

Dental Caries and Associated Determinants among Students of the Military School of Saint Louis (Senegal)

Massamba Diouf^{1*}, Mababou Kebe², Mamadou Lamine Guirassy³, Mbathio Diop¹, Abdoulaye Diouf⁴, Aida Kanoute¹, Jean-Claude Guinan⁵, Amadou Dieng¹, Abou Dramane Sanghare⁵, Daouda Cisse¹, Daouda Faye¹, Cheikh Mbacké Lo¹

¹Public Health Service, Department of Dentistry, Cheikh Anta Diop University, Dakar, Senegal

²Dental Office, Military Hospital, Dakar, Senegal

³Service of Periodontology, Department of Dentistry, Cheikh Anta Diop University, Dakar, Senegal

⁴Service of Pediatric Dentistry, Department of Dentistry, Cheikh Anta Diop University, Dakar, Senegal

⁵Public Health Service, Faculty of Dentistry, Felix H Boigny University, Abidjan, Côte d'Ivoire

Email: *dioufmass78@yahoo.fr

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Abstract

Introduction: Due to its health, social and economic morbidity, dental caries leads to absenteeism and a drop in school performance among schoolchildren. The objective of this work is to study dental caries and its determinants in pupils known as Children of Troop (CT) of the “Military School of Saint Louis” (MSS). **Method:** This was a descriptive and cross-sectional study. Recruitment was exhaustive. The collection was made at the school and has covered the period of March 10 throughout June 13, 2014 in an individual interview, based upon a deliberate consent, using a questionnaire drawn up on the basis of the variables studied. The bivariate analysis was done with the Epi Info software version 3.5.3. **Results:** The mean age of CT was 14.9. The prevalence of caries was 61.2%. Determinants related to caries were: sugar intake between meals (OR = 6.44 [3.4 - 11.9]); insufficient tooth brushing (OR = 14.3 [8.8 - 23.29]); (OR = 3.84 [2.38 - 7.14]) and for regular dental visits (OR = 5.26 [3.44 - 8.33]), with the last dental visit dating back more than one year. **Conclusion:** In the face of challenges of school performance of CT, it is necessary to set up a control plan focusing mainly on the factors identified and associated with dental caries in military school.

Keywords

Military School, Child of Troop, Dental Caries, Determinants

1. Introduction

Dental caries is a microbial, multifactorial disease that succeeds in destroying the hardest substance of the human body, the enamel [1].

This disease is identified by the World Health Organization (WHO) as one of the most important public health issues [2]. Mortality as a consequence of caries is practically non-existent. However, dental caries is an important cause of morbidity. For developing countries such as Senegal, dental caries is a public health concern because of its impact on the quality of life of people suffered from tooth decay and the high cost of care [2]. The consequences and complications of decay are pain, loss of teeth (causing disturbances in occlusion, nutrition, aesthetics and psycho-social life), local, locoregional and focal distance.

The prevalence of caries varies from geographical regions to the availability and accessibility of health services. Social determinants are also very pronounced [3] [4]. During the 20th century, the epidemiological situation of tooth decay has evolved differently in the world. In developed countries, the prevalence has significantly decreased [5] and is attributed to the rise of living standards, generalization of fluoridated toothpastes and means of prevention [6]. The global burden of these diseases is significantly higher among poor and underprivileged population groups [7].

Other determinants such as hygiene level, sugar consumption, individual biological characteristics, intervene in the onset of tooth decay.

Sixty to ninety percent of schoolchildren worldwide have cavities that often cause pain and discomfort. Pulpitis is the main reason for school absenteeism in many countries [8].

Africa is one of the most affected continents by dental caries, especially in school-aged children. In Senegal, tooth decay is also a problem for schoolchildren. In the Dakar region in 2014, a prevalence of 41.8% was observed among schoolchildren in the age of 12 [9].

The Armed Forces Medical Services contributes to maintaining morale of the troop by taking after of their state of health. In the service, children's health is a special concern. Among these children, some come from military families, but also Children of Troop (C.T) from the "Military School of Saint-Louis" (MSS) and a boarding school with military supervision. The objective of this study is to determine the prevalence of dental caries and associated determinants.

2. Materials and Methods

This was a descriptive and cross-sectional study. It was based on the MSS, a general secondary school and a military training center in Senegal.

The population under study has consisted of the MSS troop children enrolled during school year 2013/2014. Recruitment was exhaustive; The number of children of troop (C.T) was 485. Students who were unavailable or refused to take part in the survey on the basis of deliberate consent were not included in this study.

Data collection took place at the dental office of Bango military camp where MSS is housed with a WHO survey form adapted to the objectives of this study.

A pre-test was carried out in a secondary school in Dakar on 50 pupils by the dentist of the dental center of Ouakam military hospital in order to make the necessary final modifications.

An information sheet was administered to each C.T. Participation was free and voluntary. The questionnaire was anonymous and the data collected were confidential and kept in a secure location.

The Epi Info software version 3.5.3 enabled the capture of the data collected. A cleanup of the files was done with the analysis program of the same software for a correction of the outliers' data and errors of input. The results were expressed in mean and proportions in univariate analysis and in odds ratios with their confidence intervals in bivariate. The significance level was 5%.

3. Results

3.1. Socio-Demographic Characteristics

At the end of the data collection, 441 people were surveyed from March 10 throughout June 13, 2014. This difference in size is related to the absence of pupils on the day of the interviewer's visit.

The mean age of C.T was 14.9 years with extremes of 10 years and 20 years.

Senegalese nationality was dominant (73.9%) followed by Burkina Faso (3.9%), and Gabon (3.6%).

Urban C.T constituted 85.3% of the total population size (**Table 1**).

3.2. Dental Caries and Associated Determinants

The prevalence of dental caries in C.T. was 61.2%. In their majority, children of troop have consumed sweet foods between main meals of the day, *i.e.* 85.9%. These foods were made up of 38.3% candy. The other sugars represented 34% (**Table 2**). Relating to the habits of oral hygiene, only 2 pupils haven't cleaned their teeth versus 439, *i.e.* 99.5%. The method of brushing was horizontal at 57.9% and fluoridated pharmaceutical paste was used by 14.8% (**Table 2**).

In the younger category (age group 10 - 14 years), the prevalence of caries was 55.5%.

Brushing teeth several times a day was a protective factor and single dental brushing was 8.33 times more likely to have decay than those who brushed teeth several times a day but within the confidence interval IC = [4.34 - 16, 66] (**Table 2**).

4. Discussion

4.1. Limits and Methodological Considerations

The survey has investigated the presence of dental caries noted only during the study period and not to its history which could be materialized either by a definitive filling or by an absent tooth. The factors associated with the carious pathology were then studied. It should be recalled that the medical examination of aptitude in force army requires candidates who have passed the MSS exam to

Table 1. Distribution of sociodemographic characteristics of children of troop.

Characteristics	Absolute frequency (n = 441)	Relative frequency (%)	Confidence interval 95%
Age range			
10 - 13	119	27.00	22.90 - 31.40
14 - 16	209	47.40	42.70 - 52.20
17 - 20	113	25.60	21.70 - 30.00
Country			
Benin	11	2.50	1.30 - 4.60
Burkina Faso	17	3.90	2.30 - 6.20
Cameroon	1	0.20	0.00 - 1.50
Centrafrique	11	2.50	1.30 - 4.60
Côte d'Ivoire	14	3.20	1.80 - 5.40
Gabon	16	3.60	2.20 - 5.90
Guinea Conakry	8	1.80	0.80 - 3.70
Mali	12	2.70	1.50 - 4.80
Mauritania	5	1.10	0.40 - 2.80
Niger	12	2.70	1.50 - 4.80
Senegal	326	73.90	69.50 - 77.90
Tchad	8	1.80	0.80 - 3.70
Origin			
rural	65	14.70	11.60 - 18.50
urban	376	85.30	81.50 - 88.40
Educational attainment of father			
uneducated	27	6.10	4.10 - 8.90
Primary	64	14.50	11.40 - 18.20
Secondary	95	21.50	17.90 - 25.70
University	255	57.80	53.10 - 62.50
Educational attainment of mother			
uneducated	49	11.10	8.40 - 14.50
Primary	170	38.50	34.00 - 43.30
Secondary	116	26.30	22.30 - 30.70
University	106	24.00	20.20 - 28.40

Table 2. Relationship between dental caries and other variables.

Variables	Response	Dental caries		Odds ratio (OR) [confidence interval] _{95%}
		Yes	No	
Origin	Rural	40 (61.50%)	25 (38.50%)	1.3 IC = [0.9 - 1.6]
	Urban	230 (61.20%)	146 (38.80%)	
Nibbling	Yes	255 (67.30%)	124 (32.70%)	6.4 IC = [3.4 - 11.9]
	No	15 (24.20%)	47 (75.80%)	

Continued

Regular brushing	Yes	214 (77.50%)	62 (22.50%)	7.1 IC = [5.0 - 11.1].
	No	56 (33.90%)	109 (66.10%)	
Brushing frequency	once	102 (89.50%)	12 (10.50%)	8.3 IC = [4.3 - 16.6]
	More than one time	166 (51.10%)	159 (48.90%)	
Regular visite to the dentist	No	213 (74.70%)	72 (25.30%)	5.2 IC = [3.4 - 8.3]
	Yes	57 (36.50%)	99 (63.50%)	
Last visite time	One year	132 (77.20%)	39 (22.80%)	3.8 IC = [2.3 - 7.1]
	Less than a year	59 (46.80%)	67 (53.20%)	

treat decayed teeth subject to their definitive admission. This may underestimate the severity of dental caries in children.

4.2. General Considerations

The situation of dental caries in this general educational institution with a military framework is rather worrying with an overall prevalence of 61.2%. The latter is explained by factors whose statistical links with caries have been demonstrated in our study. These include sugar intake between meals, inadequate dental brushing, time to last visit of more than one year, and low awareness of regular brushing and regular visits.

Prevalence of tooth decay found by age groups was respectively 55.5% between 10 and 13 years, 63.6% between 14 and 16 years and 62.8% between 17 and 20 years. However, the mean age in the caries group was not statistically different from the mean age in the caries-free group ($p = 0.594$). Regardless of age, prevalence in the different age groups was high.

These prevalence proportions collected in the study are corroborated by global data of 2007 [5], and also by epidemiological surveys carried out in Senegal, which showed that 50% to 70% of the students examined were carrying at least one condition of dental disease [9] [10].

However, rates higher than those of our study are observed in a national pilot study on dental caries in Senegal [11]. The same is true in the Democratic Republic of Congo, Gabon, Morocco, Côte d'Ivoire, Cameroon [12] [13] [14] [15].

Rates lower than those of the MSS are also reported in Congo, in schools in Brazzaville [16], France, in 2005 on a sample of 1000 children of 12 years old, in 2002 in the Gironde [17].

Differences in prevalence (compared to MSS) are explained by the variation in determinants of tooth decay. Thus, the existence of dental offices with accessible services, the fluoride in water and the good behavior of the population in terms

of oral hygiene, *i.e.* observing a good quality of dental brushing, contribute to a prevention of dental caries [18]. On the other hand, harmful consumption of sugar, inadequate dental brushing and a deficient oral health system contribute to a high prevalence, especially when there is no fluoride in the area and the population is in a situation of precariousness [19].

The lower prevalence of MSS can be explained by the accessibility of dental care to pupils (C.T) with the existence of a dental office located a few meters from the school and especially by the management of the decayed teeth before Admission to school. Dental brushing, although deficient, is widely practiced in MSS, where C.T also enjoy good living conditions. Behavioral determinants such as poor oral hygiene due to a dental brushing deficit also explain high prevalence observed elsewhere [13].

Areas with lower prevalence benefit from a better health care system as in France [17].

The existence of statistical links between the occurrence of dental caries and the risk factors are indicative of the high prevalence observed at the MSS.

In dental caries, the difference was statistically significant between sugar consumers between meals and others. There were 67.3%, respectively, compared with 24.2% ($p < 0.001$). Children troop consumers of sugars between meals were 6.44 times more likely to present dental caries than non-consumers. Indeed, the “westernization” of the food habits of the populations residing in the major African cities has led to an abusive consumption of sweets, confectionery and pastries, among others [15].

The degradation of the sugars fermentable to organic acids by the cariogenic bacteria of the plate (*Streptococcus*, *Lactobacillus*, *Actinomyces*) is responsible for demineralization of the enamel when the pH passes below 5.5 then the dentine, more fragile, Below 6.5.

The development of tooth decay arises from a lasting imbalance in favor of demineralization, *i.e.* when acid production is prolonged (prolonged and/or repeated contact time between bacteria, sugars and enamel tooth) and/or when the buffering capacity of the saliva is decreased [3].

In another study, a high prevalence of 81.4% was explained in part by the fact that 76.2% of students consumed more than three cariogenic foods per day [20].

5. Conclusions

This descriptive, cross-analytical study revealed a 62.1% prevalence of tooth decay and a statistically significant association of factors associated with its occurrence. The study showed links with the consumption of sugars between meals, dental brushing, last visit and awareness in relation to regular brushing and regular visits.

In view of this high prevalence, which could be harmful to health of the students of this school, it is necessary to implement a checkup plan focusing on factors identified and associated with tooth decay in the “Military school of Saint Louis”.

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