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Prevalence of common oral diseases among Senior Secondary School students in Enugu State, Nigeria

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ABSTRACT

Introduction

General health could be affected by infections of the teeth and other tissues in the mouth leading to oral disease. Oral diseases include dental caries, periodontal diseases, oral cancer, clefts, dental stains, halitosis (mouth odour), gingivitis, tooth wear, pericoronitis, oral ulcers, oral candidiasis, cancrum oris, and others

Purpose

This study was aimed at ascertaining the prevalence of common oral diseases (COD) among senior secondary school students in Enugu State.

Materials and Methods

The descriptive survey design was adopted for the study. The population comprised of all the 50,736 senior secondary school students in government-owned secondary schools in Enugu State, Nigeria. The sample size for the study was 900 students. Four research questions and two hypotheses were posed for the study. A researcher-made questionnaire cum data collection form (PPCOD) was the instrument used for the study. The instrument was validated by three research experts and the reliability was tested using Kuder Richardson's formula – 20 (K – R20) at a 0.05 level of significance and a reliability coefficient of 0.97 was derived. Frequencies, percentages, and chi-square statistics at a 0.05 level of significance were utilized for data analyses.

Results

The prevalence of COD was 30.6% for dental caries and 19.2% for periodontal disease. The gender-related prevalence of COD was higher among males (33.9% and 31.8%) than females (29% and 13.4%). The prevalence of COD increased with increase in age. The prevalence of COD was higher among students in the rural secondary schools (37.2% and 21.6%) than their urban counterparts (27.3% and 18%). There was no significant gender-difference in the prevalence of dental caries **(p>0.05)** but there was a significant gender-difference in the prevalence of periodontal diseases among the students **(p<0.05)**. There were significant age-differences in the prevalence of dental caries and periodontal diseases **(p<0.05)**.

Conclusion

Sensitization campaigns on common oral diseases needs to be carried in schools and communities. Also, oral health care professionals should be engaged to work on school oral health programmes.

INTRODUCTION

The mouth is a vital organ of the body which performs too many functions that place high demands on its unique hard and soft tissues. It contains the teeth, tongue, jaws, palate, gums, and other structures. The mouth serves as an opening that leads to the general wellbeing of the body. It also serves as a mirror of the body because most diseases affecting the body are reflected through the mouth. Oral health is an essential aspect of general health and the oral cavity is considered an essential prerequisite for health-related practices such as mastication, speech, food intake, aesthetics, and communication. All these functions involve the lips, tongue, and teeth which require adequate saliva (Carneiro et al., 2011).

Oral health is multifaceted and includes the ability to speak, smile, taste, touch, chew, swallow and convey a range of emotions through facial expression with confidence and without pain, discomfort, and disease of the craniofacial complex (Glick et al, 2017). Physiological changes can also contribute to significant oral concerns in the adolescent. Such changes include loss of remaining primary teeth; eruption of remaining permanent teeth, gingival maturity, facial growth, and hormonal changes (American Academy of Pediatric Dentistry [AAPD], 2017).

On the other hand, oral diseases are alterations of structures relating to the mouth that impairs the normal functioning of the mouth (Hemphil, 2006). General health could be affected by infections of the teeth and other tissues in the mouth leading to oral disease. Oral diseases include dental caries, periodontal diseases, oral cancer, clefts, dental stains, halitosis (mouth odour), gingivitis, tooth wear, pericoronitis, oral ulcers, oral candidiasis, cancrum oris, and others. Oral disease can prevent a person from eating which can lead to malnutrition the individual. General health can be affected by infections of the teeth and other tissues in the mouth leading to oral diseases. These oral diseases affect the teeth and their supporting structures and have become a burden to humans (Aballa, 2016).

Out of so many oral diseases, two have been identified as the most common namely dental caries and periodontal diseases and they are major threats to oral health (Wagman, 2006). Dental caries can be defined as a microbial disease of calcified tissues of a tooth, characterized by demineralization of the inorganic portions and destruction of its organic structures (Purkait, 2003) while periodontal disease (gum disease) is a disease of the supporting structures of the teeth (Hollins, 2008). These two oral diseases have become a burden in oral health and when not well-managed lead to loss of a tooth.

Dental plaque has been identified as a major cause of dental caries and periodontal disease. Dental plaque is a natural biofilm with an unknown number of bacterial species, (over 700) that colonize the mouth. A biofilm is a community of microorganisms attached to a solid surface with the bacteria encapsulated in polymers derived from the bacteria and exhibiting specific characteristics, inclusive of increased resistance to antimicrobials and biocides. This biofilm forms on the teeth surface within sixty minutes of cleaning. Poor oral hygiene practices lead to deposition and accumulation of dental plaque (Ireland, 2006; Hollins, 2008). Four criteria required for dental caries formation are a tooth surface (enamel or dentine), caries causing bacteria (bacteria from dental plaque), fermentable carbohydrates (such as sucrose), and time (Aballa, 2016).

Periodontal disease is caused primarily by dental plaque buildup. Other potential causes are genetics, poor oral hygiene, malocclusion, nutrient deficiency, diabetes, certain medication, smoking, hormonal changes in the body, bruxism, mouth breathing, and others. Dental caries and periodontal disease to some extent have a common cause and frequently a common endpoint namely loss of affected tooth if not treated early and adequately.

Dental caries and periodontal disease have been observed to exist across socio-economic groups. Socio-economic conditions have long been known to influence human health. Similarly, gender has also been identified as an influencing factor in oral diseases. Hemphil (2006) stated that adolescent girls are more prone to dental caries attacks while adolescent boys are more affected by periodontal disease.

Knowledge and practice towards common oral diseases will influence the prevalence of these diseases among adolescents (Park 2013). At a point in time prevalence include both new and existing cases of the disease. Prevalence indicates the probability that a member of the population has a given condition at a point in time. It is a way of assessing the overall burden of disease in the population, so it is a useful measure in administration when assessing the need for services or treatment facilities.

When left untreated, dental diseases undermine a child's wellbeing. Dental disease exposes children to problems such as constant pain, malnourishment, loss of teeth, and in adulthood increased risk of cardiac problems and diabetes (Ireland, 2006). If severe, dental diseases cause infections that can result in death. Cases of infective endocarditis from oral disease have been reported and most cases are life-threatening and even fatal (Ireland, 2006). Pain from dental disease can overshadow childhood, making it difficult to learn, attend school and develop socially. These diseases are almost entirely preventable with simple treatments such as water fluoridation, dental sealants, fluoride toothpaste, and professional care. Untreated dental problems are the single most prevalent unmet health need of children in the United States (Centers for Disease Control & Prevention [CDC], 2019).

MATERIALS AND METHODS

The researchers adopted a descriptive survey design for this study. Descriptive survey research design enables easy and quick collection of data in a natural environment that gives high quality and honest data collection and it is easier to make decisions and go for further analysis (Sohil, 2019).

Study Population

The population for this study comprised 50,736 students in all the 292 government-owned secondary schools in Enugu State (Planning, Research, and Statistics [PRS] Department, PPSMB Enugu, 2019).

Sample Size and Sampling Technique

The sample used for this study was 900 students. A multi-stage cluster sampling procedure was adopted by the researchers. A total of six schools were sampled for the study. For each school sampled, proportionate sampling was adopted to generate the sample size used.

Data Collection

A researcher-made questionnaire cum data collection form titled – Prevalence and Prevention of Common Oral Disease (PPCOD) was used to collect data needed for this study. The questionnaire had two sections A and B. Section A contained items eliciting information on demographic data of the respondents. Section B was a data collection form to generate data on the prevalence of common oral diseases with six items; section B had dichotomous responses.

The internal consistency of the instrument was analyzed using Kuder-Richardson's formula 20(K-R20). At the end of which a reliability coefficient of 0.97 was obtained. K-R20 was used because the responses were dichotomous.

After the respondents have filled section A of the instrument, oral examination was carried out on each respondent by the researchers and the research assistants to collect data for section B of the questionnaire. Parental consent and ethical clearance were Obtained for the study. All the 900 questionnaires distributed were collected back on the spot ensuring 100 percent retrieval.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21. Descriptive statistics of frequency distribution, percentages, mean and standard deviation were utilized. Hypotheses were tested using the chi-square statistics at a 0.05 level of significance.

When the p-value was less than the stipulated 0.05 level of significance, the hypothesis was rejected. When the p-value was greater than 0.05 level of significance, the hypothesis was not rejected but upheld.

RESULTS

The results of the data analyzed are presented in frequency tables according to the research questions and hypotheses.

Research Question 1

What is the prevalence of common oral diseases among selected senior secondary school students in Enugu State?

Table 1:
Frequency and percentage of the prevalence of common oral diseases among Senior Secondary School students in Enugu State

Common Oral Diseases	Yes f (%)	No f(%)	Total N (%)
Presence of Dental Caries	275(30.6)	625(69.4)	900(100)
Presence of Periodontal Diseases	173(19.2)	727(80.8)	900(100)

The prevalence of dental caries among senior secondary school students in Enugu State was 30.6% while the prevalence of periodontal diseases was 19.2%. This indicates that dental caries was more prevalent in the study population periodontal diseases **(Table 1)**.

Research Question 2

What is the prevalence of common oral diseases among senior secondary school students in Enugu State based on gender?

Table 2:
Frequency and percentage of presence of common oral diseases among Senior Secondary School students in Enugu State based on gender

Common Oral Diseases	Male (N=286)		Female(N=614)		Total
	Yes	No	Yes	No	
	N (%)	N (%)	N (%)	N (%)	N (%)
Presence of Dental Caries	97(33.9)	189(66.1)	178(29)	436(71)	900(100)
Presence of Periodontal Diseases	91(31.8)	195(68.2)	82(13.4)	532(86.6)	900(100)

The prevalence of dental caries among male senior secondary school students was 33.9% of the total sample whereas the prevalence among female students was 29%. This indicates that 4.9% more of male students had dental caries compared to females **(Table)**.

On the other hand, 31.8% of male students had periodontal diseases while 13.4% of females presented with periodontal diseases. This shows that 18.2% more males presented with periodontal diseases than females. This suggests that there was a higher prevalence of common oral diseases among the male students than females.

Research Question 3

What age range has more prevalence of common oral diseases among senior secondary school students in Enugu State?

Table 3:
Frequency and percentage of presence of common oral diseases among senior secondary school students in Enugu State based on age (N = 900)

Common oral diseases	12-14 (N=132)		15-17 (N=648)		18-20 (N=116)		21-23 (N=4)	
	Yes(%)	No(%)	Yes: N(%)	No: N(%)	Yes: N(%)	Yes: N(%)	Yes: N(%)	No: N(%)
Presence of dental caries	29(22)	103(78)	199(30.7)	449(69.3)	47(40.5)	69(59.5)	-	4(100)
Presence of periodontal diseases	16(12.1)	116(87.9)	112(18.8)	526(81.2)	34(29.3)	82(70.7)	1(25)	3(75)

The prevalence of dental caries and periodontal diseases was higher among students between the ages of 18 and 20 years as shown by 40.5% that had dental caries and 29.3% that had periodontal diseases compared to 30.7% and 18.8% that had both conditions among students aged between 15-17 years; and 22% and 12.1% among those aged 12-14 years. However, the prevalence of dental caries and periodontal disease was lowest among students between the ages of 12 and 14 years. This indicates that there was a higher prevalence of common oral diseases among students aged between 18-20 years **(Table 3)**..

Research Question 4

What is the prevalence of common oral diseases among senior secondary schools students in urban and rural secondary schools in Enugu State?

Table 4:
Frequency and percentage of presence of common oral diseases among urban and rural Senior Secondary Schools students in Enugu State (N = 900)

Common oral diseases	Urban (N=604)		Rural (N=296)	
	Yes: N(%)	No: N(%)	Yes: N(%)	No: N(%)
Presence of dental caries	165(27.3)	439(72.7)	110(37.2)	186(62.8)
Presence of periodontal diseases	109(18)	495(82)	64(21.6)	232(78.4)

While 37.2% of students in rural schools had dental caries, 27.3% had same in urban schools, showing 9.9% more cases of the disease among students in rural secondary schools. Similarly, students in rural secondary schools had 3.6% more cases of periodontal diseases than those in urban areas (21.6% and 18%, respectively). This suggests that common oral diseases are more prevalent among students in rural than urban secondary schools **(Table 4)**.

Test of Hypotheses

Hypothesis 1

There is no significant gender-difference in the prevalence of common oral diseases among senior secondary school students in Enugu state.

Table 5:
Chi-square analysis on the difference in the prevalence of common oral diseases among wSenior Secondary School students based on gender

Common Oral Diseases	Male (N=286)		Female(N=614)		df	χ^2	P-v	R
	Yes	No	Yes	No				
	f(%)	f(%)	f(%)	N (%)				
Presence of Dental Caries	97(33.9)	189(66.1)	178(29)	436(71)	1	2.23	.135	NS
Presence of Periodontal Diseases	91(31.8)	195(68.2)	82(13.4)	532(86.6)	1	42.84	.000	S

*NS = Not Significant; **S = Significant; ***p-v = p-value; ****R = Remarks

There was no significant gender-difference in the prevalence of dental caries at $p>0.05$ (χ^2 (1df) = 2.23, p-value:

0.135). However, there was a significant gender-difference in the prevalence of periodontal diseases among the students at $p<0.05$ (χ^2 (1df) = 42.84, p-value: 0.000). The null hypothesis was therefore partially supported **(Table 5)**.

Hypothesis 2

There is no significant age-difference in the prevalence of common oral diseases among senior secondary school students in Enugu State.

Table 6 (A):
Chi-square analysis on the age-difference in the prevalence of common oral diseases among Senior Secondary School student in Enugu State

Common Oral Diseases	Age 12 – 14years (N=132)		15-17years (N=648)		18-20years (N=116)	
	Yes N(%)	No N(%)	Yes N(%)	No N(%)	Yes N(%)	No N(%)
Presence of Dental Caries	29 (22)	103 (78)	199 (30.7)	449 (69.3)	47 (40.5)	69 (59.5)
Presence of Periodontal Diseases	16 (12.1)	116 (87.9)	122 (18.8)	526 (81.2)	34 (29.3)	82 (70.7)

Table 6 (B):
Chi-square analysis on the age-difference in the prevalence of common oral diseases among Senior Secondary School student in Enugu State

Common Oral Diseases	21-23years (N=4)		df	χ^2	P-value	Remark
	Yes N(%)	No N(%)				
Presence of Dental Caries	**-**	**4(100)**	**3**	**11.78**	**.008**	**S**
Presence of Periodontal Diseases	1(25)	3(75)	3	12.04	.007	S

There were significant age-differences in the prevalence of dental caries and periodontal diseases among the students at $p<0.05$ (χ^2 (3df) = 11.78 and 12.04, p-values: 0.008 and 0.007, respectively. Therefore, the null hypothesis was rejected. Consequently, there was a significant difference in the prevalence of common oral diseases based on the age of senior secondary school students in Enugu State **(Table 6)**.

DISCUSSION

The findings of this study revealed a prevalence of 30.6% for dental caries and 19.2% for periodontal disease among the students. The key finding on the prevalence of periodontal disease is not in agreement with the findings of Ohamaeme et al. (2017) which reported 27.2% prevalence among the population they studied, presenting a difference of 8%. The prevalence of dental caries was very high (30.6%) compared to the findings of Braimoh et al. (2014) which reported a 15.4% prevalence indicating a difference of 15.2%. This indicates an increasing prevalence of dental caries among senior secondary school students in Enugu State.

Results from this study on the prevalence of dental caries are more in agreement with the results of Kalejaiye et al. (2016) that reported a 34% prevalence. In another study by Orji (2015) a 45.8% prevalence of dental caries was reported. This was very high compared to the current findings of this research.

Findings on gender prevalence from the current research indicate a dental caries prevalence of 33.9% for males and 29% for females while periodontal disease prevalence was 31.8% for males against 13.4% for females. In both instances, oral disease was more prevalent among male students. This is in agreement with the findings of Ohamaeme et al. (2017) for periodontal diseases. The present study's findings, , in which there was a higher prevalence of both diseases for the male gender, are against the findings of other researchers. For example, Kalejaiye et al., (2016) reported a higher prevalence of dental caries in female than male students; Orji (2015) reported a prevalence of 55% for female students against 34.4% for male students; Okoye and Ekwueme (2011) reported a higher prevalence of dental caries in girls than boys in rural secondary schools in Enugu State. From the present findings, it can be deduced that there was a higher prevalence of common oral diseases among the male students.

The present study's finding on age-related prevalence indicated that there was an increase in prevalence with age. The highest prevalence of dental caries (40.5%) and periodontal disease (29.3%) were recorded against the age bracket, 18-20 years. The least was recorded as 22% and 12.1%, respectively, for the age bracket, 12-14 years. The above results on age-related prevalence of common oral diseases are in agreement with Orji, (2015), Akpata (2004),

and United Kingdom National Technical Reports [UKNTR] (2003) who reported an increase of COD with increasing age.

The present research findings on the prevalence of COD based on location indicated a higher prevalence of dental caries (37.2%) and periodontal disease (21.6%) among the rural senior secondary school students while their urban counterparts recorded a lower prevalence of 27.3% and 18% for dental caries and periodontal diseases, respectively. The present findings are similar to the results of Braimoh et al. (2014), Akpata (2004), and Akinyamoju et al. (2018). From the review, only Jamil (2006) had a contrary report.

CONCLUSIONS

Based on the results generated from this study, the following conclusions were made. The students in senior secondary schools in Enugu State have a higher prevalence of dental caries than periodontal disease. This may be due to diet/snacking patterns, peer influence, nonattendance to dental care facilities, and lack of knowledge.

Sensitization campaigns on common oral diseases needs to be carried in schools and communities. Also, oral health care professionals should be engaged to work on school oral health programmes.

Recommendations

Based on the findings of the study the following recommendations have been made;

1. Sensitization campaigns on common oral diseases should be intensified and spread out to all schools and communities by oral health professionals.
2. School oral health services should be embarked upon and the government should engage oral health professionals and post them to take charge of pupils'/students' oral health.
3. Daily oral health inspection should be integrated into schools as part of the morning assembly procedure to awaken the consciousness of the students.
4. Frequent broadcast of oral health topics by the electronic and print media.
5. Professional preventive measures can be sponsored by the government to ensure widespread service to all pupils/students to ensure these common oral diseases are given a good combat
6. Incorporation of indepth topics in oral health into the physical and health education curriculum used in schools by the curriculum planners

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Conflict of Interest: The authors declare no conflict of interest.

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