EFFECT OF UN-IDEAL METHOD OF TOOTH BRUSHING ON GINGIVAE AMONG SECONDARY SCHOOL STUDENTS IN EPE LOCAL GOVERNMENT AREA OF LAGOS STATE NIGERIA

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Abstract

This research seeks to estimate the effect of un-ideal method of tooth brushing on gingivae and sustainability among secondary school students of Epe Local Government Area of Lagos. The validated instrument was administered to forty (40) secondary school students in Ijebu Ode Local Government of Ogun State who were not part of the study. The test re-test reliability method was adopted at an interval of two weeks to determine the reliability of the instrument using Pearson product moment correlation confident (r). A sample of four (400) hundred secondary school students was selected with the aid of stratified sampling techniques to select the schools and simple random sampling method to select the respondents from each selected schools. Three hypotheses were formulated and tested using chi-square analysis of 0.05 level of significance. One hypothesis was accepted while the remaining two (2) hypotheses were rejected. The findings show that Tooth decay is a common global disease which can be reduced with good oral hygiene practice. The researcher recommends dental health education among others.

Keywords: Gingivae, tooth brushing, gums, caries

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Introduction

A tooth (plural teeth) is a small, calcified, whitish structure found in the jaws (or mouths) of many vertebrates and used to break down food. Some animals, particularly carnivores, also use teeth for hunting or for defensive purposes. The roots of teeth are covered by gums (Johnson, 2007). Gingiva is part of the soft tissue lining of the mouth. They surround the teeth and provide a seal around them. Compared with the soft tissue linings of the lips and cheeks, most of the gingivae are tightly bound to the underlying bone which helps resist the friction of food passing over them. Healthy gingiva usually has a colour that has been described as "coral pink." Other colours like red, white, and blue can signify inflammation (gingivitis) or pathology. Although described as the colour coral pink, variation in colour is possible (Bath-Balogh and Fehrenbach, 2011).

A healthy gingiva has a smooth arcuate or scalloped appearance around each tooth. Healthy gingiva fills and fits each interdental space, unlike the swollen gingiva papilla seen in gingivitis or the empty interdental embrasure seen in periodontal disease. Healthy gingiva has a firm texture that is resistant to movement, and the surface texture often exhibits surface stippling. Unhealthy gingiva, on the other hand, is often swollen and less firm. Healthy gingiva has an orange-peel like texture to it due to the stippling. The gingival cavity microecosystem, fuelled by food residues and saliva, can support the growth of many microorganisms, of which some can be injurious to health (American Dental Association, 2007).

Un-ideal oral hygiene can lead to many gingival and periodontal disorders, including gingivitis or peridontitis, which are major causes for tooth failure. Recent studies have also shown that anabolic steroids are also closely associated with gingival enlargement requiring a gingivectomy for many cases. Gingival recession is when there is an apical movement of the gingival margin away from the biting (occlusal) surface (American Dental Association, 2007). It may indicate an underlying inflammation such as periodontitis or pyorrhea, a pocket formation, dry mouth or displacement of the marginal gingivae away from the tooth by mechanical (such as brushing), chemical, or surgical means. Gingival retraction, in turn, may expose the dental neck and leave it vulnerable to the action of external stimuli, and may cause *root sensitivity* (Bath-Balogh and Fehrenbach, 2011).

Inadequate plaque control can lead to an increase in pathogenic microflora, which is considered the primary cause of gingivitis and is certainly implicated in the progression of

periodontitis although its relationship to the latter is more complex (Terezhalmy, Bartizek & Blesbrock, 2005). Tooth brushing is the most commonly recommended and performed oral hygiene behaviour in Africa and is done ubiquitously in developed nations (Saxer, Barbakow & Yankell, 1998) It is considered a primary mechanical means of removing substantial amounts of plaque in order to prevent oral disease, including gingivitis and dental caries, while also maintaining dental aesthetics and preventing halitosis (Terezhalmy *et al.*, 2005). While the primary mechanism of action of tooth brushing is the mechanical removal of plaque, it is also used as a means of delivering chemotherapeutic agents via toothpaste.

Dental caries, also known as tooth decay or a cavity, is an infection, bacterial in origin, that causes demineralization and destruction of the hard tissues (enamel, dentin and cementum), usually by production of acid by bacterial fermentation of the food debris accumulated on the tooth surface. If demineralization exceeds saliva and other remineralization factors such as from calcium and fluoridated toothpastes, these hard tissues progressively break down, producing dental caries (cavities, holes in the teeth). The bacteria most responsible for dental cavities are the mutans streptococci, most prominently *Streptococcus mutans* and *Streptococcus sobrinus*, and lactobacilli. If left untreated, the disease can lead to pain, tooth loss and infection. Today, caries remain one of the most common diseases throughout the world (Rogers, 2008).

Though most people in most countries use tooth brushing as part of their routine oral health interventions, the adequacy in controlling plaque through this means is considered sub-optimal, particularly in the gingival area, which is critical in preventing inflammation (Sgan-Cohen & Vered, 2005). It was reported that the average daily toothbrush cleaning of two minutes would remove only 50% of all plaque. Factors affecting the efficacy of tooth brushing include the technique, frequency, duration, brush type and design, and the dentifrice used (Asadoorian, 2006).

Tooth decay is the most common global disease. Over 80% of cavities occur inside pits and fissures on chewing surfaces where brushing cannot reach food left trapped after every meal or snack, and saliva or fluoride have no access to neutralise acid and remineralise demineralised teeth, unlike easy-to-reach surfaces, where fewer cavities occur.(WHO 2001).

Worldwide, most children and an estimated 90% of adults have experienced caries, with the disease most prevalent in Latin American

countries, countries in the Middle East, and South Asia, and least prevalent in China. In the United State, dental caries is the most common chronic childhood disease than asthma. It is the primary pathological cause of tooth loss in children. Between twenty-nine and fifty-nine percent of adults over the age of fifty experience caries (Zadik, 2008). Tooth brushing is a form of hygiene, in which a person cleans his/her teeth with a toothbrush. Brushing one's teeth has long been considered an important part of dental care. As long ago as 3000 BC ancient Egyptians constructed crude toothbrushes from twigs and leaves to clean their teeth. Similarly, other cultures such as the Greeks, Romans, and Indians cleaned their teeth with twigs. Some would fray one end of the twig so that it could penetrate between the teeth more effectively.Modern day toothbrushing as a regular habit became prevalent in Europe from the end of the 17th century. The first mass-produced toothbrush was developed in England in 1780. In the United States, although toothbrushes were available at the end of the 19th century, the practice did not become widespread until after the Second World War, when US soldiers continued the tooth brushing that had been required during their military service (Patricia, 2002). Modern medical research has shown that brushing teeth properly can prevent cavities, and periodontal, or gum disease, which causes at least one-third of adult tooth loss. If teeth are not brushed correctly and frequently, it could lead to the calcification of saliva minerals, forming tartar. Poor dental health has been associated with heart disease and shortened life expectancy. (Hartmann, 2008).

This research seeks to estimate the effect of un-ideal method of tooth brushing on gingivae and sustainability among the students of Epe – Senior Grammar School, Lagos.

Objectives of the Study

i. To determine the influence of inappropriate use of right toothbrush on gingivae and its sustainability among the students.
ii. To examine the significant influence of not changing toothbrush often enough on the gingivae.
iii. To find out the influence of poor tooth brushing on gingivae and its sustainability.

Research Hypotheses

(i). Inappropriate use of right toothbrush has no significant effect on gingivae and its sustainability.
(ii). Not changing toothbrush often enough have no effect the gingivae.
(iii). That, brushing teeth too often or too hard has no significant effect on gingivae and its sustainability.

Research Methodology

This deals with the method used in gathering, analyzing and recording of all information relating to the data needed. The term (Methodology) involves collection of all data. This research involves a descriptive survey research method. Data were collected in order to evaluate the effect of un-ideal method of tooth brushing on gingivae and sustainability among the students of Epe Local Government area of Lagos State, Nigeria.

Population and Sample Techniques

The population for this study consists of four hundred (400) students from eight (8) selected Senior Secondary Schools in Epe Local Government area of Lagos state Nigeria. The students were chosen using stratified sampling techniques to select two (2) schools from a quadrants of school made by the division. Fifty (50) students from SS 1, to SS 3, were selected from each school using random sampling method.

Instrument for Data Collection

Source of data collection was through primary source. This primary source is the use of questionnaire method that is achieved by personal interview and distribution of well-prepared questionnaire for the purpose of this research to respondents in the selected secondary schools in Epe Local Government Area of Lagos. This questionnaire consists of two sections, A and B section respectively. The section A, deals with the demographical data of the respondents and section B, of the questionnaire centered on eliciting facts in respect of the research topic i.e. in answered questionnaire on the effect of un-ideal method of tooth brushing on gingivae and its sustainability.

Data Collection and Data Analysis

For the purpose of this study, the source of data collection was field source, the selected senior secondary schools were visited for information on the effect of un-ideal method of tooth brushing on gingivae and sustainability was determined. Frequency count, simple percentage and inferential statistic of chi-square analysis were adopted in analyzing data obtained through primary in the field survey. Table shall also be prepared to present the responses of the respondents towards the hypotheses tested at a glance. The formula for the chi square (X^2) is

$$X^2 = \Sigma \frac{(O-E)^2}{E}$$

Where O = the observed frequency,

E = the expected frequency

Σ = summation

Presentation and Analysis of Data

Table 1: Distribution of respondents used for the study

S/N	Population	Selected Samples
1	Epe Grammer School	50
2	Odo Obara High School	50
3	Army Children High School	50
4	Okunmodede Secondary School	50
5	Epe Girls High School	50
6	Odomola Secondary School	50
7	Obona High School	50
8	Alaro Community High School	50
	Total	400

Testing of Hypothesis

Hypothesis One

Null hypothesis (H_0) states that appropriate use of right toothbrush has no effect on gingivae and its sustainability

Alternate hypothesis (H_A) states that appropriate use of right toothbrush has effect on gingivae and its sustainability

Table 2

Cells	Observed value (O)	Expected value (E)	Residual (O-E)	$(O-E)^2$	$\frac{(?? - ??)??}{??}$
Yes	204	200	-4	16.00	0.08
No	196	200	-4	16.00	0.08
TOTAL	**400**	**400**			**0.16**

Calculated Value of $x^2 = 0.16$;

1 Df at alpha level X^2 Critical Value (X^2_{tab}) =3.84

H_0 tested = If X^2calculate > X^2tabulated = rejected

Therefore the Null Hypothesis (H_0) is accepted

This reveals that the calculated value of the chi-square value (X^2) was 0.16 which is less than the critical value of 3.84 with the degree of freedom 1 at 0.05 alpha level of significance. Hence, the null hypothesis is thereby accepted; which indicates that appropriate use of right toothbrush has no effect on gingivae and its sustainability. This implies that inappropriate use of right toothbrush can have effect on gingivae and its sustainability.

Hypothesis Two

Null hypothesis (H_0) states that not changing toothbrush often enough has no significant effect on the gingivae.

Alternate hypothesis (H_A) states that not changing toothbrush often enough has significant effect on the gingivae.

Table 3

Cell	Observed value (O)	Expected value (E)	Residual (O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
Yes	346	200	146	21316	106.58
No	54	200	-146	21316	106.58
TOTAL	**400**	**400**			**213.16**

Calculated Value of x^2 = 213.16;

1 Df at alpha level X^2 Critical Value (X^2_{tab}) = 3.84

H_0 tested = If X^2calculate > X^2tabulated = rejected

Therefore the Null Hypothesis (H_0) is rejected

This reveals that the calculated value of the chi-square value (X^2) was 213.16 which is greater than the critical value of 3.84 with the degree of freedom 1 at 0.05 alpha level of significance. Hence, the null hypothesis is thereby rejected; which indicates that not changing toothbrush often enough has significant effect on the gingivae.

Hypothesis Three

Null hypothesis (H_0) states that brushing teeth too often or too hard has no significant effect on gingivae and its sustainability.

Alternate hypothesis (H_A) states that brushing teeth too often or too hard has significant effect on gingivae and its sustainability

Table 4

Cells	Observed value (O)	Expected value (E)	Residual (O-E)	$(O-E)^2$	$\frac{(O-E)^2}{E}$
Yes	264	200	64	4096	20.48
No	136	200	-64	4096	20.48
TOTAL	**400**	**400**			**40.96**

Calculated Value of x^2 = 40.96;

1 Df at alpha level X^2 Critical Value (X^2_{tab}) =3.84

H_0 tested = If X^2calculate > X^2tabulated = rejected

Therefore the Null Hypothesis (H_0) is rejected

This reveals that the calculated value of the chi-square value (X^2) was 40.96 which is greater than the critical value of 3.84 with the degree of freedom 1 at 0.05 alpha level of significance. Hence, the null hypothesis is thereby rejected; which indicates that brushing teeth too often or too hard has significant effect on gingivae and its sustainability.

Findings

Based on the data revealed by the analysis, the study found that one hypothesis was accepted while the remaining two (2) hypotheses were rejected, based on the fact that calculated values of chi-square which were greater than the tabulated values were rejected hence the following conclusion:

i. Appropriate use of right toothbrush has no effect on gingivae and its sustainability.

ii. Not changing toothbrush often enough has a significant effect on the gingivae.

iii. Brushing teeth too often or too hard has significant effect on gingivae and its sustainability.

iv. Un-ideal method of tooth brushing have significant impact on gingivae.

Discussion of Findings

From the result of the findings, the following could be deduced.

Gingiva is pink and firm, tapered contoured tissue surrounding the teeth which in health does not bleed on probing and tooth brushing. Gingival bleeding occurs mainly due to inadequate plaque removal which results in the thinning, ulceration, necrosis of gingival epithelia coupled with engorgement of blood vessel. Gingival bleeding on tooth brushing is a form of provoked gingival bleeding, a vital feature and probably one of the most frequent complaints among patients with periodontal disease.

Periodontal disease usually begins at childhood as gingivitis and increases in prevalence and severity, which may lead to the development of periodontitis. The presence of plaque has been established as being a precondition for gingivitis. Tooth brushing is considered to be the most reliable mean of plaque control, providing thorough and regular cleaning. Nowadays, a wide variation exists in the tooth brush design, brushing technique, and in the frequency and time of tooth brushing this view is expressed by Barzan and Hussain (2006) who observed in their study of school aged children that the highest prevalence of plaque and gingival score was for those with no brushing and tends to decrease with increasing frequency of tooth brushing, and this agreed with the fact that the single most important hygiene measure is tooth brushing and it is the most effective mean of promoting oral health.

Azodo and Ojehanon (2012) in a cross-sectional survey among undergraduates of University of Benin, Benin City, Nigeria observed that individuals with gingival bleeding were significantly more likely to use excessive force during tooth brushing, less likely to have received professional instruction on tooth brushing and report worsening condition of

teeth despite daily tooth brushing. In another review by Asadoorian (2006), he emphasise the importance of proper toothbrushing ahead of frequency of brushing by reiterating that the quality of brushing is likely a more important factor than the frequency in relation to improvements in periodontal health. He stated further that while a multitude of toothbrushing techniques were developed, no one method had been shown to be superior. Hence further it was concluded that the conscientious and correct application of a brushing method was more critical than use of any specific method.

Serino, Wennstrom, Lindhe & Eneroth (1994) in an observational study of students observed the presence of gingival recessions in patients with a high standard of oral hygiene was related to wrong toothbrushing technique, too much strength exerted in brushing, overbrushing, and usage of hard toothbrush bristles. These findings were supported by Tezel, Canakci, Cicek, & Demir (2001) who concluded recession is particularly associated with toothbrushing technique, in particular horizontal scrubbing. Another observational study, which focused on the use of hard or soft MTs, reported recession was far more pronounced in subjects who had used a hard toothbrush and for users of hard toothbrushes a correlation between the percent of surfaces with recession and increasing brushing frequency (American Dental Association, 2007).

Recommendations

The following were however recommended:

(i) **Dental Health Education;** impacting scientific accurate knowledge on the care of teeth (oral health) to individuals, family or community at large in such a way that will be understood, believed, accepted and equally put into practice for the betterment of their health status.

(ii) Arousing the interest of people towards appropriate use of right toothbrush, changing of toothbrush often enough, brushing teeth soften, ideal method of tooth brushing on gingivae and its sustainability thus preventing diseases, promoting health, and prolonging life.

(iii) **Teeth cleaning;** is the removal of dental plaque and tartar from teeth to prevent cavities, gingivitis, and gum disease.

(iv) **Flossing;** the use of dental floss is an important element of oral hygiene, since it removes plaque and decaying food remaining stuck between the teeth.

(v) **Dentifrice;** any compound used for routine cleansing of teeth. The most common forms of dentifrices are pastes and powders. In general, toothpastes contain several ingredients: an insoluble polishing agent, a binder, flavouring, and a liquid to give plasticity.

(vi) **Medical intervention;** Dentists and dental hygienists are health care professionals trained and licensed to provide dental care. General dentistry emphasizes treatments that prevent oral health problems, especially dental caries, commonly called tooth decay.

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