

Tobacco use and oral health of inmates in a Nigerian prison

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Abstract

Objectives: To determine the effect of tobacco use on oral health status of inmates of a federal prison in Enugu, Nigeria.

Materials and Methods: The study involved 230 inmates of the Nigerian Prison in Enugu. An interviewer-administered questionnaire was used to collect data on the demographic characteristics of the participants, oral hygiene methods, and smoking habits. An intra-oral examination to determine their oral health status was done using simplified oral hygiene index (OHI-S) for the oral hygiene status, the modified decayed missing and filled teeth (DMFT) index for caries status, and community periodontal index of treatment needs (CPITN) for the periodontal needs. Statistical Package for Social Sciences software, version 15 was used to analyze data.

Results: One hundred and twenty participants (52.2%) were current smokers. Mean DMFT of smokers and nonsmokers were 2.38 ± 0.71 and 2.25 ± 0.83 respectively ($P = 0.508$) while mean Community Periodontal Index (CPI) scores of smokers and nonsmokers were 4.71 ± 1.26 and 2.27 ± 0.86 , respectively ($P = 0.276$). Oral soft tissue lesions such as mucosal burn, oral leukoplakia-like lesions were found mainly in the tobacco users.

Conclusion: Tobacco use had a negative effect on the oral health of the participants as smokers had worse oral health profile than non-smokers. They may benefit from counseling programs with the view to educate them on the effect of tobacco use on oral health and by extension, the general health. The full implementation of the Framework Convention on Tobacco Control (FCTC) treaty in Nigeria could help in curtailing these unwanted consequences of tobacco use.

Key words: Oral health promotion, prisoners, periodontal health, tobacco use

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Introduction

Tobacco use, a common risk factor for many chronic diseases such as diabetes, cardiovascular disease, and respiratory conditions, can also affect the oral health.^[1] It can induce oral conditions such as periodontal disease, oral cancer and its recurrence, retarded wound healing from impaired immune system, congenital defects such as cleft lip and palate in children, whose mothers smoked during pregnancy.^[1,2] It could also cause halitosis, hairy tongue, smoker's melanosis, and nicotinic stomatitis.^[3,4] These negative effects of tobacco on oral health can be observed not only with cigarette smoking, but also with smokeless tobacco including moist or dry snuff,^[1] and in most cases

affected persons have inadequate knowledge of these associated hazards.^[5,6]

In Nigeria, tobacco use has enjoyed a boost as in most developing countries; prevalence rise of about 30% and 18% in males and females, respectively, were recorded from 1984 to 2007 for cigarette smokers,^[7] while prevalence of smokeless tobacco in a recent study was put at 7.94%.^[8] Credible reports in literature have linked tobacco use with periodontal disease, usually in terms of increased prevalence and severity.^[9-14] Van-Dyke and Dave^[10] noted that risk

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of developing periodontal disease as measured by clinical attachment loss and alveolar bone loss was profound with increased smoking. These effects were attributed to the concentration of nicotine metabolites in periodontal tissues that in turn mediate local and systemic host response.^[11] Nwhator *et al.*^[12] in their study on oral hygiene status and periodontal treatment needs of Nigerian male smokers noted significant poorer oral hygiene, higher Community Periodontal index (CPI), and greater number of teeth with periodontal pockets in smokers than in nonsmokers, while in India, deeper periodontal pockets at CPI of 4 were observed among smokers.^[13]

Tobacco use by prison inmates is quite common as it is an integral part of their life. It serves a range of functions in prison: As a surrogate currency, a means of social control, as a symbol of freedom in a group with few rights and privileges, a stress reliever, and as a social lubricant.^[15] Existing data from different parts of the world report oral health of inmates as poor even without the modifiable factor of tobacco use.^[16-20] Hence, great caution is necessary in dealing with this vulnerable population in order to propagate good oral health and by implication general health.^[21] The effect of tobacco use on oral health of Prison inmates in South-east of Nigeria has not been investigated. Our aim was to determine the prevalence of tobacco use and its effect on oral health of inmates of the Federal Prison in Enugu, Nigeria. Policy makers may find this data useful when designing plans to improve the oral health of prison inmates.

Materials and Methods

The study involved inmates of the Federal Prison in Enugu, South-eastern Nigeria that is one of the 145 convict prisons available in the country.^[22] This institution is located in the urban part of the city – a distance of about 1 km from the Enugu North Local Government headquarters. It has a medical centre manned by some health personnel but lacks oral health care facility. At the time of data collection for this study (June 2010), the Enugu Prison had a total of 1255 inmates (1207 males and 48 females). The sample size of 286 was derived based the formula for sample size determination for population less than 10 000.^[23] A systematic sampling method was used to select the sample size of 286 using different sampling frames for both sexes but only 230 of them consented to participate.

An interviewer-administered questionnaire was used to collect data on the demographic characteristics of the participants. Data on oral hygiene methods: Materials and frequency of cleaning teeth during imprisonment were obtained. Use of tobacco by the inmates and the item(s) smoked were also ascertained. An intraoral examination was done to determine their oral hygiene, caries, and periodontal statuses. The examination was carried out with the subjects seated on a chair using natural daylight.

Oral hygiene status was assessed using the simplified oral hygiene index (OHI-S),^[24] the caries status by the modified decayed missing and filled teeth index (DMFT),^[25] and the periodontal treatment needs by the community periodontal index of treatment needs (CPITN).^[26] Data were analyzed using the Statistical Package for Social Sciences software, version 15. Frequency distribution tables were generated for categorical variables. Various tests used for analysis were the arithmetic mean, standard deviation, and analysis of variance (ANOVA); significant *P* value was set at $P \leq 0.05$.

Ethical clearance for the study was obtained from the Health Research Committee of University of Nigeria Teaching Hospital, Enugu. Written permission was also obtained from the Prison Authorities. Prison inmates were not allowed to write or sign any document but were told verbally that the participation was voluntary and that their answers would be confidential. At the conclusion of the study, the participants were provided with oral hygiene instructions and a documented treatment plan was handed over to the prison authorities.

Results

A total of 230 inmates aged between 15 and 66 years (mean age of 28.48 ± 9.54 years) participated in this study; 224 (97.4%) were males while 6 (2.6%) were females. The highest number of participants was found in the 20-29 years age group. One hundred and seventy two (74.8%) were married and the highest level of education attained by 50% of them was secondary school [Table 1].

Table 1: Demographic characteristics of the participants

Characteristic	n (%)	Mean \pm SD
Age (in years)		28.48 \pm 9.54 years
<20	17 (7.4)	
20-29	147 (63.9)	
30-39	43 (18.7)	
40-49	7 (3.0)	
50 or more	16 (7.0)	
Gender		
Male	224 (97.4)	
Female	6 (2.6)	
Marital status		
Single	58 (25.2)	
Married	172 (74.8)	
Educational level		
No formal educ.	22 (9.6)	
Primary educ.	75 (32.6)	
Secondary educ.	115 (50.0)	
Undergraduates	14 (6.1)	
BSc/BA and postgraduates	4 (1.7)	

One hundred and twenty (52.2%) participants cleaned their mouth with chewing stick, 86 (37.4%) use toothbrushes while 18 (7.8%) do not clean at all. Mean Oral hygiene index score (OHI-S) of chewing stick users was 1.63 ± 0.84 while toothbrush users had 1.53 ± 0.85 ($P = 0.348$) [Table 2]. One hundred and twenty (52.2%) were current tobacco users and they were all males. The remaining 110 (47.8%) representing the nonusers consisted of those who had never smoked before plus those who had not smoked in the last 2 years. Among the smokers, 39 (32.5%) had smoked for 6 to 10 years and 15 (12.5%) for more than 10 years. Ninety eight (82.7%) use smoke cigarette only, 12 (10.0%) use smokeless tobacco alone whereas 10 (8.3%) use any of the above with Indian hemp [Table 3].

Higher mean decayed missing and filled teeth (DMFT) and community periodontal index (CPI) were observed in smokers than in nonsmokers though differences were not statistically significant. Mean DMFT of smokers was 2.38 ± 0.71 and nonsmokers 2.25 ± 0.83 ($P = 0.508$) while mean CPI scores of smokers and nonsmokers were 4.71 ± 1.26 and 2.27 ± 0.86 , respectively ($P = 0.276$) [Table 4]. Other oral conditions observed among the participants were traumatized anterior teeth, soft tissue injury, total edentulism mucosal burn, oral candidosis, periodontal abscess etc., [Figure 1].

Discussion

This study ascertained the oral health status of Prison inmates in Enugu-Nigeria and the impact of the tobacco on oral health. Chewing stick was the most commonly employed cleaning tool by the inmates in this study even though the resultant oral hygiene was slightly better (lower mean OHI-S) for tooth-brush users and this finding corroborates with previous studies that compared effects of the two devices on oral hygiene.^[27,28] In this study, though the difference was not statistically significant, the finding could be due to the regimented time operated in the institution that would not allow production of fine bristles from the chewing stick for effective cleaning. Chewing sticks have been proven to produce good effects on gingival health,^[29,30] and the fluoride content in some of them provide anticaries effect via their re-mineralization properties.^[31,32] Sofola *et al.*^[27] observed that those who subscribe to only chewing stick for their oral hygiene usually employ wrong techniques leading to ineffective cleaning. However, it is commendable that some inmates in our study improvised chewing sticks with twigs from shrubs-trees got within their confinement in line with the principle of appropriate technology of the primary oral health care approach.^[33]

More than half of the inmates (52.2%) who participated in this study were current tobacco users and they were all males with majority (81.7%) consuming tobacco in the form of cigarette. A recent hospital-based study at the University of

Table 2: Oral hygiene status of the participants

Tools used for mouth cleaning	n (%)	Mean OHI with SD
Nothing (do not clean)	18 (7.8)	1.67±1.03
Chewing stick	120 (52.2)	1.63±0.84
Toothbrush and paste	86 (37.4)	1.53±0.85
Other items such as salt water and finger	6 (2.6)	2.17±0.98

$F=1.105$,
 $P=0.348$ (NS)

OHI=Oral hygiene index, SD=Standard deviation, NS=Not significant

Table 3: Prevalence of tobacco use among participants

Tobacco use	n (%)	Duration of use (N=120)	n (%)	Items used (N=120)	n (%)
Yes	120 (52.2)	0-5 years	66 (55.0)	Cigarette	98 (81.7)
No	110 (47.8)	6-10 years	39 (32.5)	Smokeless tobacco	12 (10.0)
Total	230 (100)	>10 years	15 (12.5)	Any of the above with Indian hemp	10 (8.3)

Table 4: Caries and periodontal statuses of smokers and nonsmokers

Smoking status	Caries level				Periodontal status			
	DMFT				CPI			
	Mean	n	SD	SEM	Mean	n	SD	SEM
Smokers	2.38	120	0.71	0.17	4.74	120	1.26	0.06
Nonsmokers	2.25	110	0.83	0.17	2.27	110	0.86	0.08
Total	2.31	230	0.77	0.05	3.52	230	1.06	0.05
	$F=0.680$				$F=1.193$			
	$P=0.508$				$P=0.276$			
	(NS)				(NS)			

DMFT=Decayed missing and filled teeth, CPI=Community periodontal index, n=Number, SD=Standard deviation, SEM=Standard error of mean, NS=Not significant

Benin Teaching Hospital dental clinic found that all tobacco users were males, and 94% of them were cigarette smokers.^[6] In this study, we recorded higher mean DMFT and CPI scores for smokers than nonsmokers ($P > 0.05$). Although the observed difference in oral health of smokers and nonsmokers was not statistically significant in our study, it could be a pointer to worse oral health for smokers from the clinical point of view. Also, the absence of oral health care facility at this Federal prison in Enugu may pose a big challenge in meeting these oral health needs either through preventive or curative services. This trend of worse oral health for smokers than nonsmokers corroborates with findings from similar studies on institutionalized persons.^[16,20,34] In Nigeria, Braimoh *et al.*^[16] reported 63.7% prevalence of smokers at the Benin city prison; smokers had poorer periodontal tissues and higher calculus deposits than nonsmokers. Reddy *et al.*^[20] noted 72.5% prevalence of smoking for life imprisoned inmates in India with mean DMFT of 5.26, CPI of 2 for the majority and some had high CPI scores of 4. In a cross-sectional study designed to investigate the relationship

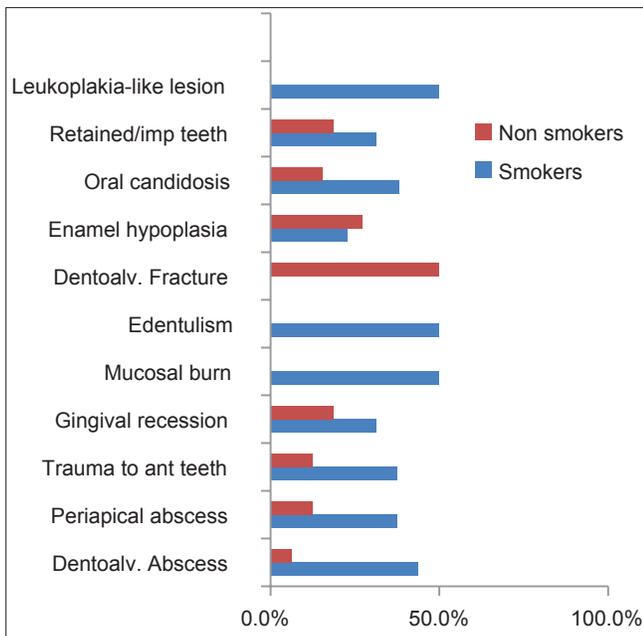


Figure 1: Other oral conditions observed among participants

between tobacco use and oral health of prison inmates in Mississippi, Crospey *et al.*^[34] revealed a high prevalence of smoking, with 69% of the sample reporting current smoking. Inmates who smoked or smoked along with using other tobacco products had the worst dental outcomes.

Furthermore, a CPI score of 4.74 obtained for smokers in our study translates to the periodontal need that goes beyond oral prophylaxis to complex periodontal therapy that may include surgical intervention and/or deep scaling and root planning with local anaesthetic.^[26] Usually, the nicotine, a vasoconstrictor in tobacco ensures that the gum does not bleed as readily as in nonsmokers; hence, smokers with periodontal disease may be unaware that their condition could progress rapidly resulting in greater bone loss and deeper periodontal pocket.^[11,12,35] Lastly, we found other oral health conditions such as oral mucosal burn, oral candidosis, and leukoplakia like lesions more in smokers; these are suggestive of damaging effect of the chemicals in tobacco on the oral soft tissues and the possible presence of premalignant lesions. Established relationship between tobacco use and the development of premalignant lesion exist and smokers with these potentially malignant lesions have an annual cancer transformation rate of about 5%.^[36] Hence, the oral soft tissues lesions especially white lesions should not be taken lightly.

Apart from the uncertain prognosis of periodontal recovery posttreatment and little or no benefit from professional oral prophylaxis,^[9,37] the financial implications for the inmates or even the prison authorities may be a burden especially when viewed on a larger scale. Attempts to ban tobacco use in prison so far has not produced the

desired result,^[15] so one major way to circumvent this challenge may be the adoption and full implementation of the World Health Organization (WHO) framework convention in tobacco control (FCTC) by Nigeria. This is an international tobacco treaty produced from negotiations of the 2003 World Health Assembly.^[38] The agreement is a part of a global strategy to reduce tobacco-related deaths and diseases around the world through smoking prevention and treatment, tobacco taxation, product regulation etc. Nigeria signed the treaty in 2004 and ratified it in 2005,^[39] but full adoption is yet to be witnessed especially in the area of monitoring and evaluation of laid down programs to that effect.^[7] In addition, four most prominent noncommunicable diseases (NCDs) such as cardiovascular diseases, diabetes, cancer, and chronic obstructive pulmonary diseases are said to share common risk factors (related to lifestyle) with oral diseases.^[40] Emphasis should then be on role of intermediate, modifiable risk behaviours, such as oral hygiene practices, sugar consumption, as well as tobacco use and excessive alcohol consumption since such behaviours may not only affect oral health status negatively as expressed by clinical measures but also impact on quality of life.^[41]

Conclusion and Recommendations

Barring the limitation of this study posed by the drop outs from the selected sample that may have affected statistical outputs, smokers in this study had worse oral health than nonsmokers. A dental centre for the provision of oral health care services to the inmates is strongly advised as it will help take care of some of their dental needs.

Prison authorities in Nigeria should be one of the advocates of the Framework Convention on Tobacco Control (FCTC). The need for full adoption and implementation of this treaty by the Nigerian government cannot be over-emphasized. While we wait for government to play its role, oral health care givers should engage in awareness programme(s) to educate inmates and their care givers on the methods of improving their oral health with counselling on tobacco cessation.

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