



(RESEARCH ARTICLE)



## Impact of tooth wear on quality of life of patients attending a tertiary hospital in Lagos, Nigeria

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World Journal of Advanced Research and Reviews, 2024, 24(03), 1592–1599

Publication history: Received on 03 November 2024; revised on 14 December 2024; accepted on 16 December 2024

Article DOI: <https://doi.org/10.30574/wjarr.2024.24.3.3800>

### Abstract

Tooth wear is listed as one of the main oral health problems which affects a major part of the population. It may affect the physical, mental and social well-being of an individual, thereby impacting on the general health and quality of life. This study aimed to determine the impact of tooth wear on quality of life of patients attending a tertiary hospital in Lagos.

**Methods:** 239 consecutive subjects with tooth wear who attended the Dental Centre of the Lagos State University Teaching Hospital Ikeja, Lagos within a period of 3 months were recruited. Informed consent was obtained, and an interviewer-administered structured questionnaire was used to collect sociodemography, diet history and tooth brushing techniques. All subjects also completed the oral health impact profile 14 (OHI-14) questionnaire. Basic Erosive Wear Examination (BEWE) index was used to assess tooth wear. The association between tooth wear and OHI-14 was determined.

**Results:** The age range was 18 years to 80 years with a mean of  $56.21 \pm 14.3$  years. A higher proportion of tooth wear was seen in males (52.3%). The most common BEWE index score was medium, 9-13 (130; 54.4%), followed by high, 14 and above (59; 24.7%) and the least was low, 3-8 (50; 20.9%). The physical pain domain had the highest mean score of  $3.11 \pm 2.4$  while social disability domain had the least which was  $0.8 \pm 1.2$ .

**Conclusion:** The most affected domain was physical pain followed by psychological discomfort and physical disability while the least affected domain was social disability.

**Keywords:** Tooth wear; Attrition; Abrasion; Erosion; Abfraction; Quality of life

### 1. Introduction

Tooth wear is a non-carious, multifactorial problem that results in irreversible loss of dental hard tissues and may lead to aesthetic, functional and psychological complications.[1] It is listed as one of the main oral health problems which affects a major part of the population.[2] Tooth wear may affect the physical, mental and social well-being of an individual thereby impacting on the general health and quality of life.[3] It can be physiological, affecting an individual throughout his/her lifetime with an average vertical loss of enamel of 0.02-0.38  $\mu\text{m}$  in a year.[4,5] Wear is considered excessive and pathological when it is more than what is anticipated for subject's age and it causes aesthetic concern and

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discomfort to the individual.[6] The prevalence varies globally and was found to increase in the western world from 3% at the age of 20 years to 17% at the age of 70 years.[7]

A cohort study of elderly patients carried out in South-South Nigeria revealed a prevalence of 83.2% (40% mild tooth wear; and severe 7.2%); prevalence among old people in Oyo State was 53% between ages 20-64 years and 92.8% in another study.[8,9] In Benin city, the prevalence was 55.3% among 16-66 years old.[10] Tooth wear has been established to increase with age since there is an increasing elderly population with less occurrence of edentulism.[11] In Port Harcourt in Nigeria, prevalence of mild and moderate tooth wear was common in the elderly.[9] All these support age as a predictor of tooth wear. Males have a higher prevalence of tooth wear than females.[5] Tooth wear may be caused by tooth-to-tooth contact known as attrition, tooth friction with external material contact known as abrasion, acidic insult or chelation of teeth with no bacterial involvement known as erosion or stress induced micro-fracture of dental tissues in the cervical region known as abfraction. [4,12] Tooth wear mechanisms mostly co-exist with one another.[13]

The health of individual teeth or the entire dentition can be compromised by tooth wear with manifestations ranging from dentine hypersensitivity to severe loss of tooth structure, abnormal occlusion and reduced facial height.[14] At the early stage of development, patients with tooth wear lesion may be symptomless, however, if untreated, it results to discomfort such as hypersensitivity especially during eating, drinking or tooth brushing and this may progress to spontaneous pain or the pulp may become necrotic.[15] The patients seek help because of problems of pain, altered function and unsatisfactory appearance especially when the anterior teeth are involved.[16] The management of patients with tooth wear has been of several challenges for many years to dental professionals. Rather than abate, the problem is on the increase due to the fact that more of the population is retaining their natural teeth into old age.[16] It was therefore the aim of this study to determine the impact of tooth wear on quality of life among patients with these lesions who presented at the conservation unit of the Dental Centre of the Lagos State University Teaching Hospital Teaching Hospital, Lagos, Nigeria.

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## 2. Methodology

The subjects were recruited based on convenience sampling of consecutive patients that presented at the Dental Centre of Lagos state University Teaching Hospital Ikeja, Lagos.

**Inclusion criteria:** Subjects 18 years and above with tooth wear and who were willing to participate were recruited. After obtaining consent, the subjects were assessed and examined clinically and those that satisfied these inclusion criteria were recruited into the study.

**Exclusion criteria:** Those excluded were subjects with debilitating conditions such as cardiovascular diseases, tuberculosis and aggressive tumors; subjects in acute pain such as acute apical periodontitis, irreversible pulpitis and temporo-mandibular dysfunction syndrome; subjects with neuromuscular handicapping conditions, subjects that were mentally unable to comprehend or answer the questions on the proforma and those with mouth opening  $\leq 3.5$ cm.

Ethical approval for this study was obtained from the Health Research Ethics Committee of the Lagos State University Teaching Hospital Ikeja, Lagos, Nigeria. All eligible and consenting subjects were asked to fill and sign an informed consent form and an interviewer structured questionnaire consisting of two sections was administered.

Sample size estimation was based on the formula

$$n = \frac{Z^2 pq}{d^2}$$

Where

n = the desired sample size

Z = the standard normal deviate, usually set at 1.96 which corresponds to the 95% confidence level (or 5% significant level)

$p$  = the proportion of the target population estimated to have a particular characteristic from previous study using proportion of 0.17 when prevalence is 17%. [17]

$$q = 1.0 - p$$

$d$  = degree of accuracy desired set at 0.05

$$n = \frac{(1.96)^2(0.17)(0.83)}{(0.050)^2}$$
$$= 216.8$$

With 10% attrition (21.7), total of 239 subjects were recruited for the study. [18]

An interviewer-administered proforma form comprising of two sections was filled out for all subjects.

Section A, requested details on age, sex, socio economic class, type of diet, consumption of fruits/ citric fruits, consumption of beverages/carbonated drinks and tooth brushing techniques.

Subjects were classified into 3 socioeconomic groups: Upper class, Middle class and Low class. [19]

Section B, consisted of oral health impact profile 14 measure of oral health-related quality of life. The OHIP 14, a multifactorial tool, was used to assess the frequency of issues linked to oral health in seven distinct conceptual domains: functional limitation (e.g. difficulty pronouncing words; felt worsened sense of taste), physical pain (painful aching; uncomfortable to eat), psychological discomfort (self-consciousness and felt tensed), physical disability (diet has been unsatisfactory, interrupted meals), psychological disability (difficulty to relax, little embarrassed), social disability (felt irritable with others, difficulty doing usual jobs) and handicap (Less satisfaction). [2]

For each question on the OHIP-14, the subjects were asked how frequently they had experienced the problem during the preceding 3 months. Responses were recorded using a 5-point Likert scale: 0 = never, 1 = hardly ever, 2 = occasionally, 3 = fairly often and 4 = very often. Total OHIP score was calculated for each subject by adding the score for each question, while the mean score was calculated by dividing the total score by fourteen.

Oral examination was carried out in the dental clinic by two calibrated examiners. The calibrated examiners performed a pre-test to examine inter examiner reproducibility with 20 randomly chosen adults. Both examiners further examined 10 randomly chosen subjects to assess intra examiner reproducibility.

Selected subjects underwent oral examination on a dental chair using air syringe, sterilized dental mirror and WHO periodontal probe under standardized visible light in a normal surgery condition. All teeth were examined and attrition, erosion, abrasion and abfraction were charted based on the guidelines of Kelleher and Bishop. [20]

The tooth wear was graded using the Basic Erosive Wear (BEWE) index. [21]

This index was scored from 0 to 3 based on the severity of tooth wear ranging from no surface loss (0), initial loss of surface texture (1), distinct defect, hard tissue loss (dentine) less than 50% of the surface area (2), or hard tissue loss more than 50% of the surface area (3). Buccal/facial, occlusal and lingual/palatal surfaces were examined on each tooth. The scoring system recorded the most severely affected surface in a sextant. All teeth were examined. The cumulative score was recorded.

#### **Data management and analysis:**

Data was collected for each parameter and subjected to statistical analyses using SPSS version 23. Mean and standard deviation of numeric variables were calculated. Categorical variables were compared using frequency and percentages.

### 3. Results

A total of 239 patients attending dental clinic were recruited in this study. The mean age was  $56.2 \pm 14.3$  years. Majority 107 (44.8%) of the participants were in the middle age class (41- 65 years), 39.7% were elderly (above 65 years). 52.3% were males while 47.7% were females. The medium socio-economic class made up the highest group at 73.6% (Table 1). Majority of participants ate a mixed diet of hard and soft meals (91.2%) and 8.8% fed on vegetables. 88.3% indulged in fruits and citric drinks while (71.1%) drank beverages/ carbonated drinks (Table 1).

In relation to oral hygiene practices many of the participants brushed up using horizontal technique (47.7%) (Table 1).

**Table 1** Basic demographical characteristics of the study population

| Variables  | No (%)    |
|--|-----------|
| <b>Age group</b>                                   |           |
| ≤40 years  | 37(15.5)  |
| 41-65years   | 107(44.8) |
| ≥65years   | 95(39.7)  |
| <b>Sex</b>   |           |
| Male   | 125(52.3) |
| Female   | 114(47.7) |
| <b>Socio economy class</b>                         |           |
| Low income   | 54(22.6)  |
| Medium   | 176(73.6) |
| High income  | 9(3.8)    |
| <b>Type of Diet</b>                                |           |
| Vegetarian   | 21(8.8)   |
| Mixed  | 218(91.2) |
| <b>Consumption of fruits/citric drinks</b>         |           |
| Yes  | 211(88.3) |
| No   | 28(11.7)  |
| <b>Consumption of beverages /carbonated drinks</b> |           |
| Yes  | 170(71.1) |
| No   | 69(28.9)  |
| <b>Brushing Techniques</b>                         |           |
| Vertical   | 83(34.7)  |
| Horizontal   | 114(47.7) |
| Roll   | 42(17.6)  |

Attrition accounted for 48.5% of the subjects, followed by attrition combined with abrasion (20.5%), abrasion only (18.4%), erosion (9.2%) and the least was abfraction (3.4%) (Table 2). The most common BEWE index was medium score (range 9-13) which was seen in 130 (54.4%) participants, followed by high score (14 and above) seen in 59 (24.7%) participants and the least was low score (range 3-8) found in 50 (20.9%) (Table 2).

**Table 2** Types of Tooth wear among study participants

| Variable                 | No (%)      |
|--------------------------|-------------|
| Type of Tooth wear       |             |
| Attrition                | 116 ( 48.5) |
| Erosion                  | 22(9.2)     |
| Abrasion                 | 44(18.4)    |
| Abfraction               | 8 (3.4)     |
| Attrition + Abrasion     | 49(20. 5)   |
| <b>BEWE Index Scores</b> |             |
| Low(3-8)                 | 50(20.9)    |
| Medium (9-13)            | 130(54.4)   |
| High ( 14 and above)     | 59(24.0)    |
| Total                    | 239(100)    |

Assessing tooth wear and its impact on quality of life, using the oral health impact profile (OHI-14) This resulted in certain domains being mostly affected such as physical pain ( $3.11 \pm 2.4$ ), psychological discomfort ( $3.03 \pm 2.5$ ), physical disability( $2.20 \pm 1.7$ ) and the least affected was social disability with a score of  $0.8 \pm 1.2$  (Table 3).

**Table 3** Mean Oral Health Impact Profile-14 domain mean scores among the study population.

| Domain                       | OHIP-14   | Mean $\pm$ SD                      |
|------------------------------|---|------------------------------------|
| Functional limitation        | Difficulty pronouncing words Felt worsened sense of taste | 0.90 $\pm$ 1.2                     |
| Physical pain                | Painful aching Uncomfortable to eat                       | 3.11 $\pm$ 2.4                     |
| Psychological discomfort     | Self-conscious Felt tensed                                | 3.03 $\pm$ 2.5                     |
| Physical disability          | Diet has been unsatisfactory Interrupted meals            | 2.20 $\pm$ 1.7                     |
| Psychological disability     | Difficulty to relax Little embarrassed                    | 1.45 $\pm$ 1.7                     |
| Social disability            | Felt irritable with others Difficulty doing usual jobs    | 0.8 $\pm$ 1.2                      |
| Handicap                     | Less satisfaction Unable to function                      | 1.09 $\pm$ 1.5                     |
| <b>Overall OHIP-14 score</b> |   | <b>12.58 <math>\pm</math> 8.61</b> |

#### 4. Discussion

This study determined the association between tooth wear and quality of life. It showed that tooth wear occurred in all age groups but commonest in the middle age group 41-65 years followed by the elderly. This corroborates the findings of some previous studies.[16, 22, 23] This age range has been associated with 10 times increased risk of tooth wear.[8] This is however, contrary to report of Rubb,[24] in which tooth wear prevalence was more among patients less than 26 years old. This difference might be due to dissimilarity in the predominant type of tooth wear in the different studies. In the present study, tooth wear increases in occurrence with increase in age because of the cumulative effect of teeth contact.

Several studies [25, 26] have reported differences in the incidence of tooth wear in relation to the genders of the participants. In this study, the incidence of tooth wear was higher among males (52.3%) than females. This is in alignment with the study of Oginni and Olusile. [26] This was associated with higher bite force in male due to mastication, clenching and grinding relative to females. [10,26]

Majority (73.6%) of the participants belonged to the medium socioeconomic class which implied being involved in different grades of occupations which would require further investigations. This is contrary to a previous study that associated poor or low social class with tooth wear.

This class is said to be affected due to lack of awareness, knowledge and poor oral hygiene condition. [19]

Attrition (48.5%) was the most common type of tooth wear in the present study, and this is similar to result of previous studies in Nigeria. [16, 19, 22] This is however, contrary to reports of the study in Saudi-Arabia [27] and Europe [28] in which erosion accounted for 90% and 70% of tooth surface loss respectively. The dissimilarity in these findings could be due to differences in the main etiological factors of tooth wear in different parts of the world.

In the present study majority (91.2%) of the participants fed on mixed diet which included hard and soft meals. They also consumed acidic fruits/ citric drinks (88.3%). One hundred and seventy (170; 71.1%) participants also indulged in consumption of beverages and carbonated drinks. Furthermore, most participants (47.7%) also practiced horizontal brushing technique. All these could be the reason for tooth wear in this study.

Since a large proportion of the study participants practiced horizontal technique of tooth brushing, this needs to be corrected and modified because tooth brushing is a daily activity and a principal contributory factor to the development of tooth wear. Tooth brushing instruction is of paramount importance in any oral health promotion program. [2] It is aimed at improving the knowledge, attitudes and behaviors of individuals regarding oral health. And as such people develop self-care skills to control dental hygiene. This brushing instruction, should involve provision of enough time for demonstration and repetition for the individual to master the skill. [2]

In this study, most of the participants exhibited medium (9-13) and high (14 and above) BEWE index score. These were patients with moderate and severe tooth wear respectively. This was similar to earlier studies in which the conditions impacted on the quality of life. [2, 12]

Concerning tooth wear and its impact on quality of life, the most affected domain was physical pain (mean score  $3.11 \pm 2.4$ ), followed by psychological discomfort ( $3.03 \pm 2.5$ ) and physical disability ( $2.20 \pm 1.7$ ), while the least affected domain was social disability ( $0.8 \pm 1.2$ ).

Similarly, Daly et al. [15] also reported painful sensation and discomfort as the most common negative effect of tooth wear on the quality of life of their patients. Likewise, Ogunrinde et al. [16] reported painful sensation as the most common negative effect of tooth wear on the quality of life of their patients.

However, Goyal et al [2] reported problem with physical disability as the most impacted by tooth wear in relation to quality of life of the population studied. Painful sensation was responsible for the highest impact on oral health quality of life in this present study possibly due to poor dental awareness of the patients leading to late presentation in the clinic for treatment.

In our study, the social disability domain was the least affected (which asks about patients having difficulty in doing their usual job and being a bit irritable because of tooth wear). In a previous study, [16] the domain least affected was handicap domain whereas the least affected domain in the study of Goyal et al [2] was functional limitations.

This finding agreed with the report of a previous study that common dental diseases although have negative impact on the quality of life of patients, it rarely incapacitates the patients. [29]

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## 5. Conclusion

In this study the most common occurring type of tooth wear was attrition. Tooth wear affected all ages studied but occurred more in the middle and older age groups. Majority of participants had medium (9-13), and high (14 and above) BEWE index scores. Using OHIP-14 to measure the impact of tooth wear on quality of life in our study, physical pain domain was the most affected while social disability domain was the least affected.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

No conflicts of interest regarding the publication of this paper.

### *Statement of ethical approval*

Approval for this study was obtained from the Health Research Ethics Committee of the Lagos State University Teaching Hospital Ikeja, Lagos, Nigeria.

### *Statement of informed consent*

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

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