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Evaluation of Periodontal Health of Adolescents in Three Schools in the Biyem-Assi Health District, Youndé-Cameroon

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Abstract

Introduction: *The periodontium is a major anatomical structure of the child's oral cavity. During growth and dental eruption, it undergoes many physiological changes. The assessment of periodontal health in adolescents is crucial to prevent periodontal diseases at an early age. It is important to know the normality of this periodontium in order to detect alterations. Periodontal diseases are chronic inflammatory diseases of bacterial etiology that affect the soft and hard tissues supporting the teeth. Different factors can modify the periodontium. In our context, few studies have been done on the issue in recent years despite the relatively large number of adolescents consulting daily for an oral health problem.*

Objectives: *To assess the periodontal health of adolescents in three schools in the Biyem-Assi Health District in Yaoundé, Cameroon.*

Methodology: *We conducted a cross-sectional study for four months from February to May 2023 at the Mendong Bilingual High School, Mario College and Biyem-Assi Bilingual Primary School in Yaoundé. The data were analyzed using R Project for statistical computing version 4.2.3 a 95% confidence interval was retained, the main descriptive analysis involved was the calculation of the frequency and the p value.*

Results: *Out of 159 adolescents, the female sex was in the majority 64.1%. The most represented age group was 14 - 16 years or 44%. 95% of the participants ate between meals and consumed cariogenic sugary foods (biscuits and chocolate) at more than 80%, only 2.5% consumed cheese. 62.2% brushed twice a day; only 59.1% brushed after meals. 35% had an average OHI-S. 15.7%) of students had mild gingival inflammation the 159 participants had Mühlemann physiological mobility. Periodontal pockets were in category 1 with pockets less than 3 mm. We did not note any association between the Oral Hygiene Index Simplified Score and BMI of students, nor with the frequency of brushing with p>0.05 nor with the tools used by students for brushing teeth. A significant association was noted between gingival status and smoking of students P= 0.049.*

Conclusion: *The periodontal health of adolescents in the Biyem-Assi Health District was relatively good despite interprandial eating habits. There was no association between brushing frequency and periodontal pathology. Smoking had a significant influence on oral hygiene unlike alcohol.*

Keywords: Periodontal Health, Adolescents, Oral Hygiene, Risk Factors, Yaoundé-Cameroon

Introduction

The periodontium is a major anatomical structure of the child's oral cavity. During tooth growth and eruption, it undergoes many physiological changes. Assessing periodontal health in adolescents is crucial to preventing periodontal disease at an early age. It is important to know the normality of this periodontium in or-

der to detect any alterations. Periodontal disease is a chronic inflammatory disease of bacterial etiology that affects the soft and hard tissues that support the teeth. Various factors can change the periodontium. In our context, few studies have been done on the issue in recent years despite the relatively large number of adolescents consulting daily for an oral health problem.

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Methodology: We conducted a cross-sectional study for four months from February to May 2023 at Mendong Bilingual High School, Mario College and Biyem-Assi Yaoundé Bilingual Primary School. The data were analyzed using R Project for statistical calculation version 4.2.3 a 95% confidence interval was retained, the main descriptive analysis involved was the calculation of the frequency and the p-value.

Results: Out of 159 adolescents, the majority was female, 64.1%. The most represented age group was 14 – 16 years old, i.e. 44%. 95% of the participants ate between meals and consumed cariogenic sweet foods (cookies and chocolate) at more than 80%, only 2.5% consumed cheese. 62.2% brushed twice a day; only 59.1% brushed after meals. 35% had an average IHO-S. 15.7%) of students had mild gum inflammation to assess the periodontal status of students. The questionnaire contained data on socio-demographic, dietary assessments and other risk factors for periodontal disease such as oral hygiene level. Data sheets, note materials, a counter, a scale and dental consultation trays containing a periodontal probe [1]. A laptop, a USB stick and a phone were used to transfer the data. The collected questionnaire data were cross-checked and entered into Microsoft Excel 2016 and analyzed using the R Project for statistical computing version 4.2.3 statistical software. Using a 95% confidence interval, the main descriptive analysis involved was the calculation of frequency, chi-square and p-value. $p<0.05$ was significant. The results were presented in the form of figures and tables

Ethical and Administrative Considerations

The project proposal and questionnaire were submitted to the Ethics Committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaounde I and the National Ethics Committee for ethical assessment and approval. the Inspector of Basic Education of the Biyem-Assi District and the Delegate of Secondary Education of the Central Region of Mfoundi. Authorization was obtained from the Delegate, the Inspector and the respective directors of the study sites. A copy was given to the respective school administrators. Children and parents were informed of the objectives and conduct of our study. Informed consent and assent from each participant was required before enrollment. Anonymity and confidentiality through the ballot boxes used for the collection of completed questionnaires. Participants were allowed to ask questions before giving their consent and were always free to leave in case of discomfort.

Methodology

This is a cross-sectional descriptive study, conducted in a school setting. This study was carried out in three schools in the Biyem Assi district, namely: Biyem Assi public bilingual primary school Yaoundé; Mendong public bilingual high school Yaoundé; Mario secondary school Yaoundé. The study was carried out over a period of 4 months from February to May 2023. The study population included primary and secondary school students aged 10 to 19 years in the three schools in the Yaoundé health district. who or their parents gave informed consent. Incomplete or poorly completed questionnaires were not retained. Non-exhaustive sampling was used. The assessment of gingival status was done by the Loe index and the Silness gingival index. Periodontal pockets were measured by the Dutch Periodontal Screening Index (DPSI) and mobility by the Mühlemann index [2].

Data Collection and Analysis

A modified AUSTRIALIAN Oral Health Screening Tool (periodontal) form was used to assess the periodontal status of the students. The questionnaire contained data on socio-demographic, dietary assessments and other risk factors for periodontal disease such as oral hygiene level. Data sheets, note materials, a counter, a scale and dental examination trays containing a periodontal probe were used. A laptop, a USB stick and a telephone were used to transfer the data. The collected questionnaire data were cross-checked and entered into Microsoft Excel 2016 and analysed using the R Project for statistical computing version 4.2.3 statistical software. Using a 95% confidence interval, the main descriptive analysis involved was the calculation of frequency, chi-square and p-value. $p<0.05$ was significant. The results were presented in figures and tables

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Results

This study consisted of 200 students followed in three schools in the Biyem-Assi district of Yaoundé. 22 refused to give their informed consent, 178 agreed to participate in the study, 19 people were excluded from the study due to poorly completed questionnaires, 159 were finally retained [4].

Distribution of Participants by Study Site

Our study was carried out in 3 schools in the Biyem-Assi health district welcoming 159 students who consented to participate in the study. Mario Yaoundé secondary school had the majority of participants, 51%.

Distribution According to Socio-Demographic Profile

The most represented age group was that of 14 – 16 years old or 44%, the female gender was in the majority or 64.1%, the children of the second cycle of secondary education were in the majority or 67.9.

Table 1: Distribution according to socio-demographic profile

Features	name (n=159)	Frequency (%)
Age group		
10 – 13	55	34.6
14 – 16	70	44
17 – 19	34	21.4
Sex		
Female	102	64,1
Male	57	36
Education level		
1st cycle of secondary school	13	8.2
2nd cycle of secondary school	108	67.9
Ecole primaire	38	23.9

Distribution of Participants by BMI The study showed that 29 (18%) of the children were overweight [5].

Distribution of Participants According to Foods Consumed Between meals most of the participants consumed sugary foods that are cariogenic and initiators of bacterial plaque, biscuits and chocolate at more than 80%, while only 2.5% of them consumed cheese.

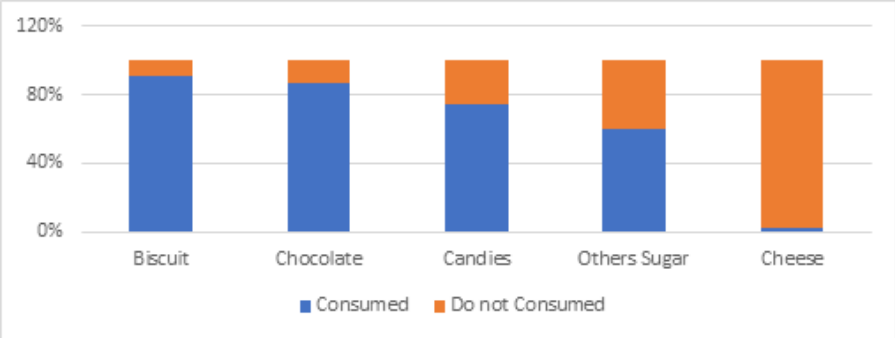

Figure 1: Distribution of students according to the type of food consumed between meals.

Distribution of Participants by Eating Habits Between Meals, Smoking and Alcohol Consumption Most of our participants (95%) eat between meals. A minority (3.1%) of these students reported smoking cigarettes; 33.3% of participants reported drinking alcohol.

Table 2: Distribution of participants by eating habits between meals, smoking and alcohol consumption

Characteristic	name (n=159)	Frequency (%)
Eating habits		
Eating between meals	151	95%
not eating between meals	8	5%
Smoke the cigarette		
Don't smoke	154	96.9
Smoke	5	3.1
Alcohol		
Do not consume alcohol	106	66.7
Consume alcohol	53	33.3
Ecole primaire	38	23.9

Distribution of Participants According to the Frequency of Tooth Brushing Only 62.2% of participants brushed their teeth twice a day and 5% brushed 3 times a day, the rest brushed once a day.

Distribution of Participants by Post-prandial Brushing Practices Only 59.1% (94) of participants brushed their teeth after meals [6].

Distribution of Participants According to the Brushing Tools Used It was noted that 91.1% (145) of participants used a commercial toothbrush and fluoride toothpaste for brushing Distribution of Participants According to Eating Habits Between Meals, Smoking and Alcohol Consumption by Gender Out of 102 girls, 101 (99.01) ate between meals. Out of 57 boys 50 (87.8) boys ate between meals. No girls smoked, while 8.7% of boys did. 28 (27.5%) girls drank alcohol compared to 25 (43. %) boys.

Table 3: Distribution of participants according to eating habits between meals, according to gender

Features	Girls (n=102)	Boy(n=(57)
Feeding between meals		
Feeding between meals	101(99,01%)	50 (87,7%)
No power supply	1 (1 %)	7 (12,3%)
Cigarette smoker		
Don't smoke cigarettes	102 (100 %)	52(91,2,1%)
Cigarette smoker	0 (0 %)	5 (8,8%)
Alcohol		
Pas d'Alcool	74 (72,5%)	32 (56,1%)
Consume alcohol	28 (27,5%)	25 (43,9%)

Distribution of Participants According to Periodontal Health Status

Distribution of Participants According to the Status of the Simplified Oral Hygiene Index, Ohi-S The simplified oral hygiene index (OHI-S), which is the sum of the simplified calculus index (CI-S) and the simplified debris index (DI-S); out of the 159 participants, 55 (35%) had a medium OHI-S and 2% had a low index [7].

Distribution of Participants According to the Status of the Gums (Loe and Silness Gingival Index). It was found that 25 (15.7%) of the students had mild inflammation of the gums

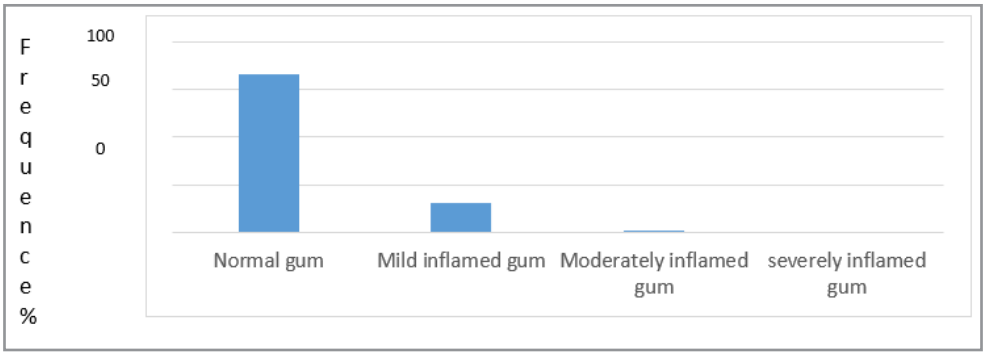

Figure 2: Participation According to the Löe and Silness gingival index

Distribution of participants according to periodontal pocket depth: Periodontal pockets measured with the Dutch Periodontal Screening Index (DPSI) showed that all participants were in category 1 with pockets less than 3 mm.

Distribution of participants by degree of mobility (mühlemann) All 159 participants had physiological mobility of Mühlemann: Level of association between periodontal health variables and risk factors: Oral hygiene index Simplified score and BMI: We did not note an association between the Oral hygiene index Simplified score and BMI of the students. Simplified Oral Hygiene Index (OHIS) score with inter-meal eating habits and smoking.

The results showed a significant association between eating habits and OHIS. It was found that 1.2% of those who ate between meals had poor hygiene; 20% of students who smoked had poor OHIS score while only 1.3% of students who did not smoke had poor OHIS score [8].

Table 4: Oral Hygiene Index score with inter-meal eating habits and smoking

Features	Good	Average hygiene	Poor hygiene
Eat between meals			
Eat between meals (n)	98 (61,6%)	51(32%)	2 (1,2%)
Do not eat anything between meals (n)	3 (1,8%)	4 (2,5%)	1 (0,6%)
Smoking cigarettes			
smoke	1 (20%)	3 (60%)	1 (20%)
No Smoking	100 (65,1%)	52 (33,7)	2 (1,2%)

Simplified Oral Hygiene Index (OHIS) and Alcohol Consumption There was no significant association between the simplified oral hygiene index and alcohol consumption of students. 1.8% of participants had a poor OHIS score regardless of alcohol consumption [9].

OHIS and daily brushing frequency: There was no significant relationship between OHIS and brushing frequency with p>0.05 OHIS and tools used for brushing Out of 145 participants, who use a toothbrush and toothpaste. The results showed no association between the simplified oral hygiene index and the tools used by students for brushing their teeth. Gingival status (Loe and Silness score) and BMI.

Table 5: Simplified oral hygiene index and tools used for brushing by students

Outils de brossage	Good Oral hygiene	Average Oral hygiene	Poor Oral hygiene	P-value
Toothbrush and paste	93	49	3	0.232
Toothbrush and power	1	3	0	
Toothbrush only	7	3	0	

In this study, no significant association was noted between gingival status and body mass index. P = 0.7690 Gingival status (gingival index) and between-meal eating habits No association was noted between gingival status (gingival index) and between-meal eating habits of students. P = 0.1588 [10].

Gingival status (gingival index) and smoking A significant association was noted between gingival status and smoking of students P = 0.049.

Table 6: Gingival status (gingival index) and smoking of participants

Loe and Silness final	smoke (n=5)	Don't smoke (n=152)	p
Normal gum	2 (40%)	131 (86%)	0,0490
Mild inflammation of gum	3 (60%)	22 (14%)	
Moderate inflammation of gum	0	1	
Severe inflammation	0	0	

Gum condition (gingival index) and alcohol consumption No significant association was noted between the condition of the gums (gingival index) and alcohol consumption of the participants.

Table 7: Gum condition (gingival index) and alcohol consumption of the participants

Loe and Silness final Score	Drink (n)	Do not drink (n)	p-value2
Normal gum	40	93	p=0,0611
Mild inflammation of gum	13	12	
Moderate inflammation of gum	0	1	
Severe inflammation	0	0	

Gingival condition (gingival index), brushing frequency - Brushing tool No association was noted between gum condition and brushing frequency or brushing tool with P = 0.49 2.10.11 Periodontal status and gender characteristics No association was noted between periodontal status and gender [11].

Discussion

Periodontal diseases are a group of ubiquitous pathologies in children, adolescents and adults. These differences are influenced by their socioeconomic status, environmental, nutritional, psychological factors, level of education, eating habits, physical and mental fitness 9. Periodontal pathologies are often addressed in adults but very little in adolescents; however, their prevalence and severity remain high in them. The general objective of this study was to assess periodontal health in adolescents and the risk factors observed in three schools in the Biyem-Assi health district, Yaoundé, Cameroon. Specifically, it was to: Determine the social demographic characteristics of adolescents in three schools in the BIYEM ASSI health district, specify the periodontal status of selected schooled adolescents in the BIYEM ASSI health districts, deduce the oral hygiene practices and eating habits of these adolescents; and finally highlight the level of association between periodontal status and risk factors of schooled adolescents in the BIYEM ASSI health districts [12].

Social Demographic Characteristics

Girls were more represented than boys at 64.15%. Our study is similar to that of Kini et al in 2019 which showed a female preponderance and family predilection in studying the assessment of risk factors in Periodontology Age, smoking, risk score, how to better identify their prognostic value10. In addition, gender differences could be partly attributed to the regulatory effect of sex steroid hormones on gingival physiology. Increased estrogen and progesterone levels during pregnancy or puberty have been reported to lead to increased gingival vascularization and infamy [13]. The most represented age group is 14 - 16 or 44.02% with an average age of 14.48 years, these results are identical to those of the literature, in particular the data from the studies of Vivek Singh et al as well as Wolfe MD et all, Dersot et all who worked for the age group of 12 to 15 years and 7 to 14 years was the most represented [11-13]. The study showed that 29 (18%) of the children were overweight. We did not observe a significant association between the weight of the children and periodontal disease; These results are in the same direction as the data of Essama et al in 2020 who did not find an association between obesity and periodontal disease; However, they found that overweight/obese subjects had on average more sites with PP $\geq$ 4 mm than normal weight subjects (2 $\pm$ 5 vs. 1 $\pm$ 3, p = 0.0097). Overweight/obese subjects did not have more periodontitis than normal weight subjects, but nevertheless had a greater number of deep periodontal pockets, and concluded that there was a need for greater monitoring of their periodontal health [14].

Oral Hygiene Practices and Eating Habits of these Adolescents

This study found that there was a relatively significant relationship between eating habits between meals and OHIS in adolescents ($p < 0.05$). These results are similar to those of Lefeve et al in 2017 where they demonstrate a significant relationship with soda consumption, consumption of snacks with caries as well as consumption of citrus fruits, fruit juices and sour candies is pointed out. It highlights the importance of brushing and the responsibility of the current dietary pattern in the face of pathologies both in terms of general health and oral health [15]. The prevalence of caries as well as periodontal pathologies and the number of students eating between meals was observed in the study of Jaraszek et al in 2022 [16]. The presence of periodontal disease and eating habits may also be due to snacking by adolescents while watching television and the availability of snacks in school canteens to which these adolescents are highly exposed without having immediate support measures such as simultaneous brushing or taking postprandial cheese which has a protective effect. This study did not show any difference between boys and girls in their eating habits between meals. These data are different from studies by the National Institute of Statistics and Economic Studies in France which states in 2024 that 0.3% of women spend their money on food than men [17].

Simplified Oral Hygiene Index Score (OHIS), Alcohol and Smoking

In this study, we did not observe any direct relationship between periodontal disease and alcohol consumption. However, there was a significant relationship between OHIS and smoking p = 0.03216. Behaviors such as smoking can significantly aggravate periodontal disease and impair the effectiveness of anti-infective therapies. These results are different from those of Noushin et al who showed that there was no significant relationship between smokers and their gingival status. Indeed, smokers had a lower GI (1.35 $\pm$ 0.48) and a higher PI (2.87 $\pm$ 0.68) than non-smokers (2.72 $\pm$ 0.31 and 1.87 $\pm$ 0.25, respectively) [18]. These results are identical to their results when they observed that the mean number of blood vessels $\leq$ 0.5 µ in diameter was 18.78 $\pm$ 10.06 and 5.90 $\pm$ 2.93 in smokers and non-smokers, respectively. The mean inflammatory cell infiltration in smokers and non-smokers was 0.89±1.03 and 70±0.46, which showed a significant difference between two groups (P = 0.001) this affirms that supragingival calculus was higher in smokers [18]. Our data are also identical to the data of Beklen et al in 2022 who found that smokers consistently scored higher for plaque index, gingival index and probing depth than non-smokers ($p<0.05$) [19]. These data are consistent with WHO data which incriminate smoking in all its forms and recommends adopting a public health approach by tackling common risk factors by promoting a balanced diet low in sugar, stopping tobacco consumption in all its forms, reducing alcohol consumption and better access to effective and affordable fluoridated toothpastes [20].

Gingival Status (Gingival Index) and Gender Characteristics, BMI and Brushing

From the results, we saw that there was no significant relationship between gingival index (gingivitis) and BMI with p = 0.77, this result is identical to that of Plamena T. et al who reported that BMI, in a study population, 5% were underweight, 66.5% normal weight, 17.7% overweight and 10.8% obese and There was no significant correlation between age and BMI similarly no significant correlation was observed between BMI and gingivitis ($p>0.05$). A significant difference was observed between boys and girls in our study, which corroborates the data of the study conducted on the Indian population by Shah et al; as well as that of Plamena T and collaborator in 2019 [21]. There was no significant relationship between OHIS and the tools used for brushing and the frequency of brushing. Our results are different from the data of authors such as Daouda et al in Senegal in 2016 who found an association between gingivitis and the frequency of brushing. Indeed, gingivitis was significantly associated with the frequency of brushing (p = 0.03) [22]. These results suggest the importance of hygiene and perhaps the action of parents in preventing this infection. The importance of oral hygiene must be instilled in both parents and children in order to guarantee the

best possible prevention of periodontal disease. Indeed, prevention and diagnosis of periodontal disease in its earliest stage is desirable because children suffering from the disease are more likely to develop serious forms of the disease in adulthood.

Conclusion

At the end of this study we can conclude that Most of our participants were girls, very few were overweight. The contributing factors were smoking, eating sugary cariogenic foods between meals (biscuits, chocolate), smoking cigarettes. The habit of brushing teeth twice a day after meals was not carried out by most, however most of the participants used a commercial toothbrush and fluoride toothpaste for brushing.

We did not note any association between the Simplified Oral Hygiene Index Score and BMI of the students, nor with the frequency of brushing with $p>0.05$ nor with the tools used by the students for brushing their teeth. A significant association was noted between gingival status and smoking among students $P= 0.049$. There was relatively little difference in oral health and brushing, brush type.

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