Assessment of Association between Anthropometry and Dental Caries among Nigerian Young Adults: A Case Control Study

A. O. Adejumo¹, O. Ogunlade¹*, E. O. Ozeigbe², A. M. Oluwadaisi¹ and M. A. Asafa¹

¹Department of Physiological Sciences, Obafemi Awolowo University, Ile-Ife, Nigeria.
²Department of Child Dental Health, Obafemi Awolowo University, Ile-Ife, Nigeria.

Authors’ contributions

This work was carried out in collaboration between all authors. Author AOA designed the study, performed the statistical analysis and wrote the protocol and first draft of the manuscript. Authors OO and EOO managed the design, protocol, statistical analyses, result presentation and discussion of the study. Author AMO managed the literature searches and wrote the first draft of the manuscript. Author MAA participated in data analysis and management. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMPS/2018/42186

Original Research Article

ABSTRACT

Aims: The aim of the study was to evaluate the relationship between anthropometric parameters and dental caries among young adults in Ile-Ife, Osun state, Nigeria.

Study Design: This was a cross-sectional case-control study.

Place and Duration of Study: The study was carried out at Department of Physiological Sciences and University Health Centre, Obafemi Awolowo University, Ile-Ife between December 2015 to December 2016.

Methodology: Ninety-two university students aged 18-35 years were recruited for the study. The participants were classified into two groups (cases and control) which were age-and sex-matched. The cases were 46 students with dental caries while the control were 46 students without dental caries.

*Corresponding author: E-mail: ogunladesomotomilayo@gmail.com;
1. INTRODUCTION

Oral health has a considerable impact on general health and vice versa. Dental caries is a multifactorial oral infection [1]. It is the most common chronic childhood disease in oral health [2]. Factors predisposing to dental caries include consumption of refined sugar, poor oral hygiene, inadequate fluoride supplementation, low socio-economic status, low salivary immunoglobulins and high oral bacterial load.

As one of the most common prevalent disease in the world, dental caries is hypothesized to be a potential risk factor for general health [2]. Anthropometry is the scientific assessment of body size. It provides the single most portable, inexpensive and non-invasive technique for assessing the size, proportions and composition of the human body [3]. The common anthropometric indices include weight, height, body mass index (BMI) and body surface area (BSA). BMI is also called Quetelex index. It is an internationally accepted index for defining and classification of obesity [4-6].

Abnormal BMI is part of global health burden. A high BMI may be an indicator of excess body fat deposition. BMI can also be used as a screening tool but is not diagnostic of the body fatness [6]. According to World Health Organization (WHO), BMI (kg/m²) of an adult is classified as underweight (<18.5), normal (18.5 - 24.9), overweight (25.0 to 29.9) or obesity (≥ 30) [7]. Underweight, overweight and obesity were associated with increased risk of morbidity and mortality [8]. Individuals with abnormal BMI were at increased risk of numerous multisystemic health challenges involving the endocrine, metabolic, cardiovascular, respiratory, musculoskeletal and neurological systems [9].

Obese adolescents are more likely to become obese adults, posing an increased risk of morbidity and mortality in adulthood [10]. While genes are important in determining a person's susceptibility to weight gain, energy balance is determined by calorie intake and physical activity. Dental caries is a multifactorial medical condition with overwhelming task to healthcare professionals in dentistry. Changes in behavior, culture, environment, genetic factors and worldwide nutrition transition have been implicated in driving the obesity epidemic [11] and some of these factors are also responsible for dental caries.

Obesity and dental caries have common risk determinants and require a comprehensive multidisciplinary approach [10]. While obesity may be caused by eating too much calories and refined sugar and burning too little, dental caries is caused by eating too much of refined sugar [11]. Dietary interventions by dental practitioners to eliminate the development of dental caries may at the same time reduce the body mass index. This can be achieved by administration of dietary chat which will point out the major diet(s) causing the carious lesion and or obesity. BSA measures the total surface area of the body and is used to calculate drug dosages and medical indicators or assessments. The present study was conducted to evaluate the relationship between BMI, BSA and dental caries among young adult in Ile-Ife, Nigeria.

2. METHODOLOGY

The research was a case-control study that compared the anthropometric parameters in young adults with and without dental caries. The sample size of 92 was determined using a formula for comparison of proportion defined by...
STATA statistically software (version 10). The participants were grouped into two; cases (46 students with dental caries) and controls (46 students without dental caries). The cases and controls were sex- and age- matched and selection was by purposive sampling technique. Participants were undergraduates of Obafemi Awolowo University, (OAU) Ile-Ife, Osun State who were within the age range of 18-35 years. A written informed consent was sought from each participant. Ethical clearance was obtained from Institute of Public Health, College of Health Sciences, Obafemi Awolowo University, Ile-Ife. Volunteers for the study had dental examination done by a calibrated dentist. Caries status was assessed using World Health Organization(WHO) index called Decayed, Missing, and Filled Teeth (DMFT) index. Using the DMFT, individuals were classified into cases (DMFT>1) and controls(DMFT<1). Individuals who were less than 18 years or older than 35 years, underlining systemic conditions, history of cigarette smoking, regular alcohol intake and long-term coffee consumption were excluded from the study. The participants were examined seated on a plastic chair in a room with good lighting source using sterile mouth mirrors and a probe for each participant. Caries was determined visually with the optimal illumination of oral cavity and no x-rays was used. Participants were asked to complete the dietary chart by writing the meals and in-between meals eaten over a period of three days including a weekend day. These meals and in-between meals were categorized into high caries/cariogenic diet (high in refined sugar) or low caries/non-cariogenic diet (low in refined sugar). Weight and height of each selected participant were assessed using a standard physician scale (200CHUB) and a wall-mounted stadiometer respectively. The body mass index (BMI) was calculated using a Quetelex formula; BMI = weight/height² [4]. Weight was measured in kilogram while height was measured in meters. Body surface area was calculated using the Mosteller formula; BSA = (height (cm) x weight (kg) / 3600)½. Data were analyzed using SPSS Windows Version 23 (SPSS Inc, IBM, UK). A P value less than .05 was considered statistically significant.

3. RESULTS AND DISCUSSION

3.1 Results

A total of ninety-two participants were selected into the study, out of which forty-six (50.0%) were caries free and forty-six (50.0%) were caries active. Among the caries active participants, 50.0% were males with 30.0% of them within the age of 25-29 years and another 30.0% of them within the age of 30-34 years; the remaining 40.0% were less than 24 years. The mean age of caries active participants was 24.0 ± 5.0 years. Among the caries free participants, 50.0% male out of which 48.0% falls between 20-24 years and 50.0% were females out of which 78.0% were between 20-24 years. The mean age of caries-free participants was 23.0 ± 5.0 years. Presence of decayed, missing or filled teeth/tooth were observed in the oral cavities of the caries active participants and the number of such teeth ranges from 1 to 5. There was no significant difference in the mean values body mass index of cases compared with control (Table 1). The mean BMI of caries active participants was found to be 22.56 ± 3.84 while that of caries free participants was 22.35 ± 3.34 (t = 0.29, P = .78). The BSA showed no significant relationship with caries status (Table 1). The proportion of individuals with overweight was significantly higher in cases than the control (Table 2). There was a significant relationship between BMI classes and caries status (X² = 10.00, P = 0.02).

3.2 Discussion

The present study compared caries active and caries free individual with the aim of finding the differences in the anthropometry. Poor oral health had a profound effect negative effect on general health [12]. Poor oral health is typified by the onset of dental caries, presently adjudged most common chronic disease [13]. Current study showed that there was a significant association between BMI class and dental caries (p=0.02). Critically, a number of studies have linked consumption of sweetened beverages with increased energy intake, obesity [14-16] and dental decay [13,17-18], there are reports of associations between obesity and dental caries, [19-21] these data are diverse and provide conflicting evidence. Obesity and dental caries share common, modifiable, influences such as diet and lifestyle. Recent national data from Sweden [22] suggest a positive correlation between dental caries and Body Mass Index (BMI), and showed that behaviours such as snacking on refined carbohydrate in early childhood predicted caries development in adolescence. BMI is widely used as a surrogate measure for obesity because it corrects for an individual's height in relation to weight, and it is a commonly used indicator of nutritional status [23]. The observed relationship that
Table 1. Relationship between anthropometric measurements and dental caries status

<table>
<thead>
<tr>
<th>Anthropometry</th>
<th>Caries active</th>
<th>Caries free</th>
<th>t</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>1.65±0.67</td>
<td>1.64±0.72</td>
<td>0.28</td>
<td>.78</td>
</tr>
<tr>
<td>Weight</td>
<td>61.30±11.56</td>
<td>60.41±10.38</td>
<td>0.39</td>
<td>.70</td>
</tr>
<tr>
<td>Body mass index</td>
<td>22.56±3.84</td>
<td>22.35±3.34</td>
<td>0.29</td>
<td>.78</td>
</tr>
<tr>
<td>Body surface area</td>
<td>1.67±0.17</td>
<td>1.66±0.16</td>
<td>0.37</td>
<td>.71</td>
</tr>
</tbody>
</table>

*P<.05

Table 2. Distribution between BMI class and dental caries

<table>
<thead>
<tr>
<th>BMI Class</th>
<th>Caries status</th>
<th>Total</th>
<th>X²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Caries active</td>
<td>Caries free</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>6(13.04%)</td>
<td>2(4.35%)</td>
<td>8(8.69%)</td>
<td>10.000</td>
</tr>
<tr>
<td>Normal weight</td>
<td>26(56.52%)</td>
<td>39(84.78%)</td>
<td>65(70.65%)</td>
<td></td>
</tr>
<tr>
<td>Overweight</td>
<td>12(26.09%)</td>
<td>3(6.52%)</td>
<td>15(16.30%)</td>
<td></td>
</tr>
<tr>
<td>Obese</td>
<td>2(4.35%)</td>
<td>2(4.35%)</td>
<td>4(4.35%)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46(100%)</td>
<td>46(100%)</td>
<td>92(100%)</td>
<td></td>
</tr>
</tbody>
</table>

*P <0.05

Table 3. Effects of diet on caries status

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Caries active</th>
<th>Caries free</th>
<th>X²</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low caries diet</td>
<td>04</td>
<td>39</td>
<td>53.49</td>
<td>0.001*</td>
</tr>
<tr>
<td>High caries diet</td>
<td>42</td>
<td>07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>46</td>
<td>46</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: Significance at P < .05

dental caries rates and BMI are a measure of diet-related health outcome makes the association not to be a surprise. Changes in diet and lifestyle since the mid1990s, such as increased affluence and access to high caloric carbohydrate-rich foods and drinks, may help to account for the rising prevalence of dental caries and obesity [24,25]. Chen et al., [26] discussed a triangular relationship between dental caries, obesity and frequency of ingestion of refined carbohydrates. The current study also showed more carious lesion occur among overweight individuals. Overweight adults are more predisposed to eat or snack on refined carbohydrate. Time or duration should be taken into cognizance to assess such correlations. World Health Organization (WHO) recommends 15 years of age to evaluate caries in young adults. The caries index that was used in this study took into consideration the actual number of teeth at risk and the severity of the lesion. Previous studies reported by Pentapati et al., [27] claimed that there were limited or lack of information on dietary habits. This study, however, included dietary chart, which was administered to the participants. The finding of this study was in tandem with previous studies that showed significant relationship between consumption of refined sugar and dental caries [25]. More of caries active participants were found to consume more of cariogenic diets than the caries free participants. This present study revealed that overweight was closely linked with dental caries. This was in consonance with previous studies where there was a correlation between high BMI and dental caries [24,28-31].

4. CONCLUSION

In conclusion, this study established that there was a significant association between body mass index classes and caries status. Overweight and high caries diet contributed significantly to caries formation.

CONSENT

All authors declare that 'written informed consent' was obtained from the participants for the research.

ETHICAL APPROVAL

All authors hereby declare that all experiments have been examined and approved by the Institute of Public Health Ethics and Research committee, Obafemi Awolowo University, Ile-Ife and have therefore been performed in
according to the ethical standards laid down in the 1964 Declaration of Helsinki.”

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


© 2018 Adejumo et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.