

Oral Habits and Dental Wear Patterns in the Baka Pygmies in the East Region of Cameroon

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Abstract

Dental wear, a non-carious lesion believed to be a condition of older persons has now become very common amongst adolescents and young adults. Consequently, dental wear may become a major oral health problem given the impact it has on the quality of life and the well-being of the individual. Studies have shown that oral habits are predisposing factors to dental wear in sedentary populations. However, there is little data on the subject matter in sub-Saharan Africa and particularly in the Cameroonian context. There is therefore need to sensitize and educate the population so as to help reduce the impact of dental wear on oral health. The main objective was to determine the prevalence of dental wear and its relationship with oral habits among the Baka pygmies.

Keywords

Oral habits; dental wear pattern; prevalence; Baka pygmies; Cameroon

Introduction

Dental wear is the term commonly used in dental medicine to describe the phenomenon of attrition, abrasion, abfraction and erosion [1]. This chronic, naturally occurring, irreversible, non-carious, destructive phenomenon and universally occurring condition depends on lifestyle, especially diet [2]. This physiological process may later become pathologic if it involves extensive destruction of the enamel and the dentine, especially when associated with problems of feeding, bruxism, noxious habits, mastication or certain types of behavior and certain medications [1,2]. The resultant being dentine hypersensitivity, pulpitis, periapical periodontitis, and even to the extent of pulp necrosis [2]. Dental wear represents a public health problem and can greatly influence the quality of life and well-being of the individual. On a global scale, there is no exact prevalence data since each wear index only measures a particular aetiology according to each classification and the prevalence and incidence of dental wear greatly varies in different parts of the world [3]. A recent study in Nigeria in 2018 by Savage et al. [4] showed a prevalence of 60.2 % of tooth surface wear in young Nigerian adults [4]. Hemmings, et al. [5] conducted a survey in United Kingdom (UK) and reported the incidence of dental wear ranging from 0% and 80% for adolescents and an increased from 66% to 76% in adults when compared to the survey in 1998 [5], thus dental wear increases in prevalence with increasing age [6]. Some studies have shown that some sedentary populations like the Eskimos and the Tigara from Point Hope [7] and the Australian aboriginals [8] have a greater risk of dental wear than other populations owing to their dietary habits, distinct subsistence strategies, food preparation techniques and lifestyle.

Dental wear, believed to be a condition of older persons has now become very common amongst adolescent and young adults, thus it is necessary to sensitize and educate the population on the presence of the condition in order to reduce the impact of the diverse health problems that could result from the condition. Patients generally come with aesthetic complaints, while some present with symptoms of dentine sensitivity and impaired function [5]. Nonetheless, dietary habits within indigenous populations are greatly determined by ecological constraints and daily activities thus, considering the wide scientific interest brought about by the Pygmies and limited documentation and publications on the subject, it makes it difficult to draw conclusions. However, the relationship between dietary habits and dental wear in sub-Saharan Africa and particularly in Cameroon remains unknown as no studies have been carried out. To bridge this knowledge gap, we carried out this study to determine the prevalence of dental wear and its relationship with oral habits among the Baka pygmies in Abong-Mbang, East region of Cameroon.

Materials and Methods

In 2019, we carried out a descriptive cross-sectional study, with a consecutive and exhaustive sampling design. All participants for our study were recruited in two Baka pygmy communities; Missoume and Njibot in the AHD, south-eastern of the East region,

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Cameroon. East region of Cameroon, Abong-Mbang has an estimated population of 30381 inhabitants. We enrolled all Baka pygmies: adolescents of at least 12 years and adults of up to 70 years, present at the site during the time of the study and having given their consent. We excluded participants presenting with trismus/restricted mouth opening and all with complete edentulous dental arches. Dental wear was recorded using the Smith and Knight's tooth wear index (TWI) [9]. Dental wear patterns and orientation were gotten from studying dental models. Data was analysed using Statistical Package for Social Science (SPSS) version 20.0. Chi-squared test and Fisher's test were used to test associations between categorical variables and statistical significance was considered for a p - value < 0.05.

Results

Results participants

A total of 84 participants were included. There were 50 (59.5%) males with a sex ratio of 1.5. The most represented age group was that of 20–30 years. The majority of the study participants attained primary school (92.9%), with level three (48.8%) being most frequent level (Table 1). Concerning the Oral Habits, (Table 2) amongst the most drank beverages were carbonated soft drinks 81 (96.4%) and hot drinks 67 (79.8%). The majority of the participants mostly fed on starchy food such as sweet potatoes 84 (100%), Irish potatoes 84 (100%), cassava 84 (100%), plantain 83 (98.8%), cocoyam 83 (98.8%) etc. Groundnuts 83 (98.8%) and fish 83 (100%) were also registered as most consumed. (Table 3) gives information's about the population based on chewing habits: Chewing of palm nuts 78 (92.9%) and palm kernels 71 (84.5%) were most prominent among the population. The distribution of the population based on teeth brushing habits, technique, frequency and type of toothbrush bristles shows in (Table 4): Seventy-eight (92.9%) of the 84 participants practiced the habit of teeth brushing. The majority of participants 75 (96.1%) brushed their teeth horizontally. The use of hard bristle configuration tooth brush 52 (66.7%) and soap 76 (97.4%) was most prominent. The most recurrent teeth brushing frequencies were twice/day 38 (48.7%) and once/day 27 (34.6%) as shown on the (Table 4) below.

Clinical examination gives information about respect to oral hygiene. In the study good, moderate and poor oral hygiene was observed in 16 (19.1%), 27 (32.1%) and 41 (48.8%) participants respectively. The majority of the participants had teeth sensitivity 69 (82.1%). Sensitivity to cold 62 (89.1%) and sweet 55 (79.7%) were

Variable	Category	Frequency n = 84	%
Gender	Male	50	59.5
	Female	34	40.5
Age groups	12 – 19 years	27	32.1
	20 – 30 years	38	45.2
	>30 years	19	22.6
Marital status	Married	48	57.10%
	Single	29	34.50%
	Divorced	4	4.80%
	Widow/widower	3	3.60%
Education	Primary level 1	0	0
	Primary level 2	37	44.1
	Primary level 3	41	48.8
	Secondary	6	7.1
Profession	Farmers	80	95.2
	Hunter-gatherer	4	4.8
Religion	Christian	73	86.9
	Atheist	2	2.4
	Animist	9	10.7

Table 1: Sociodemographic profile of the study sample

Variable	Category	Frequency n = 84	%
Beverages	Carbonated soft drinks	81	96.4
	Alcoholic drinks	23	27.4
	Hot drinks	67	79.8
Foods	Sweet potatoes	84	100
	Irish potatoes	84	100
	Cassava	84	100
	Fish	84	100
	Plantain	83	98.8
	Groundnuts	83	98.8
	Cocoyam	83	98.8
	Yams	83	98.8
	Corn	79	94
	Caterpillar	75	89.3
	Insects	63	75
	Mushroom	63	75
	Meat	60	71.4

Table 2: Distribution of beverages and foods consumption the study sample with respect to oral habits

Chewing habit	Frequency n = 84	%
Palm kernels		
Yes	71	84.5
No	13	15.5
Palm nuts		
Yes	78	92.9
No	6	7.1
Nail biting		
Yes	28	33.3
No	56	66.7
Tobacco		
Yes	14	16.7
No	70	53.3

Table 3: Distribution of the population based on chewing habits

Variable	Category	Frequency n = 78	%
Teeth brushing habits	Yes	78	92.9
	No	6	7.1
Teeth brushing technique	Horizontal	75	96.1
	Vertical	2	2.6
	Both	1	1.3
Teeth brushing material	Tooth paste	52	66.7
	Soap	76	97.4
	Chewing stick	3	3.8
Teeth brushing frequency	Once	27	34.6
	Twice	38	48.7
	Thrice	13	16.7
Teeth brushing type of bristles	Hard	52	66.7
	Medium	25	32.1
	Soft	1	1.2

Table 4: Teeth brushing technique, frequency and type of toothbrush bristles

most recurrent and only 22 (31.9%) took herbs 22 (100%) (Table 5). A total of 2160 teeth were examined. Dental wear was recorded in 76 participants and some 988 (49%) of the 2160 teeth examined were worn, resulting in a prevalence of 90.5 % (95% CI: 84.5 – 96.4).

Variables	Category	Frequency n = 84	%
Teeth sensitivity	Yes	69	82.1
	No	15	17.9
	Sensitivity to cold	62	89.1
	Sensitivity to heat	5	7.2
Treatment	Sensitivity to sweet	55	79.7
	Yes	22	31.9
	No	49	68.1
	Herbs	22	100

Table 5: Population distribution with respect to teeth hypersensitivity

Dental wear pattern	Frequency n = 988	%
Attrition	887	89.8
Abrasion	8	0.8
Erosion	3	0.3
Attrition and abrasion	90	9.1

Table 6: Distribution of type of dental wear patterns

Of the 988 worn teeth, 82.1 % had mild wear, while 89.8 % had attrition (Table 6). The pattern of wearing in the study population was smooth and flat. The factors associated with dental wear were: young age ($p = 0.001$), low educational level (primary level two, $p = 0.013$ and primary level three, $p = 0.037$), poor oral hygiene ($p = 0.003$) and consumption of citrus fruits, $p = 0.009$ and hot drinks, $p = 0.001$. Studying the dental models of participants, it was noticed that among the two populations identified in the study, the wear patterns was similar in the younger ages while it was to be completely different as age increases. The scratch patterns observed were flat and fine and was similar among the participants (Figure 1).

Discussion

We carried out a descriptive cross-sectional study, with a consecutive and exhaustive sampling design in two Baka pygmy communities; Missoume and Njibot in the AHD, south-eastern of the East region, Cameroon. The prevalence of dental wear was 90.5 %. This result is higher to the prevalence of 83.2 % reported by Braimoh and Alade [9] among elderly population in Port Harcourt, Nigeria [9]. The difference in age range and sample size of the study may account for the slight disparity in prevalence. The age of participants in the previous study was 60 years and above and the sample size was 543, while in the present study, age range was between 12 - 70 years with a sample size of 84. A study has reported increase in tooth wear with an increase in age [12]. Once more this prevalence was higher than 53 % recorded by Ibiyemi, et al. [10] among rural adult males in Ibadan, Nigeria. This disparity might be due to age difference of the male individuals in this study (20–64 years) and possible dietary differences [10]. This further supports that age is a predictor for dental wear. With regards to the degree of dental wear, grading was done and the prevalence data in the present study showed that the majority of participants (84.5 %) had mild wears. This finding was different from that reported by Braimoh and Alade [9], who reported that majority (40 %) of the participants had mild dental wear. This could be explained by the study population solely made of the elderly (60 years and above) in the previous study, while the present day study was carried out mainly on the younger population between 12 and 30 years and only a few adults above the age of 30. A total of 2160 teeth (8640 teeth surfaces) were examined in this study and 988 teeth had dental wear. Similarly, Daly et al. [13] examined 6384 tooth surfaces (1596 teeth) from 81 patients, with 1108 of these surfaces having dental wear: 886 (80 %) scored 1, 203 (18 %) scored 2 and 19 (2 %), scored 3, while none of the surfaces scored 4 [13]. The similarity in the findings could possibly be because both studied on populations of similar age ranges, though the scoring methods


Figure 1: Images of dental models of a farmer (up) and of a hunter-gatherer (down). (Courtesy: our study)

used in both studies were different the present study scored wearing per tooth examined unlike the previous study in which scoring was per tooth surfaces examined.

Considering the wear pattern in this study, attrition only was the most common form of wear patterns. This is not in line with the findings of Ibiyemi et al. [10] in Nigerian. The previous study evaluated attrition per participant and observed that about one-fourth of the participants had attrition. The present study evaluated attrition per tooth examined and found that more than two-fifths of total teeth examined had attrition. This is more likely due to rigorous mastication of the more fibrous diet especially by people living in rural communities like Igbo-ora (Nigerian). In support of these findings, were studies by Braimoh and Alade (2018) and Oginni and Olusile in 2002 [9,11]. Contrary to our findings, Daly et al. (2010) found abrasion to be the most common form of dental wear [13] and in European countries, erosion was observed to be the most common and the major cause of dental wear [14,15]. This difference in pattern of dental wear could be related to contemporary European lifestyle, oral/dietary habits such as the high consumption of acidic drinks and more refined food unlike in Africa, where mostly oral habits such as poor oral and consumption of fibrous diet were considered to be the causes of wear. This can justify a stomach upset to three-fourth of the participants in the present study. The present study showed wearing to be more widely distributed on incisors and molars than premolars and canines, significantly occurring in both the maxillary or mandibular dentition. This result is at variance with the findings of Braimoh and Alade in 2018, which showed that molars and premolars had greater wear than incisors and canines on both the mandibular and maxillary dentition [9]. The high rate of wear on the incisors and molars in this study may be related to the difference in the causative factors of wear owing to oral habits such as high use of incisors in biting of food, heavy masticatory force on molars when chewing of highly fibrous food, and the use of hard bristle for routine oral hygiene and partly the cultures where some female participants had their anterior teeth shaped for beauty purposes [9,15]. This accounted for the preponderance of attrition on the incisors and molars of our study population. This further supports the fact that the causative factors responsible for dental wear could be different among pygmies and other population. Therefore, there is a need to develop appropriate local measures for the prevention of dental wear lesions.

In the present study, the younger age group showed a significant relationship with dental wear among the Baka pygmy population. The most affected group with dental wear was those within the age interval of 12 - 19 years. This group represents the most active and curious age group in our study population and are therefore easily exposed to diverse oral habits and practices which could be a reason for the high frequency of dental wear lesions in this age group. The half of participants aged between 20 and 30 years in the study

population presented with dental wear lesions and a quarter of our study participants representing the age group above 30 years, were all affected by dental wear. Similar to this trend were the findings of Savage et al. in 2018 that assessed tooth wear lesions among young Nigerians of 18 – 35 years [4]. They showed that prevalence of tooth wear was found to increase with age of the participants and those aged between 18 and 25 years showed statistical significance ($p = < 0.001$) [4]. Contrary to the finding of the current study, was that of Ibiyemi et al. [10] who that the age group most affected by dental wear was those above 50 years representing (96.0 %; $p = < 0.001$) followed by those between 20–30 years and the least those between 31 - 50 years [10]. The difference may be explained by the age distribution, gender and sample size [4,10,11]. The present study had a small sample size of 84 participants consisting of both males and females and a much younger age group (12 – 19 years) was included with the other age groups. The previous study recruited a total of 200 males participants and included those aged 20 years and above. Both studies all showed that age is a predisposing factor and is indeed proof of dental wear being an ageing phenomenon. This agrees with the study by Oginni and Olusile in 2002 that showed that increasing age is associated with the prevalence of tooth wear thus showing tooth wear to be an accumulative process [11].

In our study, males were most represented with a sex ratio of 1.5 and more affected (60.5%) by dental wear than females (39.5%) but no significant association was established with dental wear. Wazani et al. in [16] reported that the number of males referred with tooth wear was significantly higher than females, with a ratio of 2.3 [16]. The difference between gender may be attributable to the greater masticatory force males are able to generate and differences in lifestyle such as diet and the stress they often go through [16,17]. Participants in our study had low level of education with the majority of participants being those who attended primary school. The primary educational system in our study had three levels: level one, level two and level three. Primary level two and three however showed statistical significance with dental wear, and respective p -values of 0.013 and 0.037. This could be attributed to the 65.5 % high level of unawareness of the condition in the study population. In agreement to this were the findings of Savage et al. [4]. In view of this, it is important that more effort be made to increase awareness on dental wear and its risk factors [4]. Thus, a low level of education contributes to having tooth wear, and may suggest that participants who attain higher levels of education would be aware of this condition and could implement preventive measures [4,6,9].

Tooth erosion may be caused by drinking citrus juices, cola drinks, vinegar etc. and regurgitation of contents of the stomach. In this study, consumption of hot drinks and together with citrus acid containing fruits was common, though statistical significance in relation with dental wear (erosion) was observed. Citrus fruit (lime) being a highly acidic fruit with dependence on the frequency of consumption, duration of exposition of its acidic content to teeth surface, it is certain way to soften the enamel on the tooth thereby causing it to wear [9]. A previous study investigated the consumption of alcohol and the drinks commonly consumed by adults in rural communities in South-western Nigeria and found statistically significant relationship between alcohol consumption and tooth wear [10]. However, this was not the case in this study where there was no significant relationship between consumption of carbonated soft drinks and alcohols and dental wear. Furthermore in our study, regurgitation of gastric content was uncommon among participants, and thus no statistical significant relationship was established between the habit and dental wear. A similar trend was found by Ibiyemi, et al. [10], who reported regurgitation as an uncommon practice among the participants and thus no association observed [10]. Conversely, many studies reported significant association between regurgitation and tooth wear pattern [12,14,17].

Circumstantial evidence implicates tooth brushing with gingival recession and exposure of dentine and available evidence supports a probable link between tooth brushing with or without toothpaste

to tooth wear [18]. Many studies showed that oral hygiene practices like brushing teeth late at night, technique of brushing, types of toothbrush used and frequency of brushing were found to have an association with tooth wear lesion [14,19,20]. In our study, participants who used a particular tooth brush configuration like the use of hard bristled tooth brush to clean their teeth was common but no statistically significant relationship was established between them and dental wear. Further support for this view came from the study by Savage et al. in 2018 who showed no statistical significance between the type toothbrush used and dental wear despite of the use of hard bristled tooth brush along with abrasive cleaning agents (e.g., grounded charcoal, broken plate) use of which was common among the participants [4]. Ibiyemi, et al. [10] reported in a previous study, that males who cleaned their teeth with chewing sticks and those who cleaned their teeth horizontally had higher incidence of tooth wear lesions than those who do not [10]. The observed relationship between the use of chewing sticks and dental wear in the previous study might be due to improper use such as through the application of too much pressure and toughness of the bristles of the toothbrush and chewing sticks. Bergström and Lavstedt [20], reported in a study in the adult population of 430 000 residents of the Stockholm region, Sweden that tooth brushing techniques and tooth brushing frequency independently related to increasing tooth wear [20]. However, brushing of teeth horizontally and the frequency of cleaning were not related to dental wear in this study. Our present study showed that more than half (53.9 %) of the participants had poor oral hygiene which is generally due to poor brushing techniques, type and abrasive nature of local cleaning agents, vigorous tooth brushing and the frequency of teeth brushing. This was however significantly associated with dental wear with $p = 0.003$. These findings are in line with the widely accepted view that dental wear is most commonly caused by incorrect and or over vigorous tooth brushing [21]. Good oral hygiene was significantly associated with low dental wear ($p = 0.045$) and was considered protective, thus suggesting that good oral hygiene practices reduces the rates of dental wear.

In our study, the severity of dental wear was considerably low with most of the teeth having the score 1. This may appear insignificant but dental professionals remain very troubled because of its aggravating potentials with time. Thus dental wear that occurs in adolescents may most likely continue into adulthood and even furthermore into the elderly stage [22]. In the current study, the majority (82.1%) of participants had experienced teeth hypersensitivity brought about by the high rate of dental wear. We acknowledge that the study sampling method was not random due to the inability to have the total population at the time of this research. Thus these results may, as well as may not be representative of the actual population. Furthermore our sample size was also reduced by the fact that some of the indigenes had to travel long distances to meet up at the recruitment site. So only the little who could make this distance was recruited. The comparative study between farmers and hunters was limited by the low turnout of hunters who were in the forest at the time of recruitment. However dental wear is a preventable and treatable condition and it is important that we combat the problem while in its early stages so that we can prevent it from becoming worse and a heavy burden in the future. To the best of our knowledge, this is the first time a population-based study on dental wear in relation to oral habits is carried among the Baka pygmy population in Cameroon. In view of this, it is important to increase awareness concerning this condition and its associated risk factors in the general population of the Baka pygmies, in order to improve their oral health.

Conclusion

Dental wear is highly prevalent among the Baka pygmies in the East Region of Cameroon and it is associated with young age, low educational level, poor oral hygiene and the consumption of hot drinks and citrus fruits. We recommend an intervention to improve upon oral hygiene in this population in order to prevent dental wear.

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