	0.25 ± 0.46	0.00 ± 0.00
6 – 9 years	47	0.49 ± 0.93	0.02 ± 0.15
10 – 13 years	41	0.17 ± 0.67	0.22 ± 0.47
14 – 17 years	56	0.00 ± 0.00	0.21 ± 0.49
Total	152	0.21 ± 0.41	0.14 ± 0.35
p-value		0.002S	0.036S

Level of significance (p-value) = 0.05, S = statistically significant difference

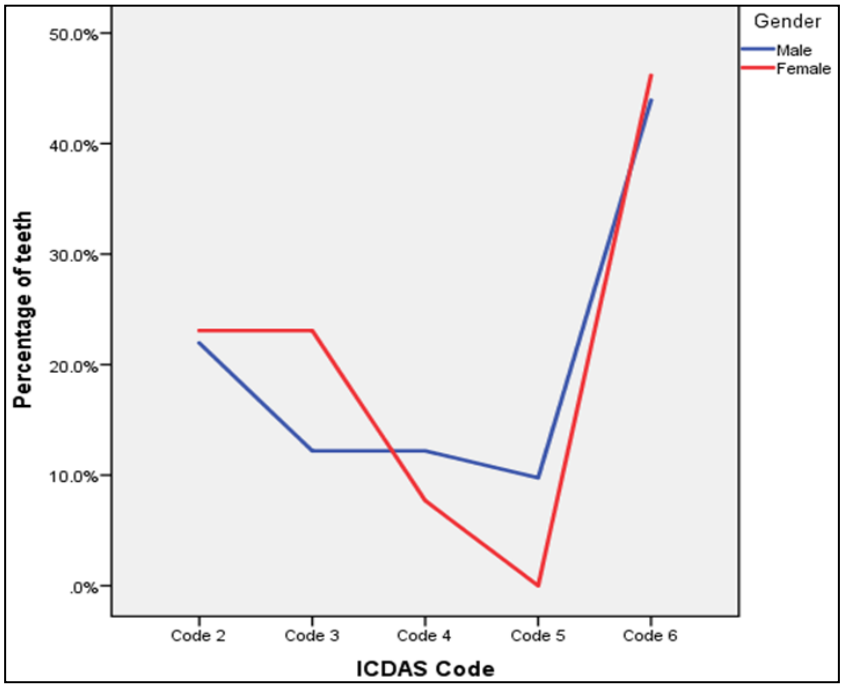


Fig 1: The severity of dental caries using ICDAS and gender of subjects

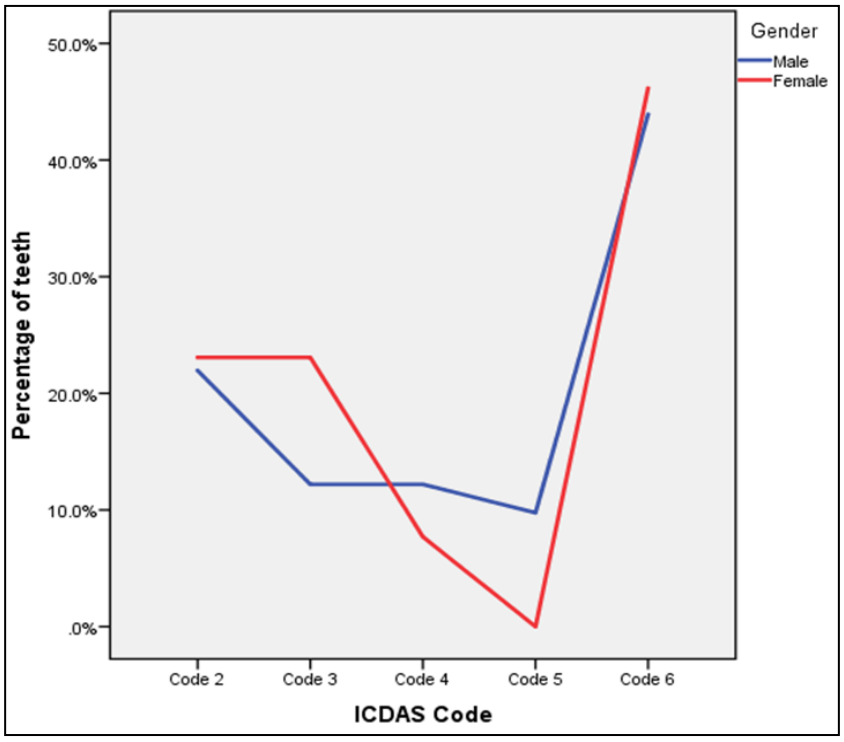
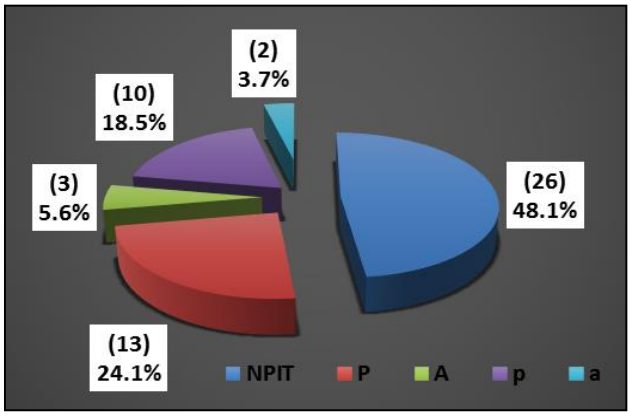


Fig 2: The severity of dental caries using ICDAS and age category of subjects



Where NPIT indicates no pulp involved tooth

Figure 3: Percentage distribution of PUFA/pufa index and decayed teeth with no pulp involvement

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Study limitation

The assessment of caries was based on the WHO criteria which do not require use of radiographs. Early enamel caries could be missed especially at the interproximal areas.

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Nil

Conflicts of interest

There are no conflicts of interest.

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