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Journal of Dental Health Oral Disorders & Therapy

Research Article
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# Oral hygiene status among orthodontic patients attending university of Benin teaching hospital, Benin city, Nigeria

## Abstract

**Objective:** The aim of this study was to assess oral hygiene status among patients with fixed orthodontic appliances.

**Materials and Methods:** A Simplified Oral hygiene Index (OHI-S) by Greene and Vermillion was used to determine the oral hygiene status of orthodontic patients who were on active fixed orthodontic treatment at University of Benin Teaching Hospital Dental Centre, Benin City, Nigeria. The standard six surfaces were evaluated to determine the Debris index and Calculus index for each patient. A self-administered questionnaire was also used to determine tooth brushing practices among the orthodontic patients. Statistical gender and age differences in the subject's oral hygiene status, debris and calculus indexes were evaluated with the chi-square test and mean differences with independent t test.

**Results:** Forty three orthodontic patients consisting of 27 females (62.8%) and 16 males (37.2%) with a mean age of 22.2±7.6 years were evaluated. The assessment of oral hygiene status revealed that most of the orthodontic patients 27 (62.8%) exhibited good oral hygiene and 16 (37.2%) had fair oral hygiene while none had poor oral hygiene. The mean debris index and calculus index were slightly higher among the males than females but the differences were statistically insignificant (P>0.05). The subjects within the age group 11-20 years old exhibited a statistically significant highest proportion of good and fair oral hygiene (P<0.05). Majority of the subjects brushed their teeth twice a day while 16.3% brushed more than twice in a day.

**Conclusion:** This study revealed a satisfactory oral hygiene status among the orthodontic patients which will enhance achievement of optimal orthodontic treatment.

**Keywords:** oral hygiene index, oral hygiene status, orthodontic patients, malocclusion, fixed appliances

Volume 1 Issue 4 - 2014

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**Received:** July 29, 2014 | **Published:** September 10, 2014

## Introduction

Orthodontic treatment is mostly received by individuals to improve dentofacial appearance.[1] The orthodontic mechanotherapy often involves the use of fixed appliances in the management of malocclusion and malrelationship of the dental arches. However, the placement of fixed orthodontic appliances could affect the ease of oral hygiene procedures among patients. A high standard of oral hygiene is therefore essential for all patients undergoing orthodontic treatment. Inadequate oral home care and dental hygiene practices can lead to accumulation of plaque and make orthodontic patients more prone and at increased risk of developing gingivitis, gingival recession, loss of gingival attachment and periodontal support and dental caries.[2,3]

Zachrisson[4] had observed that conventional orthodontic treatment has negligible effects on periodontal health if oral hygiene procedures are maintained during treatment. Ramfjord and Ash[5] also reported that the determining factor for the severity of gingivitis, whether teeth are crowded or not, is the amount of plaque present in the patients. It is therefore imperative for the clinicians to make the intending orthodontic patients to appreciate that the components of fixed appliances could facilitate accumulation and retention of plaque in a poorly motivated individual with poor oral hygiene, and with concomitant increase in oral Microfloras during orthodontic treatment could result in oral and dental infections.[6–8]

The Simplified Oral Hygiene Index (OHI-S) by Greene and Vermillion[9] has been found useful in assessment of oral hygiene state of individuals. The evaluation of oral hygiene status among orthodontic patients on active treatment will reveal their current oral health status and facilitate the planning of appropriate of oral health care and dental services. It will also facilitate the determination of the need to further reinforce home care oral hygiene instructions and remedies for patients where appropriate with a view to prevent and reduce risk of complications of oral and dental infections during active orthodontic treatment. The orthodontic clinic of the University of Benin Teaching Hospital dental centre is the foremost referral center for patients requiring fixed orthodontic appliance therapy in the south southern and eastern regions of Nigeria. Presently, there is no published data on oral hygiene status among orthodontic patients in these regions of Nigeria. The aim of this study was therefore to determine the oral hygiene status of orthodontic patients under fixed appliances therapy at the University of Benin Teaching Hospital, Benin City, Nigeria.

## Materials and methods

A cross-sectional study of patients undergoing active orthodontic treatment at the Orthodontic Unit of University of Benin Teaching Hospital Dental Centre, Benin City, Nigeria was conducted between January and December, 2013. The clinical examination of all the orthodontic patients on active fixed appliances therapy for at least a minimum of 6 months was done by a single calibrated examiner[1] using

a mouth mirror and dental probe. The patients were examined during their routine 6th weekly review appointments and had no scaling and oral prophylaxis at least 4 weeks preceding their examination.

The orthodontic patients were examined for their oral hygiene status using the Simplified Oral Hygiene Index (OHI-S) by Greene and Vermillion.[9] The standard six tooth surfaces were examined for debris and calculus for each patient and recorded in a chart. The average individual Debris index and Calculus index were subsequently determined and added to obtain the simplified Oral hygiene index for each patient. The state of oral hygiene among the patients were then graded into three groups and determined as Good (OHI value 0-1.2), Fair (OHI value1.3-3.0) and Poor (OHI value 3.1-6.0). A self-administered questionnaire was also used to determine tooth brushing practices among the orthodontic patients. This study was approved by the Research ethics committee of the College of Medical Sciences of the University of Benin, and also the parents and patients gave their consent to participate in the study. The data analysis was carried out with Statistical Package for Social Sciences software version 17 (SPSS, Chicago, Illinois). Statistical significance between frequencies, age and gender differences in oral hygiene status, debris and calculus indexes were evaluated with the chi-square test and independent t-test respectively with $p<0.05$ regarded as significant.

## Results

A total of 43 orthodontic patients, 27 females (62.8%) and 16 males (37.2%) aged 12-42 years (mean age of 22.2 years±7.6) were evaluated in this study. The age and gender distribution of the subjects were shown in Table 1. The subjects aged between 11 and 20 years old were predominant and constituted slightly more than half of the total sample population.

**Table 1** Age and gender distribution of the subjects

| Gender | | | | | | |
|---|---|---|---|---|---|---|
| **Age (Years)** | **Females** | | **Males** | | **Total** | |
| | N | % | N | % | N | % |
| 11-20 | 14 | 51.9 | 8 | 50.0 | 2 | 51.2 |
| 21-30 | 9 | 33.3 | 5 | 31.3 | 14 | 32.6 |
| 31-40 | 3 | 11.1 | 3 | 18.8 | 6 | 14.0 |
| 41-50 | 1 | 3.7 | 0 | 0.0 | 1 | 2.3 |
| Total | 27 | 100.0 | 16 | 100.0 | 43 | 100.0 |

Mean age=22.5 years; Standard deviation=7.5

Table 2 shows that the majority of the subjects (62.8%) had good oral hygiene status, more than a third (37.2%) had fair oral hygiene and none of the orthodontic patients had poor oral hygiene. There was no statistically significant gender differences in the distribution of oral hygiene status ($P>0.05$) among the subjects. The mean oral hygiene index, debris index and calculus index were slightly higher among the males than females but statistically insignificant ($P>0.05$) as shown in Table 3.

There was highly significant difference in the frequency of tooth brushing among the subjects ($P<0.001$) as 62.8% of the subjects brushed their teeth twice daily while 16.3% brushed more than twice in a day as shown in Table 5.

**Table 2** Gender distribution of Oral hygiene status (OHI-S) among the subjects

| **Oral Hygiene Status** | **Male** | | **Female** | | **Total** | |
|---|---|---|---|---|---|---|
| | n | (%) | n | (%) | n | (%) |
| Good | 9 | 56.3 | 18 | 66.6 | 27 | 62.8 |
| Fair | 7 | 43.8 | 9 | 33.3 | 16 | 37.2 |
| Poor | 0 | 0.0 | 0 | 0.0 | 0 | 0.0 |
| Total | 16 | 100.0 | 27 | 100.0 | 43 | 100.0 |

$X^2= 2.555; P > 0.05$

**Table 3** Comparison of mean Debris index, Calculus index and Oral hygiene index among the male and female subjects.

| **Index** | **Male** | **Female** | **P value** |
|---|---|---|---|
| | **Mean ±S.D** | **Mean ±S.D** | |
| Oral Hygiene | 1.23±0.57 | 1.04±0.44 | NS |
| Calculus | 0.44 ±0.37 | 0.30±0.30 | NS |
| Debris | 0.79±0.35 | 0.78±0.31 | NS |

NS: Not significant; *Significant difference at P<0 .05

**Table 4** Age distribution of oral hygiene status (OHI-S) of the subjects

| **Oral Hygiene status** | | | | | | |
|---|---|---|---|---|---|---|
| **Age (Years)** | **Good** | | **Fair** | | **Total** | |
| | N | % | N | % | N | % |
| 11-20 | 14 | 51.9 | 8 | 50.0 | 22 | 51.2 |
| 21-30 | 10 | 37.0 | 4 | 25.0 | 14 | 32.6 |
| 31-40 | 3 | 11.1 | 3 | 18.8 | 6 | 14.0 |
| 41-50 | 0 | 0.0 | 1 | 6.3 | 1 | 2.3 |
| Total | 27 | 100.0 | 16 | 100.0 | 43 | 100.0 |

$X^2 = 10.495; P < 0.05$

**Table 5** Frequency of tooth brushing

| **Tooth Brushing** | **Male** | | **Female** | | **Total** | |
|---|---|---|---|---|---|---|
| | **n** | **(%)** | **n** | **(%)** | **n** | **(%)** |
| Once a day | 4 | (25.0) | 2 | (7.4) | 6 | (14.0) |
| Twice a day | 8 | (50.0) | 19 | (70.4) | 27 | (62.8) |
| More than twice a day | 2 | (12.5) | 5 | (18.5) | 7 | (16.3) |
| Others | 2 | (12.5) | 1 | (3.7) | 3 | (7.0) |
| Total | 16 | (100.0) | 27 | (100.0) | 43 | (100.0) |

$X^2 = 19.344; P < 0.001$

## Discussion

The Simplified Oral Hygiene Index (OHI-S) by Greene and Vermillion[9] was utilized to evaluate oral hygiene status among the orthodontic patients in this study. Fifty one percent of the sample population was aged between 11 and 20 years old which could be

attributed to early commencement of orthodontic treatment in adolescence. There was also a higher number of females under fixed appliance therapy compared to the males in this study and may be due to the fact that more females possibly presented for orthodontic treatment because of their awareness of malocclusion and desire of treatment. Even though, the reasons for seeking orthodontic treatment were not within the scope of this present study.

The assessment of oral hygiene status revealed more than sixty percent (62.8%) of the subjects had good oral hygiene, over a third had fair oral hygiene and none of the patients presented with poor oral hygiene. This study revealed no statistically significant gender differences in the distribution of oral hygiene status among these orthodontic patients even though the mean oral hygiene, debris and calculus indices were slightly higher among the males than females. The subjects aged between 11-20 years old exhibited a significantly highest level of good and fair oral hygiene status. The satisfactory oral health status observed in this study therefore suggested a good ability of these orthodontic patients to control and reduce plaque accumulation around their fixed appliances. This study also revealed that the significant majority of the subjects brushed their teeth twice daily which were also consistent with high frequency of subjects with good oral hygiene. The good oral hygiene status observed among these subjects could possibly be attributed to their dental awareness and positive attitude towards oral health since most individuals who seek orthodontic treatment desire improved dental aesthetics, oral function, optimal oral health and psychological well-being.[1] Routine provision of information on oral hygiene and home care instructions to the intending orthodontic patients pre-treatment at the consultant orthodontists' clinic may also be contributory. This present study is however in contrast to the findings of Atassi & Awartani[10] who reported unsatisfactory oral hygiene in their orthodontic patients despite the fact that more than half of their patients (54%) brushed their teeth twice daily and one-fifth thrice daily. They further stated that frequency of tooth brushing alone cannot be used as a measure of the quality of oral hygiene but levels of patient's education and motivation, and continuous reinforcement of oral home care are important factors in oral hygiene care. Hobson and Clark[11] also observed that even though many orthodontists advocate appropriate oral hygiene measures, the efficacy is largely determined by the patient's motivation.

In a similar study among orthodontic patients in South western Nigeria using the same index by Greene and Vermillion,[9] Onyeaso et al.[12] also reported a good oral hygiene in 59.6% of their orthodontic patients and 38.2% with fair oral hygiene which they attributed to their subjects attitudinal factors because of their relatively better dental awareness.

A high dental awareness and positive attitude towards oral health among patients therefore constitute significant contributory factors in achieving good oral hygiene status. It is also imperative to note that while the orthodontic patients have the responsibility to observe and maintain good oral hygiene, the orthodontists also have an important role to promote oral hygiene during orthodontic treatment which will include choice of more hygienic orthodontic appliances, provision of oral health education and advice about methods of plaque control, dietary advice, fluoride therapy, motivation and monitoring to ensure effectiveness of the oral hygiene regime with the aim of reducing plaque accumulation during treatment and prevention of corresponding adverse effects.

## Conclusion

This study revealed a satisfactory oral hygiene status among this sample of Nigerian orthodontic patients. There were no statistically significant gender differences in the distribution of oral hygiene status among the subjects, although the younger subjects had a significantly highest proportion of good and fair oral hygiene status.

## Acknowledgments

None.

## Conflict of interest

The author declares that there is no conflict of interest.

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