

Prevalence of Oral Diseases and Oral Hygiene Practices Among Elementary and Junior School Students in Keren, Eritrea

Samuel Jirom Welday^{1*} and Idris Mahmud²

¹Department of Nursing, Ministry of Health Keren Sub Zone, Anseba Region

²Department of dental technician, Ministry of Health Keren Sub Zone, Anseba Region

*Corresponding Author

Samuel Jirom Welday, Ministry of Health Keren Sub Zone, Anseba Region, Eritrea.

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Abstract

Background: Oral disease is one of the most prevalent diseases of childhood in developing countries. However, there is a paucity of epidemiological data on the prevalence and associated factors of oral diseases in Eritrea. The objective of this study was to assess the prevalence of oral diseases and oral hygiene practices among elementary and junior school students in Keren, Eritrea.

Methods: A school based cross sectional study was conducted among 2,502 elementary and junior school students in five selected schools (four urban and one rural) from May to June 2021. A self-developed checklist was used to collect relevant data. To assess oral diseases, two examiners were calibrated by a certified dentist and inter observer agreement was calculated using the Cohen's Kappa statistic (0.80). All data analysis was done using SPSS version 23.

Results: The prevalence of oral diseases was 88%, without significant difference between males (81%) and females (95.5%). Out of the 2,502 participants included in the study, 1205 (48.2%) were females (Table 1). More than one quarter 935 (37.4%) of the study participants said they didn't clean their teeth. More than one quarter (30.5%) of the study participants said they cleaned their teeth "once a day" and 16.5% twice daily. The most common tools used were brushes and local "chew sticks" with reported utilization by 50.4% and 49.6% respectively.

Conclusion: Oral disease is a common public health problem among elementary and junior school Eritrean students. These values are considerably higher compared to reports from other, mainly African, developing countries. There was also a gap concerning oral health practices. Only 62.6% of the respondents practiced oral hygiene on a daily basis using different means, with tooth-brush and chew stick being the most commonly tools utilized.

Keywords: Oral Disease, Oral Hygiene Practice, Keren, Eritrea

1. Background

The 2010 Global Burden of Diseases, Injuries and Risk Factors Study estimated that oral conditions affected 3.9 billion people, and that the burden of oral conditions had increased by almost 21% between 1990 and 2010. There were notable increases in severe periodontitis and untreated caries – in fact, untreated caries in permanent teeth was found to be the most frequent condition of the 291 diseases included in the study, with a global prevalence of 35% for all ages combined [1]. Oral diseases have been affecting humans since the prehistoric times. Dental caries was ranked as the most common oral condition among 291 diseases between the years of 1990 and 2010 [1]. Worldwide, dental caries is the most prevalent disease of childhood, affecting 60–90% of all children [2].

Majority of dental caries remains untreated due to inappropriate, unaffordable or unavailable dental health services. In most developing countries, the dentist to population ratio is about 1 per 150,000 people, making the provision of dental health services difficult, compared to about 1 to 2000 in high-income countries [3]. In Eritrea, the dentist to population ratio is 1 per 303,185 people. This is exacerbated due to generally poor dental health facility infrastructure and low dental health related knowledge and practice in the general public [4]. Moreover, dental services in Eritrea are largely concentrated in hospitals in urban centers or in private practices where the services offered are not affordable for a large proportion of the population.

Globally, dental diseases, mainly dental caries cost 298 billion dollars in direct treatment costs to the global economy, covering

up to 4.6% of the global health expenditures. There is also an incurred cost of 144 billion dollars due to loss of productivity; souring the total cost to 442 billion dollars [5].

Moreover, dental problems are a major cause for poor quality of life. Dental caries is the most common oral condition that evokes aesthetic and functional complaints in children. In addition, dental caries is mentioned as the major contributor for the loss of 51 million school hours due to acute dental problems annually [6].

Eritrea is a low-income country located in the horn of Africa. Eritrea has recorded a significant success in achieving the health-related Millennium Development Goals in recent years, particularly goals number 4 (reducing child mortality), 5 (improving maternal health) and 6 (combating HIV/AIDS, Malaria and Tuberculosis). Life expectancy in Eritrea has risen from 54.4 in 2000 to 64.7 years in 2014 [7]. However, there has been slower progress regarding oral health and oral care activities including prevention and control of oral diseases.

In Eritrea, dental caries is consistently ranked as the first or second most commonly reported disease with the highest morbidity in Out Patient Departments in the country. Dental caries was ranked as the highest morbid disease in the years 2013 and 2014 and second highest reported disease during the years 2011, 2012, 2015 and 2016 [8]. According to a study done in 12 years old students in central region, Eritrea in 2017, 78% of the students had dental caries [9]. However, as there has been no nationwide research conducted regarding the prevalence of oral diseases, determining the exact burden of dental caries and its associated factors in different settings and groups of people remains a considerable challenge.

Therefore, the objectives of this study were to determine the prevalence of oral diseases and to assess oral hygiene practices among elementary and junior school students in Eritrea.

2. Methods

A cross sectional study was conducted in Keren, Anseba region of Eritrea. It was carried out in five schools (four urban and one rural) among elementary and junior school students from May to June 2021.

2.1 Sample Size

All students from the selected schools, 2,502 in total, was

included during the study period. The selected schools were Dearit Elementary School, ODAS Elementary School, Alnahda Elementary & Junior School, Adiae Elementary School and Hager Elementary School. Hager Elementary school was from rural setting.

2.2 Sampling Design

This study employed a purposive sampling design. The selection of four school from an urban and one from a rural community was based on the assumption that data related to each school reflects the situation of the community they serve.

2.3. Data Collection Procedure

Data collection was done by two research team members who were trained to identify oral diseases. The training was done by a certified dentist and included both theoretical and practical sessions. The theoretical part included a detailed description of oral diseases and numerous illustrations of at different locations and of varying degrees of severity. The examiners also took 4 weeks of practical lessons in a dental clinic, where they examined patients and categorized the status of oral diseases under the direct supervision of a dentist. At the end of the training session, 30 students were examined by the data collectors independently for oral diseases under the supervision of a certified dentist. Inter observer agreement was then calculated using the Cohen's Kappa statistic (0.80) which indicated "almost perfect agreement". A self-developed checklist was used to collect relevant data. Written consent was obtained from school directors to conduct the study. Respondents were asked for verbal consent before the interview. Students were examined for oral diseases under an artificial light using a dental mirror. Data entry and analysis was done using the Statistical Package for Social Sciences (SPSS ver. 23). Data analysis was performed by applying descriptive statistics and chi square tests to assess the relationship between oral diseases and related variables. The level of statistical significance was set at $p < 0.05$.

3. Result

Out of the 2,502 participants included in the study, 1205 (48.2%) were females. The majority of the respondents (55.2%) were Christian and the Tigrigna ethnic group comprised 46.4% of the study population while Tigre and Blien accounted for 32.2% and 19.2% respectively. More than two thirds of the participants (87%) were from urban setting and 13% were from the rural setting (Table 1).

Demographic variables		N (%)
Age	7-13	1,669 (66.7)
	14-16	383 (33.3)
Sex	Male	1,297 (51.8)
	Female	1,205 (48.2)
Religion	Christian	1,381 (55.2)
	Muslim	1,121 (44.8)
Ethnicity	Tigre	831 (32.2)
	Tigrigna	1,161 (46.4)
	Blien	480 (19.2)
	Others	30 (2.2)
Residence	Urban	2,177 (87)
	Rural	325 (13)

Table 1: Demographic Characteristics of the Study Participants (n = 2,502)

Students from an urban setting had higher prevalence of oral diseases than rural (80% versus 72%). However, this was not statistically significant. Similarly, no statistical significance was found between the occurrence of oral diseases between female (95.5%) and male respondents (81%) (Table 2)

		Oral diseases prevalence		Total N (%)	p-value
		Yes N (%)	No N(%)		
Sex	Male	1051 (81%)	246 (19%)	1,297 (100%)	0.721
	Female	1151 (95.5%)	54 (4.5%)	1,205 (100%)	
Residence	Urban	1742 (80%)	435 (20%)	2,177 (100%)	0.325
	Rural	234 (72%)	91 (28%)	325 (100%)	

Table 2: Oral Diseases Prevalence by Gender and Residence

More than one quarter 935 (37.4%) of the study participants said they didn't clean their teeth. More than one quarter (30.5%) of the study participants said they cleaned their teeth "once a day" and 16.5% twice daily. The most common tools used were brushes and local "chew sticks" with reported utilization by 50.4% and 49.6% respectively.

School Name	Students cleaned their tooth			Dental Instrument		Dental cleaning frequency/day			
	Yes	No	Total	Using Chew Stick	Using Brush	Once	Twice	Thrice	Some times
Dearit Elementary School	403	236	639	153 (23.9%)	250 (39.2%)	198 (49.1%)	125 (31.1%)	77 (19.1%)	3 (0.7%)
ODAS	0	10	10	0	0	0	0	0	0
Alnahda Elementary & Junior School	567	453	1020	347 (34%)	220 (21.6%)	272 (47.9%)	142 (25%)	128 (22.6%)	25 (4.4%)
Adiae Elementary School	583	230	813	263 (32.3%)	320 (39.4%)	290 (49.7%)	140 (24%)	123 (21%)	30 (5.1%)
Hager Elementary School	14	6	20	14 (70%)	0	3 (15%)	7 (35%)	10 (50%)	0
Total	1,567	935	2,502	777 (49.6%)	790 (50.4%)	763 (30.5%)	414 (16.5%)	338 (13.5%)	58 (2.3%)

Table 3: Students Dental Hygiene Practices and Tools Utilized (n = 2,502)

Dental caries, plaque, calculus and gingivitis was the highest oral diseases diagnosed with 31.2%, 29.7%, 22.7% & 11.4% respectively. Dental caries was recorded with similar burden in male (49.1%) and female (50.9%) respondents. Dental fluorosis was seen in 2% of the students.

S. N	Cases	Number of students			Number of students having oral diseases in percentage		Out of all students, percentage of a single case
		M	F	Total	M	F	
1	Dental caries	383	397	780	49.1	50.9	31.2
2	Gingivitis	164	122	286	57.3	42.7	11.4
3	Plaque	419	325	744	56.3	43.7	29.7
4	Calculus	331	237	568	58.3	41.7	22.7
5	Dental Fluorosis	23	26	49	47	53	2
6	Periodontitis	54	41	95	56.8	43.2	3.8
7	Crowding	40	37	77	52	48	3.1
8	In a Critical situation	288	202	490	58.8	41.2	19.6
9	Clear (good)	112	188	300	37.3	62.7	12

Table 4: Prevalence of Oral Diseases (n = 2,502)

S. N	Cases	Number of students			Number of students having oral diseases in percentage		Out of all students, percentage of a single case
		M	F	Total	M	F	
1	Proximal caries	125	152	277	45.1	54.9	11.1
2	Rampant caries	38	48	86	44.2	55.8	3.4
3	Pits & fissures caries	72	67	139	51.8	48.2	5.6
4	Occlusal caries	117	105	222	52.7	47.3	8.9
5	Cervical Caries	31	25	56	55.4	44.6	2.2

Table 5: Prevalence of Dental Carries Classification (n = 2,502)

More than two thirds 2,202 (88%) of the respondents had at least one oral disease during examination.

	Frequency
Total Screened	2,502
Having oral diseases	2,202
Having good oral health	300
Total % of students having oral diseases	88%

Table 6: Over all Result of the Oral Health Assessment

4. Discussion

This study was done from 7-16 years old, with a prevalence of 88%. Oral disease was a common public health problem among elementary and junior school students in Keren, Eritrea. This is similar to the 77% prevalence reported in India but was higher than rates described from Sudan (30.5%) [10, 11]. These different prevalence figures could be attributed to many factors including socio cultural differences, study setting, sample size, dietary behaviors and differences in knowledge, attitude and practice regarding oral hygiene.

In the current study, dental caries, plaque, calculus and gingivitis was the highest oral diseases diagnosed with 31.2%, 29.7%, 22.7% & 11.4% respectively. Dental caries was recorded with similar burden in male (49.1%) and female (50.9%) respondents. Contrastingly, a study done among 12-year-old students in central region Eritrea, revealed that with a prevalence of 78%, dental caries was a common public health problem in Eritrea [9].

In this study, dental fluorosis was seen in 2% of the students, this attests there is high concentration of fluoride content in the water system of Keren town.

In the present study, only 16.5% of the study respondents said they cleaned their teeth twice daily, which is consistent with a study in Eritrea [9]. The majority of the students (62.6%) cleaned their teeth using different tools. Tooth-brush (50.4%) and local chew-stick (49.6%) were the most commonly utilized. These figures are lower with other study [9] that showed tooth brush and tooth paste being the most common means of maintaining oral hygiene. In Eritrea, many species of trees are used as chew stick. The selection of these species usually depends on personal preference and availability in the neighborhood. However, the most common selection method is based on perceived power of cleaning of the tree species. Some of the usually used species in Eritrea include *Olea europea*, *Euclea schimperi*, *Rumex nervosus* and *Cadaba farinosa* [12]. A chew stick from these trees is cut and prepared in a suitable design or shape and is used for cleaning the teeth without any tooth-paste.

This study has assessed the prevalence of oral diseases and oral hygiene practices in elementary and junior school children in Eritrea. Due to feasibility this study employed a purposive sampling design. Hence the results, even though they may shed light to the current situation, may not be generalized to the whole elementary and junior school student population in Eritrea.

5. Conclusion

Oral disease is a common public health problem among

elementary and junior school Eritrean students. These values are considerably higher compared to reports from other, mainly African, developing countries. There was also a gap concerning dental health practices. Only 62.6% of the respondents practiced dental hygiene on a daily basis using different means, with tooth-brush and chew stick being the most commonly tools utilized.

Declarations

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Availability of Data and Materials: The complete data set supporting the conclusions of this article is available from the corresponding author and can be accessed upon reasonable request.

Authors' Contributions: Both authors participated in all phases of the study including topic selection, design, data collection, data analysis and interpretation.

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