WJARR

World Journal of Advanced Research and Reviews

World Journal Series
INDIA

(RESEARCH ARTICLE)

Check for updates

Bucco-dental hygiene in the adult population in Bafia, Cameroon

H. Blaise Nguendo Yongsi *

Geospatial Land and Health Laboratory Institute for Population Studies (IFORD)-University of Yaoundé II, Cameroon.

Abstract

Background: Oral diseases are one of the most prevalent problems throughout the world. According to WHO, despite great improvements in the oral health of population in several countries, concerns persist. Research objectives: The aim of the present study was to investigate oral health related behaviors and practices, dietary habits, and to highlight the status of oral hygiene in adults. Methods: A cross-sectional epidemiological study in 1 211 individuals aged 18 years and more was carried out. Those individuals were selected among the 50 enumerated areas that make up the city. We resort to a quantitative approach (using descriptive methods) and to qualitative technique in order to well understand adults' practices regarding dental hygiene. Results: We found that most respondents were males (68.9 %), belonged to the 35-45 age group (48.3%), and are involved in informal activities (56.9). The study revealed that 42.8 % use tobacco and 49.0% drink alcohol on a regularly (daily) basis. 78.1% brush their teeth, but once daily (76.2%), with very few who respect the brushing technique in accordance with the WHO recommendations (09.5%). The cleaning products used are varied: fluoridated toothpaste (43.5%), chewing (19.1%), and tooth powder (18.1%). Analysis of the debris index and the tartar index shows that the level of oral hygiene in the adult population in Bafia is poor (75.2%). Learning objectives: it is important to establish oral hygiene programs or strengthen existing programs, with emphasis on the effective use of fluorides for the prevention of dental caries, promotion of oral hygiene, integration of oral health into national and community health programs.

Keywords: Dental health; Habits, practices; Hygiene level; Adults; Bafia; Cameroon

1. Introduction

Health is a fundamental right of every individual and oral health is an integral part of general health. It appears that oral diseases are one of the most prevalent problems throughout the world. WHO emphasized that despite great improvements in the oral health of population, global problems still persist [1]. As oral health and general health are interrelated, a preventive approach consisting of daily oral hygiene procedures and regular check-ups can stabilize progressive lesions and prevent acute complications, so contributing to a gratifying oral function and satisfying quality of life [2]. Oral diseases among adults individuals are of special concern because they must be healthy to actively participate in economic development activities. A necessary condition for maintaining oral health entails to seriously taking care of the oral cavity (mouth). This can only be achieved through oral hygiene. Defined as a set of living practices to ensure good oral health, oral hygiene is essential for the general condition and quality of life [3]. It participates in the ability to speak, smile, touch, and express emotions through facial expressions confidently, without pain and embarrassment. A recent study revealed that oral hygiene is an important public health concern and that, oral diseases have significant negative effects on populations quality of life. Globally, oral diseases are a major global public health problem affecting more than 3.5 billion people, and more than 70% of the world's population (mainly in low- and middle-income countries) do not have access to adapted and affordable oral care [4]. These oral diseases and conditions

---

* Corresponding author: H. Blaise Nguendo Yongsi
Associate Professor of Urban health   Geospatial Land and Health Laboratory Institute for Population Studies (IFORD)-Unviversity of Yaoundé II-Cameroon.

are the source of a significant disease burden in many countries and their effects are felt throughout life, causing discomfort, pain, disfiguring lesions and even death. However, so far dentistry has not been able to tackle this problem decisively. As oral health is a fundamental human right, WHO has identified priority areas on which efforts should be focused. Among others, we have maintenance of oral hygiene and prevention of oral diseases. It is on the strength of this recommendation and especially of the fact that oral health is a resource of daily life and not the goal of life, that we undertook this study whose objective is to investigate oral health related behaviors and practices, dietary habits, and to highlight the status of oral hygiene in adults, especially since their oral health status is not well known due to the scarcity of surveys carried out in this area.

2. Material and methods

2.1. Study area

This study focuses on the city of Bafia, which is located in Cameroon slightly above the Equator between 4°40'00''-4°47'00'' latitude North and 11°07'30''- 11°17'30'' longitude East. It is a secondary city located about 120 km from Yaoundé the national capital, at 1,100 and 1,300 m above sea level, and over the southern Cameroonian plateau in the Mbam-and-Inoubou department, over an area of approximately 1,300 km2. She experiences a typical Equatorial climate: regular and abundant rainfall (1, 500 mm/year), an annual average temperature of 25°C, four seasons (two dry seasons and two rainy seasons). With an estimated population of 69,270 inhabitants, Bafia has an average density of 800 inhabitants / km2. This population is unevenly distributed, because there are high-density areas such as the Riidiébi communities in Ngam and Biabiri [5]. Bafia is essentially an administrative city. Economic activities are dominated by agriculture, hunting, fishing, and other informal activities such as catering and small retail trade.

2.2. Study design, target population, and sampling

An epidemiological survey, under an observational and descriptive cross-sectional design was conducted. The survey targeted only the adult population that is individuals aged 18 years and more, because this age group represents the active population at risk of several infectious health conditions. The sampling size was determined using the following formula: $n=(z^2 \times p(1-p) \times f \times k)/(r \times e^2)$ (n: size of the sample; e : sought precision; f : average household size; k : non-response rate; r : proportion of households with health conditions; z : value of the normal distribution for the desired confidence level 1-α; p : expected coverage or prevalence rate). From this, a size of 1,157 individuals was determined. However, we rounded up to 1,200 individuals. The study being a cross-community one (ie covering the whole city of Bafia), we resorted to a stratified random sampling procedure based on two stages to select targeted individuals. First, 25 enumerating areas were selected out of the 50 that make up the city. These enumerating areas were representative of the two residential context that Bafia displays (rural context and urban context). In the second stage, 1,200 households were selected on the basis of having an individual aged 18 years and more where a household had more than two persons aged 18 years, when more than two people aged 18 were in a household, the random number table was used to select only one.

2.3. Data collection and management

In the selected households, we conducted a sociodemographic survey and a clinical examination. The first was conducted using a structured and standardized questionnaire containing items on gender, level of education, socio-professional status, dietary habits, bucco-dental practices, etc. As for the clinical dimension, examination was done by three odonto-stomatologists according to WHO Basic Oral Health Assessment [6]. All selected subjects were examined by examiners seated on a chair and examined under natural light using standardized instruments (dental mirror, precell, WHO spherical tip probe, periodontal probe, and gloves). Data obtained was compiled systematically, transformed from a pre-coded proforma to a computer and a master table was prepared. The total data was distributed meaningfully and presented as individual tables along with graphs. Descriptive statistical analysis has been carried out in the present study. The statistical software namely SPSS 18.0 was used for analysis of the data and Microsoft excel was used to generate results.

2.4. Ethical clearance

The study was approved by the Institutional Research Ethics Board for Human Health of the School of Health Science (Catholic University of Central Africa). The informed consent of each individual was taken prior to recording oral health.

3. Results

Of the 1,200 individuals who participated to the study, nearly 69.0 % were males and 31.0% were females that is a sex ratio of 2.2. Most of the participants were aged 35-45 years (48.3 %) and 25-35 years (24.8%). The level of education varied among the respondents with majority of them (60.6%) having a secondary school. Table 1 also indicates that a high proportion are involved in informal activities (56.9%) or in agricultural activities along with hunting (31.7%).

Table 1 Socio demographic characteristics of the respondents

Variables	Count	Percentage
Gender		
Male	827	68.9
Female	373	31,1
Age (years)		
[18-25]	129	10.7
[25-35]	297	24.8
[35-45]	580	48.3
[45 and more]	194	16.2
Level of education		
No education	144	12.0
Primary	221	18.4
Secondary	727	60.6
University	108	09.0
Socio economic status		
Unemployed/Retired	117	09.9
Students	139	11.8
Civil servants	126	10.7
Informal activities	556	56.9
Farmer/hunter	362	31.7

3.1. Oral Health-related Behavior and practices

Table 2 shows the overall oral health behaviors and practices in adults in Bafia, regular tobacco and alcohol habits were among 42.8% and 49.0% respectively of the characteristic of the respondents. Whereas 67.6% consume sweet drinks on a daily basis, 41.1% are notorious for their taste for foods rich in adhesive sugars. 78.1% brush their teeth, using toothbrush (62.9%) or chewing sticks (34.7%). However, only 12.8% and 11.0% clean their teeth respectively twice or more than twice daily, and mots of them on waking (82.0%). Though 13.7% do not use any tooth cleaning products, 43.5% and 19.1% respectively use tooth paste and chews for cleaning. However, about 44% of participants brushed their teeth with a hard-bristled brush versus 21.4 % who use soft-bristled. It appears from the study that only 9.8% of the participants clean their teeth for about 2 minutes, and nearly 80% of them use their tooth brushes more than 3 months or to the full length of the bristles. Regarding the direction of brushing stroke, it was found that 09.5 % brush their teeth in a combination of vertical, horizontal, and circular motion. And only 06.2% and 17.8% again of those adults have the habit of cleaning their tongue and of rinsing their mouth after meals.

Table 2 Oral health-related behaviors and practices.

	Count	Percentage
Dietary habits †		
Tobacco habits		
Non-Users	317	26.4
Ex-Users	94	07.8
Occasional Users	275	22.9
Regular Users	514	42.8
Alcohol habits		
Non-drinkers	115	09.6
Ex-drinkers	197	16.4
Occasional-drinkers	300	25.0
Regular-drinkers	588	49.0
Foods rich in adhesive sugars	493	41.1
Sugar milk and dairy products	387	32.3
Sweet drinks	811	67.6
Teeth brushing/cleaning (n= 1200)		
No	263	21.9
Yes	937	78.1
Frequency of teeth brushing (n= 937)		
Once daily	714	76.2
Twice daily	120	12.8
More than twice daily	103	11.0
Teeth brushing timing (n=937)		
On waking	768	82.0
After meals	109	11.6
At bedtime	60	06.4
Duration of brushing (n=937)		
Less than 2 minutes	801	85.5
2 minutes	92	09.8
More than 2 minutes	44	04.7
Tooth Cleaning Instrument		
Piece of cloth or sponge	09	00.9
Finger	14	01.5
Stick rubs tooth or chewing sticks	324	34.7
Toothbrush	590	62.9
Type of toothbrush used (n=590)		

Hard bristle	258	43.9
Medium bristle	216	36.7
Soft bristle	126	21.4
Frequency of replacement of the toothbrush (n=590)		
1-2 months	31	05.2
2-3 months	92	15.6
> 3 months or until the bristles are worn out	467	79.2
Direction of the brushing stroke (n=590)		
vertical	389	66.0
Horizontal	91	15.4
Circular	54	09.1
Combination of above	56	09.5
Teeth cleaning aids used with a toothbrush (n=590)		
Tooth paste	257	43.5
Tooth powder	107	18.1
Charcoal or ash	15	02.5
Chewings	113	19.1
Salt or baked soda	17	02.9
None	81	13.7
Habit of cleaning the tongue (n=937)		
Yes	58	06.2
No	879	93.8
Habit of rinsing the mouth after meals (n=937)		
Yes	167	17.8
No	770	82.2
† Respondents could provide more than one answer		

3.2. Level of oral hygiene

The level of oral hygiene was measured using the Simplified Oral Hygiene Index (OHIS). OHIS is an index made up of the debris index simplified (DIS) and the calculus index simplified (CIS), each of these indices being at turn based on 12 numerical determinations representing the amount of debris or tartar found on the buccal cavity and on lingual surfaces of each of the three oral cavity segments. Table 3 shows that three-quarters of those examined have a simplified debris index fair and low, and a simplified tartar index equally low and fair.

Table 3 Debris and calculus indices.

	Count (n=1,200)	Percentage (%)
Debris Indice [1]		
Low	112	09.3
Fair	205	17.1
High	883	73.6
[1] The debris index was measured tooth by tooth with a score of 0 to 3, using the plaque developer. Result was noted as follows : 0: no deposit or stain present on the tooth; 1 : soft deposits covering less than one third of the tooth surface or presence of stains; 2 : soft deposits covering more than one third of the tooth surface but less than two thirds of the teeth; 3 : soft deposits covering more than two-thirds of the tooth surface. Low: soft debris is absent or covers less than a third of the surface of the exposed tooth Fair: soft debris covers more than a third of the surface of the exposed tooth High: soft debris covers more than two-thirds of the surface of the exposed tooth		
Tartar or calculus Indice [2]		
Low	202	16.8
Fair	251	21.0
High	747	62.2
[2] To measure the tartar index, the periodontal probe was inserted into the sulcus of the tooth and moved horizontally from one contact area to another. Tartar was also quantified tooth by tooth with a score of 0 to 3. The result was noted as follows: 0: no tartar; 1: supragingival calculus covering less than a third of the tooth surface; 2: supragingival calculus covering more than a third of the tooth surface or distinct patches of sub gingival calculus around the cervical portion of the tooth or both; 3: supragingival calculus covering more than two thirds of the tooth surface). Low : No tartar or supragingival tartar covering no more than one-third of the exposed surface of the tooth Fair : Supragingival tartar covering more than one-third but not more than two-thirds of the exposed surface of the tooth, or the presence of spots of sub gingival tartar around the cervical part of the tooth or both. High : Tartar covering more than two-thirds of the exposed surface of the tooth or a continuous band of sub gingival tartar around the cervical portion of the tooth, or both		

The simplified oral hygiene index "OHIS" was obtained by adding the debris index and the tartar index. Table 4 shows the general level of oral hygiene among those adolescents. Thus, we see that the level of hygiene in the entire population is poor (72.2%).

Table 4 level of buccodental hygiene among individuals aged 5 to 17 in Bafia

	Count (n=1,200)	Percentage (%)
Niveau		
Poor	902	75.2
Fair	138	11.5
Good	160	13.3
The simplified oral hygiene index (OHIS) = individual mean scores of debris indices + mean scores of tartar indices. Poor: average score between 1.9 and 3.6 Fair : average score between 0.7 and 1.8 Good : average score between 0.3 and 0.6		

4. Discussion

Ultimately, this study aimed to assess the level of dental hygiene among the adult population in Bafia. The 2.2 sex ratio in favor of men doesn't reflect the national trend of 0.7 in favor of women over the total population, but of 0.3 within the 25-65 group age. Such a sex ratio in Bafia can be explained by the return migration phenomenon. As a result of the economic crisis that hit cities hard, the young people who had immigrated sought to return [7]. Anyway, adults are known to have full capacity to carry out oral hygiene measures. Recognized as a set of practices that help get rid of food debris, prevent periodontal disease, and be healthy, those practices date back to prehistoric times, precisely to the Paleolithic when initial observations of gingivitis, tartar deposits, and loosening of teeth were made on samples of human teeth [8]. It is therefore understandable why worldwide, habits tend towards prophylaxis and promotion of good oral health. In Bafia, teeth cleaning in adults is perceived as part of personal hygiene, as people here believe that oral hygiene helps to keep the mouth clean, healthy and in good health, and therefore ensure well-being. Such a knowledge that a poor dental health can increase general health conditions was once the concern of Etruscans and Egyptians during the Pharaonic era [9], and has just turned to be currently a daily concern of many communities around the world [10, 11, 12]. Most of those adults in Bafia brush their teeth irregularly or just once a day when they wake up. This habit, mentioned in some previous studies, clearly indicates that brushing remains a patters related to personal hygiene, and therefore without connection with meals [13, 14]. Yet, it is recognized by Jahangiry et al (2020), that, to properly fight against plaque buildup, brushing should be done after meals, and that in the case of a single brushing, the best is to do so in the evening, so the bacterial plaque is eliminated before sleep because during the night, salivary secretion decreases [15]. The study showed that most adults brush their teeth for less than 2 minutes; a finding close to that of Miura [16]. However, we should mention that such a time duration is insufficient because dental plaque responsible for dental caries builds up very slowly, and therefore brushing should be two or 3 minutes [17]. The fact that the majority of the adult population uses toothbrush is encouraging from a dental health promotion perspective. It shows that despite a precarious economic situation, use of tooth brush is still popular since its invention by the Chinese in the year 1500. The relatively low cost of toothbrushes and their availability in almost all small shops, probably explain this widespread use [18]. This result is nonetheless contrasted by those of Niazi et al.(2016) and Norton & Addy (2009), who indicated that teeth rubbing sticks are common instruments used in East and West rural africa communities [19, 20]. Chew stick has appeared to be the second most used instrument by the adults in Bafia. This finding is close to that of Lababidi and Daluz [21, 22]. First used by the Babylonians between 7000 and 3500 BC, chew sticks are still used in Bafia because they derive from plant species (such as *Maytenus Senegalis, Présopis, AfricanaPotentilla Rubra*) which contain chemical elements such as fluorine, sulfur, bicarbonate, tannin, alkaloids, essential oils, well known for their antibacterial and antifungal properties, and in salivary stimulation [23]. They are very beneficial for the strengthening of the gum, and in addition they contain a substance that facilitates digestion and protects the teeth against limescale. In their studies, Garcia (1997) and Chen et al (2014) have emphasized on the cleaning technique as a determining factor for good oral hygiene [24, 25]. However in Bafia, only few adults use the right technique, as previously reported by Sarita et al [26]. According to WHO, the recommended direction of the brushing stroke is as follows: Place the toothbrush at a 45 degree angle at the edge of the gum, brush the teeth in a circular manner on site to effectively clean between the teeth and the edge of your gum, then gently lift from the gums to the crown of the tooth [27]. Among the cleaning products associated with brushing in Bafia, fluoridated toothpaste is the most frequently used (54.7%). This result is similar to studies on oral hygiene habits and practices conducted by Thornton-Evans et al [28] and Mason et al [29]. Popularized in the 17th century by the French nobility for whom oral hygiene had a purely aesthetic aim, toothpaste has turned as the main cleaning product due to the fluoride it contains and which stops the development of bacteria, protects tooth enamel, and eliminates tooth staining [30]. This can also be attributed to increasing sources of information available through mass media and health education posters available in the fairs, market places [31, 32]. Tooth powder used by some adults is a mixture of crushed pumice stone, oyster shells, eggshells, crushed ginger, and honey or mint. With powerful astringent properties, these substances are believed to prevent tartar development, strengthen email, and improve smiles. Thus and as reported by Khan et al [33], tooth powder is a "two products in one formula" because of its dual role: hygienic and aesthetic. Another finding is that Youth use chews or masticatory to clean their teeth. The preferred masticatory here is Kola nut and Garcinia kola Heck called bitter-kola because of its bitter taste. Both contain alkaloids and tannoids which would have a coagulating action on the bacterial plaque and would stimulate the formation of reactive dentin, thus stopping development of caries. In addition, they are thought to have sialagogic, tonic, stimulating, and aphrodisiac effects [34]. It is unfortunate to know that 93.8 % of the adults don't have the habit of cleaning the tongue, slightly higher than that reported by Sofola et al. [35]. In a study among university students in Benin, Djossou et al [36] indicated that nearly 70% had the habit of rinsing the mouth after every meal, whereas 17.8 % had reported the habit in the present study indicating their poor practice of cleansing out the tucked food particles. Regardless of the number of daily brushing, brushing technique and cleaning products used, the study underlines that oral hygiene among youth in Bafia is poor. A general finding shared by several studies conducted in sub-Saharan Africa including Abid et al [37] and Moussa et al [38].

5. Conclusion

Results of this study indicate that bucco-dental hygiene is nowadays made up of a set of practices to ensure the good health of the oral sphere. Especially as a poor condition of the oral sphere can increase general health risks (cardiovascular diseases, respiratory infections, diabetes, obesity). It is recognized that oral health problems are currently public health concerns as they affect all segments of the population, although to varying degrees. With regard to the adult population, results of this study clearly point to the need for interventions in oral hygiene practices and dietary habits. This intervention must be dealt with from two perspectives, household and community, because eventually many of these adults are involved in activities in the community. At the community level, promotion of positive oral health practices can take place through the media (flyers, audiovisuals), social and health fairs. Moreover, dental and oral health issues, because they represent a threat to the overall health of the individual, providing access to appropriate dental care for the underserved segments of the population is an imperative. Preventive measures to improve dental care and provision of dental health education are very much necessary to ensure optimum oral health.

Compliance with ethical standards

Disclosure of conflict of interest

The author declare that there is no conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Peterson PE, Bourgeois D, Ogawa H, et al. The global burden of oral diseases and risk to oral health. Bulletin of the World Health Organization. 2000; 83(9): 661-669.

[2] World Health Organization (WHO). Global Oral Health Data Bank.

[3] Marco A, Peres E, et al. Oral diseases: a global public health challenge. Lancet. 2019; (19): 31146-31148.

[4] World Health Organization (WHO). Global Oral Health: keys facts.

[5] Bureau Central des Recensments et des Études de Population. CAMEROUN - Recensement Général de la Population et de l'Habitat (2005). Ministère de l'Économie, de la Planification et de l'Aménagement du Territoire, Yaoundé. 2011; 243.

[6] World Health Organization. Oral Health Surveys. Basic Methods. WHO publications, 4th ed. Geneva. 1997.

[7] Nguendo-Yongsi HB. Déterminants sociaux de la santé: un paradigme en émergence (application à la ville de Bafia). Montréal, Éditions Différance-Pérenne. 2020; 126.

[8] Cabanes D. Dents et dentistes à travers l'histoire. Musée dentaire de Lyon. 1928; 279.

[9] Winter A. L'Hygiène dans l'Égypte pharaonique. Paris. 1972; 179.

[10] Akarslan ZZ, Sadık B, Sadık E, Erten H. Dietary habits and oral health related behaviors in relation to DMFT indexes of a group of young adult patients attending a dental school. Med Oral Patol Oral Cir Bucal. 2008, 13(12): E800-7.

[11] Azogui-Levy S, Boy-Lefevre ML. La santé bucco-dentaire en France. Département de Santé Publique, UFR d'Odontologie, 2005, n°51. Accessed April 03, 2021.

[12] Kassem M, Kassak P, Dagher R, Bassel Doughan DDS. Oral Hygiene and Lifestyle Correlates Among New Undergraduate University Students in Lebanon. Journal of American college health. 2015; 50(1): 13-17.

[13]   Stenberg P, Håkansson J, Akerman S. Attitudes to dental health and care among 20 to 25-year-old Swedes: results from a questionnaire. Acta Odontol Scand. 2000; 58(3): 102-106.

[14]   Ruiz Miravet A, Montiel Company JM, Almerich Silla JM. Evaluation of caries risk in a young adult population. Med Oral Patol Oral Cir Bucal. 2007; 12(5): 412-418.

[15]   Jahangiry L, Bagheri R, Darabi F, Sarbakhsh P, Sistani MMN, et al. Oral health status and associated lifestyle behaviors in a sample of Iranian adults: An exploratory household survey. BMC Oral Health. 2020; 20: 82.

[16]   Miura H, Araki Y, Haraguchi K, Arai Y, Umenai T. Socioeconomic factors and dental caries in developing countries: A cross-national study. Soc Sci Med. 1997; 44: 269-272.

[17]   Kayombo CM, Mumghamba EG. Self-reported halitosis in relation to oral hygiene practices, oral health status, general health problems, and multifactorial characteristics among workers in ilala and temeke municipals, Tanzania. Int J Dent. 2017; 8682010.

[18]   Unanah AU, Braimoh OB. Oral hygiene practices and factors influencing the choice of oral hygiene materials among undergraduate students at the University of Port Harcourt, Rivers State, Nigeria. J Dent Allied Sci. 2017; 6: 3-7.

[19]   Niazi F, Naseem M, Khurshid Z, Zafar M, Almas K. Role of Salvadora Persica chewing stick (miswak) : a natural toothbrush for holistic oral health. European journal of dentistry. 2016; 10(2): 301 308.

[20]   Norton M, Addy M. Chewing sticks versus toothbrushes in west Africa. A pilot study. Clinical preventive dentistry. 1989; 11(3): 11 - 13.

[21]   Lababidi S. Salvadora Persica L. Iintérêt en hygiène bucco-dentaire. Thèse de Doctorat en chirurgie dentaire, Université Paris Descartes. 2019; 79.

[22]   Daluz K. Le « Sothiou » ou bâtonnet frotte-dents comme outil d'hygiène bucco-dentaire dans les pays en développement : exemple du Sénégal. Thèse de Doctorat en chirurgie dentaire, Université de Toulouse. 2018; 90.

[23]   Haque M, Alsareii S. A review of the therapeutic effects of using miswak (Salvadora Persica) on oral health. Saudi medical journal. 2015; 36(5): 530 - 43.

[24]   Garcia C. Étude et prévention bucco-dentaire chez une population autochtone colombienne: « les u'was. Université Toulouse III- Paul Sabatier, Thèse de Doctorat en Chirurgie dentaire. 1997; 101.

[25]   Chen X, Zhan JY, Lu HX, Ye W, Zhang W, et al. Factors associated with black tooth stain in chinese preschool children. Clin Oral Investig. 2014; 18(9): 2059-66.

[26]   Sarita PT, Tuominen R. Tooth cleaning methods and their effectiveness among adults in rural Tanzania. Proc Finn Dent Soc.1992; 88(3-4): 139-45.

[27]   Ashley P, Gill D, Naini F. An update on oral hygiene products and techniques. Dent Update. 2008; 35: 270- 279.

[28]   Thornton-Evans D, Michele DDS, Junger L et al. Use of Toothpaste and Toothbrushing Patterns Among Children and Adolescents — United States, 2013–2016. MMWR Morb Mortal Wkly Rep. 2019; 68(4): 87–90.

[29]   Mason S, Burnett GR, Patel N, et al. Impact of toothpaste on oral health-related quality of life in people with dentine hypersensitivity. BMC Oral Health. 2019; 19: 226.

[30]   Sharda A, Sharda J. Factors influencing choice of oral hygiene products used among the population of Udaipur, India. IJDC. 2010; 2: 1-3.

[31]   Sarker S, Yousuf S, Monzoor MZ. Influences on brand selection decisions of staple goods: A study on toothpaste users of Khulna city. J World Econ Res. 2013, 2: 58-66.

[32]   Martins CC, Oliveira MJ, Pordeus IA, Cury JA, Paiva SM. Association between socioeconomic factors and the choice of dentifrice and fluoride intake by children. Int J Environ Res Public Health. 2011; 8: 4284-4299.

[33]   Khan M, Mudassar A, Abdul K, Mirza K et al. Does the use of toothpowder affect the oral health status of an individual?. Journal of the Pakistan Dental Association. 2012; 21: 153-156.

[34]   Lourdel C. Évolution des moyens et techniques d'hygiène bucco-dentaire: des origines à nos jours. Thèse de Doctorat en chirurgie dentaire, Université de Toulouse III. 1993; 169.

[35]   Sofola OO, Shaba OP, Jeboda SO. Oral Hygiene And Periodontal Treatment Needs Of Urban School Children Compared With That Of Rural School Children In Lagos State. Nigeria. Odonto-Stomatologie Tropicale. 2003; 5.

[36]   Djossou D, Houngbegnon P, Kponon S, Javotte N. Hygiène orale et carie dentaire: enquête auprès de 191 étudiants sur le campus d'abomey-calavi (BÉNIN). Rev Col Odonto-Stomatol Afr Chir Maxillo-fac. 2016; 23(2): 47-50.

[37]   Abid A, Maatouk F, Berrezouga L et al. Prevalence and severity of oral diseases in the africa and Middle East region. Advances in Dental Research. 2015; 27(1): 10–17.

[38]   Moussa A, Ibrahim E, Esmat A. et al. An overview of oral health status, socio-economic and behavioral risk factors, and the pattern of tooth loss in a sample of Egyptian rural population. Bull Natl Res Cent. 2020; 44(16).