Prevalence of Dental Caries Among Children and Young Adults with Disabilities Attending a Special Needs School in Sokoto, Nigeria

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ABSTRACT

Objective: To determine the prevalence of dental caries among children and young adults with disabilities attending a special needs school in Sokoto, Nigeria.

Methods: This study was a descriptive cross-sectional survey among children and young adults with disabilities attending a special needs school in Sokoto, Nigeria. Data collected were the social demographic and dental caries status of the participants. Data were analysed using IBM SPSS Statistics for Windows, Version 23.0. The socio-demographic characteristics, as well as the dental caries prevalence of the participants, were determined using descriptive statistics. The results were presented in frequency tables and charts. A p-value less than 0.05 was considered significant.

Results: Prevalence of caries was 35.6%. Participants with hearing impairment had the highest caries prevalence (16.5%, n= 39). The highest caries prevalence per age group was amongst the 20 years and above age group (50.0%), followed by the 6-12year old group (46.2%). The Pearson chi-square test result for prevalence per age group was statistically significant (p= 0.029). Analysis by grade (class) showed a higher prevalence in the primary school section (39.3%) than in the secondary school section.

Conclusion: The prevalence of dental caries was 35.6%. It was significantly higher in the hearing and intellectually impaired groups than in their visually and physically impaired counterparts. Also, it was higher among the age group 20 years and above than in other age groups.

Keywords: Dental caries, children, young adults, disability, Sokoto, Nigeria.

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INTRODUCTION

Several authorities, define children as every human being under the age of 18 years, [1,2,3] while the term 'young adults' and 'youths' have been used interchangeably by authors to describe individuals mostly in the age range of between 15-25 years, extending to 30 years or 40 years by some authors. [4] The most recent Nigeria National Youth Policy (2019),[5] describes young adults as persons between the age bracket of 15-29 years. [5]

The United Nations (UN), defines disability as "any restriction or lack (resulting from an impairment) of ability to perform an activity in the manner or within the range considered normal for a human being". [6] As such, individuals with disabilities may be incapable of learning, playing, or functioning at a level other children and young adults of their age can. [7] Thus, they may depend on others for care and needs. Their impairment level, age, and socio-economic status may influence their oral health status. [8,9]

Oral health is fundamental and vital to general health and wellness. [10] Consequently, oral diseases are accompanied by serious difficulty. [10,11] Dental caries, a major oral health disease is defined as "an infectious microbiological disease of the teeth that result in localized dissolution and destruction of the calcified tissue" [12] of the teeth. It is one of the commonest diseases affecting children and young adults globally. [8,13] The World Health Organisation (WHO) data indicate a global reduction in the prevalence of dental caries with significant variations existing between continents, countries, social-economic strata, age groups, and gender. [14,15]

Dental caries may trigger pain which undermines the capacity to enjoy sleep, and meals, thereby affecting the quality of life. [10,16,17] It's also being acknowledged as a primary cause of absenteeism from school. [16] Developing countries have incommensurate availability of oral health services, as such carious teeth may not be treated commonly or due to pain and distress are extracted, giving rise to a significant proportion of tooth loss. [10] The situation is not different for individuals with disabilities as they are even more prone to developing oral diseases [17,18] including dental caries. This could be directly related to the effect of their disabilities such as weak muscle control hampering regular daily oral hygiene, [18] weak finger dexterity as seen in those with cerebral palsy, [19] and plaque accumulation resulting from oral health practice contrariness. [20] It may also be due to caregivers giving attention solely to their disabilities and associated challenges to the detriment of their oral health care. [18,21] The inability to express oral health needs by most special needs individuals is another reason reported for their being more prone to developing dental caries compared to their non-special needs counterparts. [22,23,24]

Several local and international studies have records of dental caries prevalence among children and young adults with disabilities. [8,17,21,22,25,26,27,28] In Nigeria, studies on dental caries prevalence among individuals with disabilities are available across different parts of the country, 33.3% in Lagos, [9] 28.1% in Port Harcourt, [25] and 22.8% in Ile-Ife. [28] However, these studies on dental caries prevalence and oral health status of individuals with disabilities, in general, are limited to the Southern States of Nigeria. [9,19,25,28,29,30] There is, however, no evidence of such studies in the Northern States of Nigeria including Sokoto State.

Therefore, this study aimed to determine the dental caries prevalence of children and young adults with disabilities attending a special needs school in Sokoto, Nigeria

MATERIALS AND METHOD

Study area: The study was done in Sokoto metropolis, Sokoto State, North-Western region of Nigeria.

Study design: This study was a descriptive cross-sectional survey. The independent variable analysed in this study was the socio-demographic profile of the participants, while dental caries was identified and analysed as the dependent variable.

Study setting: Abdulrasheed Adisa Raji Special School was used for this study. It is the only special needs school in Sokoto State. Presently, the school caters for students with disabilities (intellectual, visual, deaf, and physical) and without disabilities.

Study population: The study population consisted of all (primary and secondary school) special needs students of Abdulrasheed Adisa Raji Special School. Their total number as obtained from the school record was 448 of which 233 were in the primary school section and 215 were in the secondary school section

Inclusion criteria: All special needs students of the Special School whose parents or guardians provided a written informed consent form and who were willing to participate in the study.

Exclusion criteria: Special needs students of the school who were unwilling, very uncooperative, or too ill to participate in the study. Special needs students whose parents or guardians declined to

provide consent and those who were not present during the study period.

Sample size determination: The sample size for the school special needs population was calculated using Yamane's (1967) formula [31]

$$n = \frac{N}{1 + N(e)^2}$$

The final sample size after adjusting for 10% non-respondent (NR) was 236

Sampling procedure: The study participants were grouped into 4 groups according to their disabilities in conformity with the school's established disability groupings, namely, intellectual**,** visual, hearing, and physical impairment groups. In situations where an individual had more than one disability, the school decision of placing such an individual according to the most severe/pronounced disability was adopted. Each participant recruited for the study was selected through a systematic random sampling method using the formulae K = $\frac{N}{n}$

Where N = Population size (448)

n = Sample size (236)

k = Sampling interval

(inputting the values)

$$\frac{448}{236} = 1.9$$

Which is approximately= 2

Thus, using the list of the students for each disability group obtained from the school authority, a random pick of a number from each class list was used as the starting point number adopted for that class and every 2nd participant from the frame was selected until the required sample size for each class was obtained for each disability group. To determine the required sample size for each class, a stratified random sampling formula was used as shown below

$$\frac{\text{class population}}{448\ (\text{total population})} \times 236\ (\text{sample size}) = \text{class sample size}$$

Thus, the total number of participants for each disability group was gotten by the addition of each class sample size for that particular disability group (i.e., from primary 1 to senior secondary school 3). The final sample size for each disability group was

Intellectually impaired = 54 out of a total of 104

Visually impaired = 41 out of a total of 76

Hearing impaired = 124 out of a total of 235

Physically impaired = 17 out of a total of 33

Adding up to a sample size of 236 from a total population of 448

Ethical consideration: Ethical clearance was obtained from Usmanu Danfodiyo University Teaching Hospital Ethics Board (document number; UDUTH/HREC/2019/No. 790). Permission was sought and gotten from the Sokoto State Ministry of Basic and Secondary Education.

Dental caries status assessment: After obtaining each participant's socio-demographic information, their dental caries status was determined by the DMFT/dmft index (Klein, Palmer, and Knutson 1938) in which D/d represents the number of decayed teeth**,** M/m represents the number of missing teeth due to caries**,** and F/f represents the number of filled teeth**.** To determine if a tooth was decayed, missing, or filled (DMFT/dmft), the WHO criteria [32] were followed.

Training of examiners: To improve validity and avoid inter-examiner variability and bias, a single examiner (dentist/investigator) carried out the oral examination. Two (2) assistants (dental therapists) were trained on data documentation. One collected the sociodemographic details, while the other who was stationed with the dentist (examiner), recorded the result of the oral examination as communicated by the dentist.

Data collection procedure: It was collected every school day between October and December 2020. One of the two dental therapists recorded the socio-demographic details. The participant was then directed to the dentist for an oral examination, which was carried out (with the aid of a mouth mirror and a blunt probe) on the school field under adequate natural light with the participant seated in a school chair or his/her specialized chair where applicable, and the examiner standing behind or in front of the chair. Oral findings by the dentist were recorded by the other therapist stationed with the dentist. The examination was done in line with the process outlined in the WHO guideline.[32] The covid-19 protocol was also observed.

Data analysis: Data analysis was performed using IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY, USA. The socio-demographic characteristics, as well as the dental caries prevalence of the participants, were determined using descriptive statistics. The caries prevalence was analysed by the disability type, age group, and grade. The results were presented in frequency tables and charts. A P-value significance was set at 0.05 or less.

RESULTS

Socio-demographic characteristics: Two hundred and thirty-six participants aged 6-28years (mean age 14.55 ± 3.7 years), participated in the study. The gender distribution of the participants showed that 167 (70.8%) were males, while 69 (29.2%) were females (Male: Female=2.4:1). Over 50% of total participants belonged to the hearing-impaired group (n=124; 52.5%). The age group 13-19years old was the majority age group, accounting for 62.3% (n=147) of the total sample. The distribution of participants by class(grade) indicates a slight majority for the primary school section 51.7% (n=122). The majority of the study participants (n=213; 90.3%) belonged to the Hausa-Fulani ethnic group (Table 1).

Dental caries distribution: The total number of participants who had dental caries experience was 84 (35.6%) persons. Analysis of the distribution of dental caries by the type of disability (Figure1), showed the Hearing-impaired group had the highest number of participants with dental caries experience 39 (46.4%).

Dental caries prevalence: The caries prevalence for the study was (84) 35.6%. Analysis of the prevalence of dental caries among children and young adults with various disabilities (Fig 2), shows those with hearing impairment had the highest caries prevalence of 16.5%. This was followed by the intellectually impaired participants with a prevalence of 11.4%.

When analysed by age group (Table 2), the highest caries prevalence per age group was amongst the 20 years & above age group (50.0%), followed by the 6-12year old group (46.2%). The Pearson chi-square test result was statistically significant (p= 0.029).

Analysis by grade (Table 3) showed a higher prevalence in the primary school section (39.3%).

Table 1: Socio-demographics of study participants

Variables	Frequency	Percentages
Type of Disability		
Intellectually Impaired	54	22.9
Visually Impaired	41	17.4
Hearing Impaired	124	52.5
Physically Impaired	17	7.2
Gender		
Male	167	70.8
female	69	29.2
Age group (years)		
6-12	67	28.4
13-19	147	62.3
20 & above	22	9.3
Class(grade)		
Primary	122	51.7
Secondary	114	48.3
Ethnic group		
Hausa-Fulani	213	90.3
Ibo	4	1.7
Yoruba	14	5.9
Others	5	2.1

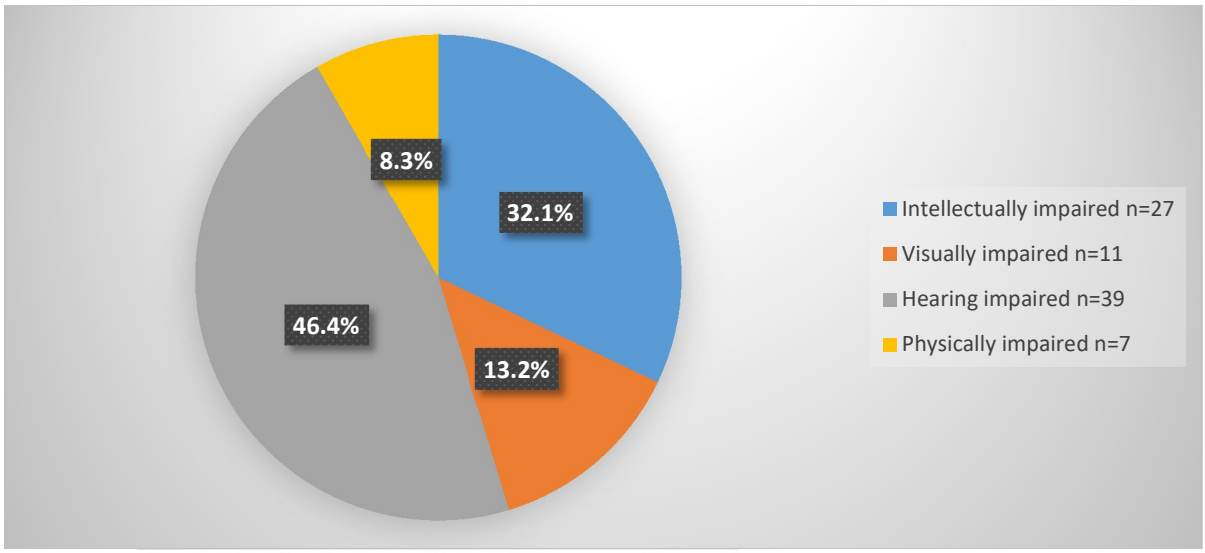

Figure 1: Caries distribution by type of disability among the participants

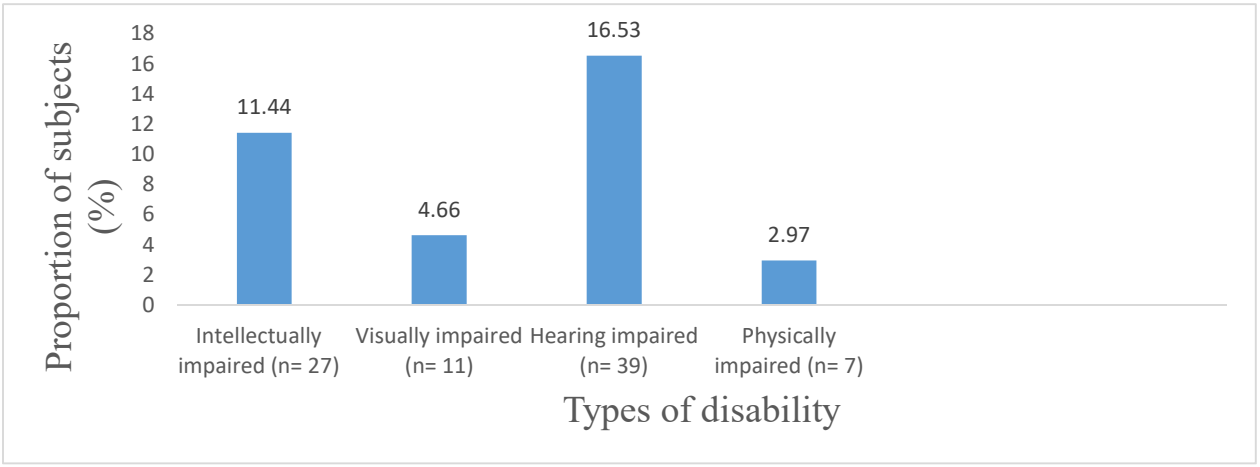

Figure 2: Prevalence of dental caries among children and young adults with various disabilities.

Table 2: Caries prevalence per Age group

Variable	Frequency (Total)	Caries prevalence	X^2	Df	p-value
Age group (years)			12.45	2	**0.029**
6-12	31(67)	46.2%			
13-19	42(147)	28.6%			
20 & above	11(22)	50.0%			

Note: x^2 = chi-square, Df = degree of freedom, p-value= probability value

Table 3: caries prevalence per grade (class)

Variable	Frequency (Total)	Caries prevalence	X^2	Df	p-value
Grade (class)			1.55	1	**0.213**
Primary school	48(122)	39.3%			
Secondary school	36(114)	31.6%			

Note: x^2 = chi-square, Df = degree of freedom, p-value= probability value

DISCUSSION.

The gender distribution of participants in this study shows that males were in the majority (70.8%) This was similar to the findings of previous studies. Oredugba and Akindayomi,[9] in Lagos, Southwest Nigeria, had 72.2% males, Nqcobo [33] in South Africa had 65% males and Mehta et al. [34] in India had 73.6% males in their studies. According to Newacheck et al. [35] in a study carried out in the United States of America, males were about one-third more likely to have a special need than females. However, this was in contrast to findings by Uwayezu et al.[22] in Rwanda who reported a higher percentage of female participants (54.4%) in their study.

The majority of our study participants were of the Hausa-Fulani ethnic group. This was not surprising considering that the study area has the Hausa-Fulani as the predominant ethnic group.

The caries prevalence in this study was 35.6%, which was similar to the prevalence of 33.3% reported by Oredugba and Akindayomi [9] in Lagos, Nigeria but was significantly higher than the 22.8% reported by Akinwonmi and Adekoya-Sofowora [28] in Ile-Ife, and the 28.1% reported by Egbobo et al [25] in Port-Harcourt, Nigeria. The prevalence for this present study was much higher than the result of the study by Simon et al. [36] in Tanzania (11.6%) and much lower than that of Altun et al. [7] in Turkey (84.6%) and Mokhtar et al. [17] in Malaysia (54.9%). The observed differences in the caries prevalence across the various studies may be attributable, to the disparity in the type and degree of impairment, study location, and the level of oral health care to which the special needs population are exposed to.

This current study shows dental caries prevalence was significantly higher in the hearing impaired and intellectually impaired groups (16.53% and 11.44% respectively) than in visually impaired and physically impaired groups (4.66% and 2.97% respectively). This was in agreement with findings by Oredugba [29] who also reported higher caries prevalence among the intellectually impaired (mentally handicapped) and hearing-impaired groups than for the visually impaired and physically impaired groups. These findings may be because the hearing-impaired participants may experience communication barriers in accessing oral health information, thus, maybe unaware of the importance of good oral hygiene practice. Likewise, the intellectually impaired participants may have challenges due to reduced ability to understand information on the importance of good oral hygiene practice, thus making both more prone to dental caries. On the other hand, most children and young adults with some form of visual impairment, are usually assisted by caregivers in carrying out most of their daily functions including toothbrushing. Thus, this could be the reason, for the low caries prevalence among them. The majority of the physical impairments observed in this study were mainly with the lower limbs and or involved only one of the upper limbs. Therefore, many were able to carry out their daily oral hygiene practices, including toothbrushing. Thus, possibly accounting for their low caries prevalence.

The caries prevalence observed across the different disability groups in this study was lower than the results of several other similar studies from middle and high-income countries. [7,17,23,37,38,39,40,41] This may be due to the higher exposure of children and young adults in middle and high-income countries to sugary food consumption compared to their African counterparts.[22] The frequency, interval, and concentration of sugar in diet have been shown to play important role in dental caries development. [18,42]

Caries prevalence was related to age in this study, this was in agreement with Mokhtar et al. [17] finding, which shows an association exists between age and dental caries prevalence among individuals with disabilities. Our study showed that the two extremes of age groups (6-12yrs and 20 years and above respectively), recorded significantly higher caries prevalence than the 13-19yrs age group. The reason for caries prevalence being higher in the 20 years and above age group than in the 13-19 years age group could be explained by the concept of exposure time, i.e., the longer the teeth and bacteria are exposed to carbohydrates, the more time the bacteria have to create acidic by-products and thus demineralize the teeth.[43] As a result, the permanent teeth present in the 20 years and above age group would have been exposed to the oral cariogenic bacteria activities for more years than those of the 13-19 years age group, and thus, a higher risk of dental caries development.

The reason for a high caries prevalence observed in the 6-12years age group compared to the 13-19 years age group, may be related to the high number of deciduous teeth found within the 6-12years age group. Deciduous teeth due to thinner enamel, are more prone to caries and also have a faster progression of caries from the enamel to dentine compared to the newly erupted permanent teeth.[44,45] This study also recorded a higher prevalence in the primary school section (39.3%) compared to the secondary school section (31.6%). A

possible reason for this finding may be related to the fact that unlike what is obtainable in the non-special needs schools where age has a direct relationship with an individual's class, the same does not apply to special needs schools where classes may be determined by an individual's degree of impairment and cognitive ability. This was particularly evident among the intellectually impaired and hearing-impaired participants of this present study. As such the possibility of having a mixture of very young participants with deciduous teeth and much older participants with matured permanent teeth being together in the same class, and therefore, in the same primary school section, may have accounted for the higher caries prevalence observed in the primary school section.

CONCLUSION

The prevalence of dental caries was 35.6%. It was significantly higher in the hearing and intellectually impaired groups than in their visually and physically impaired counterparts. Also, it was higher among age group 20 years and above than in other age groups.

LIMITATION

A limitation of this study was the exclusion of non-schooling special needs individuals. It would have improved the representativeness of the sample.

RECOMMENDATION

Oral health education and promotion strategies should be developed for the prevention of dental caries among the different disability groups, particularly the hearing and intellectually impaired students and those in age groups 6-12yrs and 20 years and above respectively.

Source of support
Nil

Conflict of interest
None declared

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