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Evaluation of the Parodontal Health of Schoolchildren from Widou in Ferlo (Senegal)

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Abstract

Introduction: Mechanical disorganization of the bacterial biofilm is the cornerstone of the prevention of gingivitis and periodontitis periodontal diseases. The objective of this study was to evaluate the periodontal health of schoolchildren in Widou, Ferlo.

Methodology: This was a descriptive, cross-sectional study of schoolchildren living in Widou in the centre of Ferlo. The survey was exhaustive and concerned the only school in the locality. The epidemiological data collected concerned oral hygiene practice, periodontal health and socio-demographic characteristics such as sex, age and educational level. The degree of hygiene was assessed by the Silness and Loe plaque index (Plaque Index); inflammation and bleeding on probing were assessed by the Loe and Silness gingival index (Gingival Index).

Results: In a total of 126 schoolchildren, boys and girls were equally represented and the average age was 10 years +/- 2.16. Sixty-nine percent (69%) of the children examined did not use a toothbrush. Of these, more than 47% reported brushing 3 times a day. The plaque index mean value was 1.23 and 99.2% of the population had a moderate plaque control. The average gingival index was 0.96 and 80.2% of the sample had moderate gingival inflammation.

Conclusion: The study showed a relatively low rate of toothbrush use in contrast to the tooth stick and a relatively high rate of periodontal index. Communication-based approaches to behaviour change in children are needed to improve periodontal health.

Keywords: Periodontal Health, Oral Hygiene, Periodontal Index, Students, Ferlo, Senegal, Oral Car

Introduction

Oral health is defined by World Health Organization (WHO) as the absence of oral or facial pain, of soft or hard mouth tissue damage and/or facial massif that limits ability to bite, chew smile and speak and thus their psychosocial well-being [1].

Thus, dental and periodontal diseases are the most common infectious diseases caused by the interaction of bacteria and an inappropriate host response. Children's oral pathologies have some clinical specificities. Several studies, particularly in Senegal, have shown increasing prevalence of oral diseases, especially in rural areas [2-4].

Young's periodontal tissues are different to those adults in their clinical and biological aspects. Gingivitis is the most common children periodontal disease in the world [5-7]. Many studies have shown a high prevalence for children and adolescent with associating to high dental plaque index [2,7-9].

Their evolution to periodontitis is so rare on temporary dentition. But it can be serious and is generally associated with systemic disease. A premature looseness of teeth that can result from this disease without treatment, could be the cause of functional, aesthetic and even psychological handicap. However, they can be prevented by simple preventive measures, as their determinants are mostly related to behavior and lifestyle [10].

It appears that as general health, oral health is also essentially determined by attitudes and behaviors that change between societies and their evolution [11].

Localizated to central east of Senegal, Ferlo is an isolated locality where access is relatively difficult with almost non-existent oral health care establishments. This side housing the Great Green Wall project (GGW) that started at 2005, and people who live there are essentially peulhs.

Peulhs might have origins from Judaic, Bohemian, Hindu, Romanian and even Gallic [12]. They cohabit with nature, herds and their main activity is nomadic rearing [13].

Children in primary school are usually between 7 and 12 years old. This group is particularly important because they are receptive to oral care education and can share their knowledge around them. Thus, the aim of the present study was to assess the state of the periodontal disease of children living in Widou at ferlo.

Methodology

The study was descriptive and transversal type started from April 02 to 10 2016.

The survey took place in Widou Thiengoly locality in the heart of space of Great Green Wall in Ferlo in Senegal center-east. This is an arid area where there is a significant lack of structures, particularly health facilities. The population travels many miles for basic needs.

Schoolchildren from all classrooms present during study were included in our sample. According to the administration, there were 126 students who were automatically enrolled in the study. In the other words, the survey was exhaustive.

To participate to this study, children had to live in Widou or at most 6km around the locality's school, to be student at primary school of Widou Thiengoly, having general health state compatible with an oral examination, having agreement of teacher and/or parents.

oral examination was done by 4 investigators previously calibrated about measurement of periodontal index by paradontology service.

The level of hygiene was assessed by calculating the Plaque Index PI of SILNESS and LOE, 1964 and its interpretation by plaque control. This index involves one of the main etiological factors of periodontal disease: bacterial plaque or microbial biofilm. It is simple and quick to use and reflects the accumulation of plaque on dental surfaces. The scores are as follows:

0: No plaque.

1: Plaque not visible but detectable by scraping the tooth surface with a periodontal probe.
2: Plaque deposits visible to the naked eye but not in the interdental spaces.
3: significant plaque accumulation on tooth surfaces.

All vestibular and palatal or lingual surfaces of the 16 or 55, 11 or 51/61, 26 or 65, 36 or 75, 31 or 71/81, 46 or 85 were examined, after air drying. In case of tooth loss or extensive or total coronal destruction, no score was given. Interpretation of the index was done according to the recommendations of Martin and Bercy [14] which allow plaque control (oral hygiene effectiveness) to be qualified according to the ranges of the PlI value: - 0 = excellent plaque control, - 0.1 to 0.6 = good control - 0.7 to 1.9 = average control, - 2 to 3 = poor control.

The gingival condition was assessed by the Gingival Index (GI) of LÖE AND SILNESS 1963 [15] it assessed the level of gingival inflammation and detected the presence of bleeding on probing. Probing was only performed when the marginal gingiva showed visible signs of inflammation. The scores are as follows: 0: healthy gingiva, no bleeding on probing, no inflammation. 1: Mild inflammation but no bleeding, 2: moderate inflammation = bleeding on probing, with discolouration and swelling of the gum, 3: severe inflammation = redness and swelling of the gum, ulceration, spontaneous bleeding. All vestibular and distal surfaces of the 16 or 55 and 26 or 65 were examined. All vestibular surfaces of 11/21 or 51/61 and 31/41 or 71/81 were examined. All distal surfaces of 36 or 75 and 46 or 85 were examined.

The interpretation of the inflammation index was done according to the recommendations of MARTIN and BERCY [14] which allow to qualify the gingival inflammation according to the same ranges of values as the plaque index. We have thus: no inflammation, light inflammation, medium inflammation or severe inflammation.

The data from the patient interview and the periodontal examination were recorded on a survey form. The investigation form was pre-tested on 20 people living to 50 kilometers. This allowed us to observe reaction of responding to the survey, to have estimation of times to complete the survey.

For dental examination, there were used materials constituted by an examination tray, mirror, tweezer, probe 6 and 17 and a Williams probe.

For each child included in the study, the collected variables concerned oral hygiene practices, socio-demographic characteristics (sex, age, ethnic group, schooling level), periodontal index measurement (O'leary, Silness and Loe).

The statistical analysis was carried using Epi Info 7.1 software for the elaboration and processing of the questionnaire and SPSS (version 23.0) for data analyzing. The data were expressed as percentages and means. The modalities of certain variables were grouped together in the statistical calculations for epidemiological purposes.

The study was conducted according with Helsinki's declaration on the protection of persons undergoing biomedical research. The teacher of each class was the signatory of the students' consents. At the end of the clinical examination, each student had an oral hygiene education session and received a package containing toothbrush and toothpaste.

Results

Socio-Demographic Characteristics:

The sample had the same proportion of boys and girls (Figure 1). The mean of age was 10±2,16 years old. More than 2/3 were 10 years and older (Figure 2)

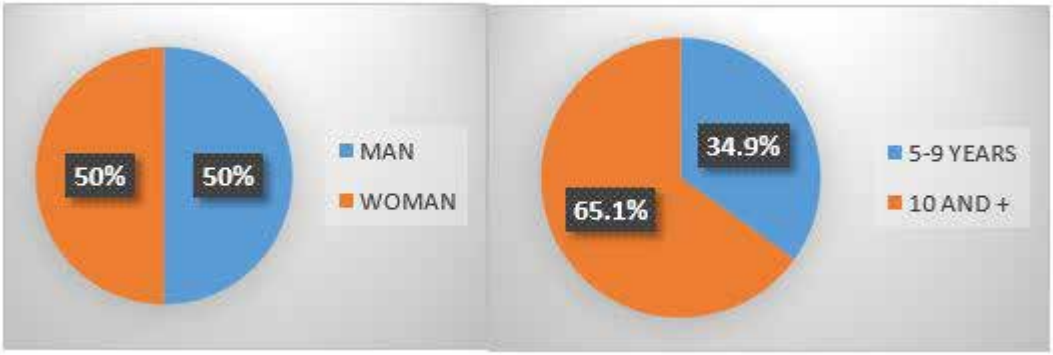

Figure 1: Distribution of the sample by sex

Figure 2 : Distribution of the sample to age

Education

Nearly a third of the sample (31.7%) are in the CI (initiation class). The lowest number (7.1%) was found in CM2 (middle class second years) (Figure 3).

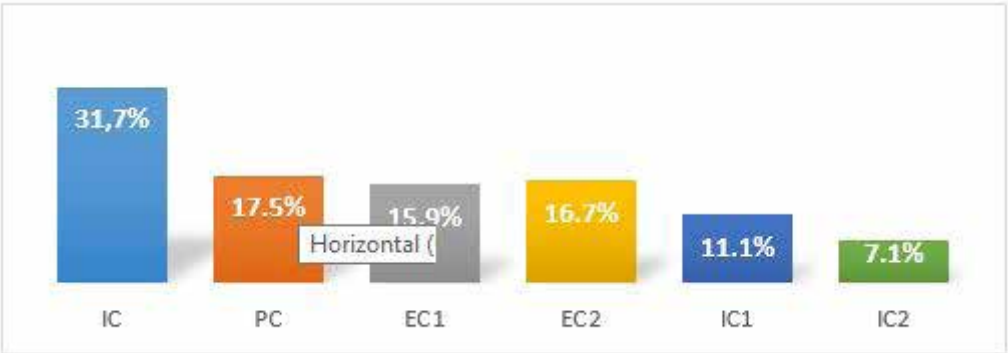

Figure 3: Distribution of the sample according to level of education

IC= Introductory course PC= Preparatory course EC1= Elementary course 1st year EC2= Elementary course 2nd year IC1= Intermediate course 1st year IC2= Intermediate course 2nd yearOral hygiene routine

In this study, sixty-nine percent (69%) of the children examined didn't used toothbrush. Of the children who brushed their teeth, almost half (45.7%) reported doing it 3 times a day, and twenty percent (20%) reported that was once a day (Figure 4).

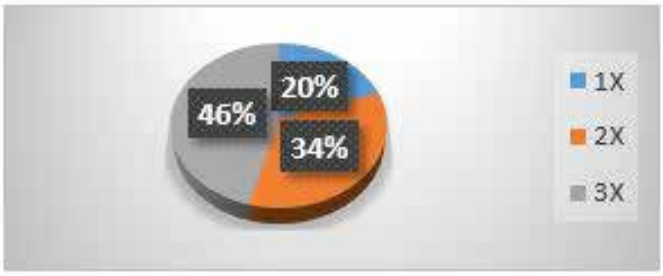

Figure 4: Distribution of the sample according to the number of brushings performed per day (brushing frequency)

The tooth stick was used by more than a third of the examined children (85.7%). Other traditional plaque control techniques such as rubbing with finger were used by 64% of students compared to 36% for coal (Figure 5).

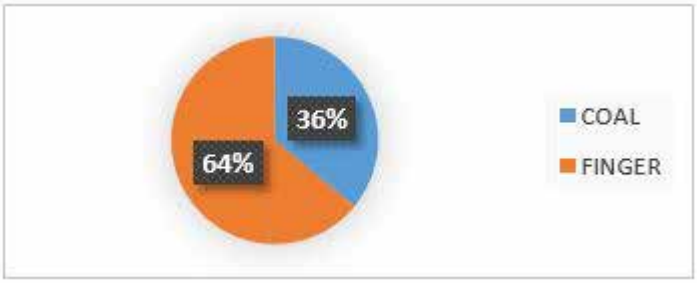

Figure 5: Distribution of the sample according to other tooth cleaning techniques

Periodontal Clinical Index

Plaque Index : Almost all (99.2%) of the sample had medium plaque control. In both upper and lower jaw the majority of the sample (96% and 90% respectively) had medium plaque control (Table 1 and 2)

Plate control	Effective	Percentage
Good control	1	0.8
Medium control	125	99.2
Total	126	100

Table 1: Global plate control in the sample

Plate control level	Maxilla		Mandibular	
	Effective	Percentage	Effective	Percentage
Good control	2	1.6	2	1.6
Medium control	120	96	113	90.4
Weak control	3	2.4	10	8.0
Total	126	100	126	100

Table 2: Number and proportion of individuals in the maxilla and mandible according to plaque control

Gingival Index : The mean of gingival index was 0.96 with a standard deviation of 0.38 and a maximum of 2. The mean of gingival inflammation grade was 0.96 ±0.38 in the maxilla and 0.98 ±0.42 in the mandible.

Gingival Inflammation : More than third of the sample (80.2%) had moderate inflammation. In both maxilla and mandible, the most (80.8% and 81.6% respectively) had moderate gingival inflammation (Table 3,4,5 and 6).

State of gingival inflammation	Effective	Percentage
No inflammation	1	0.8
Mild inflammation	24	19
Medium inflammation	101	80.2
Total	126	100

Table 3: State of gingival inflammation in the sample

State of gingival inflammation	Maxilla		Mandibular	
	Effective	Percentage	Effective	Percentage
No inflammation	2	1.6	3	2.4
Mild inflammation	22	17.6	20	16
Medium inflammation	101	80.8	102	81.6
Total	125	100,0	125	100,0

Table 4: Number and proportion of individuals in the maxilla and mandible according to gingival inflammation

Degree of gingival inflammation according to toothbrush use			Toothbrush use		Total
			YES	NO	
Gingival index	No inflammation	Effective	1	0	1
		Percentage	0.8	0	0.8
	Mild inflammation	Effective	5	19	24
		Percentage	4.0	15.1	19
	Medium inflammation	Effective	33	68	101
		Percentage	26.2	54.0	80.2
Total P=0,172		Effective	39	87	126
		Percentage	30.1	69.0	100

Table 5: Distribution of the degree of gingival inflammation according to the use of the toothbrush

More than 4/5 of the sample had moderate inflammation (80.2%) and the degree of inflammation was more important for children who did not use the toothbrush (54%) than in those who did (26.2%).

Degree of inflammation according to the use of the toothpaste stick			Using the toothpaste stick		Total
			YES	NO	
Gingiva Index	No inflammation	Effective	1	0	1
		Percentage	0.8	0.0	0.8
	Mild inflammation	Effective	19	5	24
		Percentage	15.1	4.0	19.0
	Medium inflammation	Effective	88	13	101
		Percentage	69.8	10.3	80.2
Total P=0,557		Effective	108	18	126
		Percentage	85.7	14.3	100

Table 6: Distribution of the degree of inflammation according to the use of the toothpaste stick

More than 4/5 of the sample had moderate inflammation (80.2%) and the degree of inflammation was more important in children who used tooth stick (69.8%) than in those who did not use it (10.3%).

Discussion

Based on a descriptive cross-sectional and exhaustive study, we evaluated the periodontal health of a population of Widou school-children in Ferlo. This study also helped us to describe the socio-demographic characteristics, to identify the hygiene routines and to measure the periodontal clinical aspects of the schoolchildren of the Ferlo.

Limitations and Methodological Considerations

The study concerned 126 schoolchildren, between 6 and 15 years old, living in the Ferlo and especially in the area around the Great Green Wall. The choice of an exhaustive design was determined by the low number of students registered in the school. This approach minimised the bias associated with sampling. The data was not collected by a single interviewer, which could introduce a bias of differential classification. However, the interviewers were standardized on the measurements and the questionnaire was pre-tested. All these steps were taken to reduce systematic errors.

Socio-Demographic Characteristics

In this sample, we note an equal number of boys and girls. This ratio is close to that of the Senegalese Household Survey (ESAM), which reports a national ratio of 51.3% boys to 48.7% girls for children aged 0-14 years [16]. This data can also be explained by the equitable sharing of socio-economic activities among children such as livestock rearing, agriculture, etc., between boys and girls in this locality. Our sample reveals a predominance of children between 10 and 15 years old, representing 65.1%, against 34.9% for children between 5 and 9 years old. The predominance of this age group in the sample can be explained by the later start of French education for children in this locality. Indeed, children often start at the coranic school before joining the classes.

Level of Education

The distribution of the sample according to the educational level shows a significant reduction in the number of children, probably due to the failure of children in this locality to remain in school. The massive abandonment is generally related to transhumance or the nomadic lifestyle of the local population, child labour and premature weddings of girls [17].

Oral Hygiene

Oral hygiene is a form of prevention of tooth decay. Indeed, oral hygiene is defined as a set of practices that allow the removal of dental plaque that forms naturally and permanently on teeth surface. Despite the fact that access to toothbrushes and toothpastes is not very easy in rural areas, most children used the traditional toothbrush or tooth stick.

Many measures have been used all over the world and confirmed by many studies, during which, it has been found the toothbrush sticks, chewing sticks, twigs, strips of fabric, bird feathers, animal bones and porcupine quills [18]. Plant-derived substances are tasty little sticks, although primitive, they were a transitional step towards the modern toothbrush.

In our sample, 69% of the children examined did not use a toothbrush and 85.7% used a tooth stick as a method of teeth brushing compared to 36% who used charcoal. Of those who had a toothbrush, more than a third (46%) reported brushing their teeth three times a day. These results showed that the population studied preferred to use the tooth stick. It could be explained by the possibility of having them for free and by their attachment to traditional practices. In 1918, Lemmet noted that the Senegalese rinse their mouths after each meal and in the morning when they wake up. He also noted that this rinsing was complemented by the use of the toothbrush stick at certain times of the day [19]. In Ferlo, the frequency of toothpick use was correlated with DMFT [20]. These results are supported by some authors who believe that the tooth stick satisfies an oral hygiene preoccupation which is a religion-based prescription [21,22].

Periodontal Status

Biofilm is the main etiological factor in periodontal disease. Personal plaque control is a strategical role in the prevention of periodontal disease. The periodontal index were globally elevated in our sample. The study showed that 99.2% had moderate plaque control (Table I). Qualitative interpretation of these indexes by jaw allowed us to conclude that 96% had moderate plaque control in the maxilla and 90.4% in the mandible (Table II). This reflects a moderate level of oral hygiene. Tooth brushing is the most widely used mechanical method of individual plaque control in the world. However, the use of a toothbrush is not synonymous with excellent oral hygiene. Indeed, the toothbrush allows a very limited access to proximal surfaces of molars and premolars. Visual evaluation of plaque control by toothbrushing does not mean that all bacteria have been removed from the tooth surface. In the rural and African context, the tooth stick is the most commonly used instrument. Its mechanical role on plaque control has been discussed [3].

The study also showed that 80.2% of the sample had moderate gingival inflammation and 19% had minor inflammation (Table III). In both the maxilla and mandible the most (80.8% and 81.6% respectively) had moderate gingival inflammation (Table IV). The study by Varenne et al [23] in 2004 in Burkina Faso showed that generally, the periodontal disease is associated with a lot of gingival bleeding and tartar from an early age, especially in rural areas. These periodontal conditions reflect inadequate oral hygiene practices combined with poor nutritional habits.

Although the results were not statistically significant, the analysis showed an association between gingival health and toothbrush used (Table V). However, the use of the tooth stick is reported to be inefficient and contributes to the appearance of gingival inflammation in children (Table VI). This oral hygiene could be improved by the use of a good brushing technique at regular and adapted periods. Rural populations of the Ferlo are characterised by their links with the herd, which facilitates and encourages the consump-

tion of dairy products. These dairy products can lead to the accumulation of plaque on dental surfaces. Without rigorous hygiene, this plaque can lead to gingival inflammation. Moreover, Diouf et al [3] in 2012 found that 20% of the periodontal treatment needs in Ferlo were due to dairy consumption.

Conclusion

The study showed a relatively low rate of use of the toothbrush unlike the toothbrush stick and the relatively high periodontal indices. These results recommend new strategies to be integrated into public policies to improve the oral health status of children by introducing preventive and curative approaches based on education and communication for changing behavior, accessibility and the availability of oral health services.

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