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RESEARCH ARTICLE

DENTAL OCCLUSION PATTERN AMONG THE IKA SPEAKING PEOPLE IN DELTA STATE, NIGERIA

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ABSTRACT

Background: Dental occlusion is the connection between the masticatory surfaces of the maxillary and mandibular teeth. The occlusion types include the edge to edge bite, the moderate overbite, the extreme overbite, and the negative overbite. This study offers important information for exploit in orthodontics, anthropology and forensic science. **Objectives:** To investigate the pattern of tooth occlusion among the Ika people, to investigate if there is a significant gender difference, and to provide a baseline data on the dental occlusion pattern for the Ika ethnic group. **Methods:** Data was gotten from 384 subjects from Ika Kingdoms in Delta State, Nigeria (Agbor, Owa-Ekie and Owa-Alero). Data was collected via observation as subjects were asked to bite, swallow saliva, occlude and open their mouths, while the association between the upper maxillary and lower mandibular teeth was observed and recorded. Record of occlusion pattern was taken as mild overbite, edge to edge bite, negative bite or severe overbite. The Chi-square test was used for inferential statistics and P value less than 0.05 was considered to be statistically significant. **Results:** The mild overbite occlusion pattern had the highest frequency (Males 43.2%, females 42.3%). The negative overbite had the lowest frequency (Males 2.1%, females 1.0%). There was no significant association between sex and type of occlusion pattern ($p=0.84$), and between age and type of occlusion pattern ($p>0.05$). The second most common type of occlusion pattern in the age group range of 15-19 years was the severe overbite occlusion pattern (28%), but in the other age groups (20-24years, 25-30 years) it was the edge to edge bite occlusion pattern, 28.2% and 32.8% respectively. **Conclusion:** The mild overbite occlusion pattern is the most prevalent type found among the Ika people, and there is no significant association between sex or age group and type of occlusion pattern.

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INTRODUCTION

Dental occlusion is the connection between the masticatory surface of the maxillary and mandibular teeth (Davies, 2001). This can either be static, or dynamic. It is static when there is a firm contact between the lower jaw (mandible) and the upper jaw(maxilla), while it is described as dynamic when it is associated with motion, for example when chewing (Wassell, 1998). However, in describing occlusion, it is not limited to just the nature of tooth contact. Rather, it encompasses the morphological and functional interactions of all the elements involved in the chewing system. The presentation of occlusion is a joint effort of the jaw muscles, temporomandibular joint (TMJ) and the teeth. Occlusion is said to be normal when the first upper molar mesiobuccal cusp aligns with the first lower molar buccal groove, when the upper canine tooth occludes with the distal half of the lower canine tooth and when teeth fit in the line of occlusion (Angle, 1899).

The occlusion types include the edge to edge bite, which involves the alignment of the upper teeth and lower teeth with each other, the moderate overbite, which is seen as a minor overlap of the upper teeth with lower teeth, the extreme overbite, presented as an excessive overlap of the upper teeth with lower teeth, and the negative overbite, presented as the lower jaw teeth overlapping the upper jaw teeth (Angle, 1899). In the absence of a tooth or teeth, and in dentitions where occlusion is absent, and in cases of malocclusions, the biological and psychosocial significance of occlusion becomes more apparent. These have been associated with functional, aesthetic, mental and social adverse effects. Malocclusion can be described as any irregularity in occlusion outside the range of what is recognized as natural or normal between the dental arches (Gupta, 2016). This can also be referred to as a misalignment of the human dentition, which can be as a result of overcrowding within either or both of the dental arches or an irregular relationship between both dental

arches. Malocclusion is a developmental disorder with significant negative effects on the quality of life of both children and their families (Vanarsdall, 1994). It can lead to psychosocial distress, problems with speech and chewing, periodontal problems, temporomandibular joint disease, bruxism and headaches (Komazaki, 2014). The etiology of malocclusion is not fully understood; however, it has been reported to be multifactorial, a combination of genetic and environmental factors (Dimberg *et al.*, 2015). For better understanding, and management of malocclusions, assessing the prevalence of the types of occlusion patterns in different demographic groups serves useful (Frazão, 2006). With regards to this, several studies have been conducted on different ethnic groups. In Anibor's work (Anibor, 2019) involving 300 (139 males and 161 females) subjects of Igalala origin in Kogi State of Nigeria, results showed the mild overbite occlusion pattern to be the most prevalent, which was present in 61.6% (185) of subjects. The next most prevalent was the edge to edge pattern (20.3%, 61), followed by the negative overbite (14%, 42) and the severe overbite pattern (12%, 4). Results also showed no gender association with occlusion pattern ($p > 0.05$). In another similar study by Singh and Sengupta (Singh, 2004), among the Assamese Sikhs in India, the mild overbite was also found to be the most common type of tooth occlusion pattern (male = 44.90%, female = 54.00%), followed by edge to edge bite (male = 36.73%, female 32.0%). Results also showed the negative overbite pattern to be more in males (16.33%) than females (10.00%). Another study by Anibor, (Anibor, 2020) on tooth occlusion pattern among the Hausas in Zaria, Nigeria also produced similar results.

It included 384 subjects (184 males, 200 females) within the age range of 20-49 years. Results showed the mild overbite pattern to be the most common (male = 33.6%, female = 32.6%) followed by the edge to edge type (male = 13.3%, female = 10.4%). Also, the severe overbite was found more in males (3.4%) than females (2.1%) and the negative overbite was found more in females (2.9%) than males (1.8%). The results showed no significant gender association ($p > 0.05$) in the tooth occlusion pattern. Although there have been several studies on dental occlusion among various populations and ethnic groups, literature search reveals dearth of information on the dental occlusion pattern of the Ika people in Delta State of Nigeria. This academic toil offers important information for exploit in orthodontics, anthropology and forensic science. In this study, we aim to investigate the pattern of tooth occlusion among the Ika people, to also investigate if there is a significant gender difference, and to provide a baseline data on the dental occlusion pattern of the Ika people.

MATERIALS AND METHODS

This study was carried using subjects of Ika ethnic origin. It was an observational cross-sectional study, and the multistage sampling technique was used. Data was gotten from 384 subjects (190 males, 194 females) from Agbor, Owa-Ekie and Owa-Alerow within the age bracket of 15-30 years. These are kingdoms in Delta State, Nigeria. The indigenes speak the Ika dialect of the Igbo language. Data was collected by observation as subjects were asked to bite, swallow saliva, occlude and open their mouths, while the association between the upper maxillary and lower mandibular teeth was observed and recorded. Record of occlusion pattern was taken as mild

overbite, edge to edge bite, negative bite or severe overbite. The inclusion criteria were as follows: Subject's parents and grandparents must be from the Ika ethnic group, male and female subjects within the age range of 15-30 years, and subjects willing to participate. The following exclusion criteria was used: subject's parents and grandparents not from Ika ethnic group, subjects who do not fall within the study age of 15-30 years, subjects who do not wish to participate, and Individuals who had undergone dental surgery. Ethical clearance/approval was obtained from the Research and Ethical Committee of Anatomy Department in the Faculty of Basic Medical Sciences, Delta State University, Abraka. Prior to data collection, the subjects were informed of the nature and purpose of the study and only those who give their consent were included. Data obtained was analyzed using the Statistical Package for the Social Sciences (SPSS) version 23 software. The Chi-square test was used for inferential statistics and P value less than 0.05 was considered to be statistically significant.

RESULTS

The age range of subjects was categorized into three groups, the 15-19 years, 20-24 years and 25-30 years age groups, with the 20-24 years age group having the highest frequency (Figure 1). The subjects included 190 males and 194 females (Table 1). The following occlusion patterns were considered: the mild overbite, severe overbite, negative overbite and edge to edge bite. The mild overbite occlusion pattern had the highest frequency while negative overbite was the least common among the subjects (Figure 2, Table 1). Also, the mild overbite occlusion pattern was the most prevalent type found in both males and female subjects (Table 1). This is followed by the edge to edge bite pattern, the severe over bite pattern, with the negative over bite occlusion pattern being the least common in both sexes (Table 1). However, there was no significant association between sex and type of occlusion pattern ($p = 0.84$) (Table 1). Among the different age groups, the mild overbite was the most common among type of occlusion pattern (Table 2). In the 20-24 years and 25-30 years age groups, the edge to edge bite pattern was the next most common, followed by the severe over bite and negative over bite patterns (Table 2). But in the 15-19 age group, the severe overbite pattern was the next most common, followed by the edge to edge bite and negative over bite patterns (Table 2). However, no significant association was found between age and type of occlusion pattern ($p > 0.05$) (Table 2).

DISCUSSION

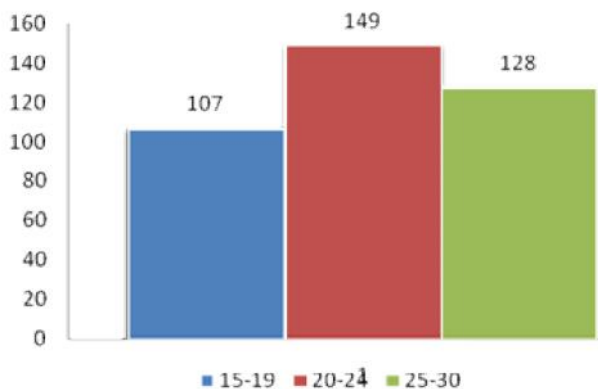
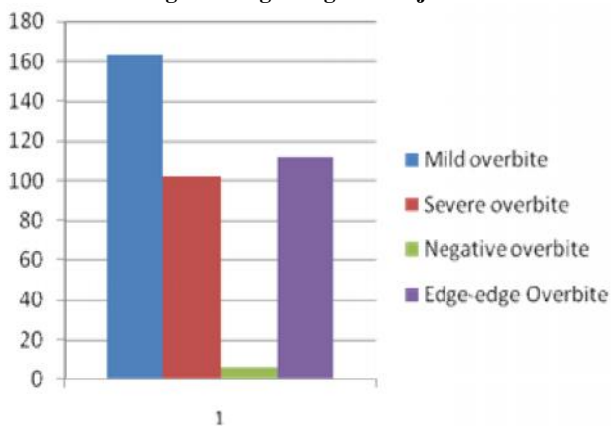
Our study showed the mild overbite type of teeth occlusion to be the most prevalent type of occlusion pattern among the Ika people (Table 1-2). Our results also showed the edge to edge bite pattern to be the second most common teeth occlusion pattern among the Ika people (Table 1-2). These results agree with similar study by Anibor (Anibor, 2020) on her work with subjects of Hausa origin in Nigeria, where the mild overbite pattern was present in 33.6% of males and 32.6% of females. This also agrees with her study¹⁰ using subjects from the Igalala ethnic group of Kogi State, Nigeria, where 61.6% of subjects had the mild overbite occlusion pattern. Both studies also reveal the edge-edge bite pattern to be the second most common.

Table 1. Frequency distribution of tooth occlusion pattern among subjects

| *C | Mild Over bite (%) | Severe Over bite (%) | Negative Over bite (%) | Edge-edge Bite (%) | Total (%) | p- value |
|----------------------------|--------------------|----------------------|------------------------|--------------------|-------------|----------|
| Corresponding author: Male | 82 (43.2%) | 49 (25.8%) | 4 (2.1%) | 55 (28.9%) | 190 (49.5%) | 0.84 |
| Female | 82 (42.3%) | 53 (27.3%) | 2 (1.0%) | 57 (29.4%) | 194 (50.5%) | |
| | | | | | 384 (100%) | |

Table 2. Pattern of Occlusion among the different age groups

| Age Range (years) | Mild Over bite (%) | Severe Over bite (%) | Negative Over bite (%) | Edge-Edge bite (%) | Total (%) | p- value |
|-------------------|--------------------|----------------------|------------------------|--------------------|-------------|----------|
| 15-19 | 48 (44.8%) | 30 (28.0%) | 1 (0.9%) | 28 (26.2%) | 107 (27.9%) | 0.88 |
| 20-24 | 64 (42.9%) | 41 (27.5%) | 2 (1.3%) | 42 (28.2%) | 149 (38.8%) | |
| 25-30 | 52 (40.6%) | 31 (24.2%) | 3 (2.3%) | 42 (32.8%) | 128 (33.3%) | |
| | | | | | 384 (100%) | |

**Figure 1. Age range of Subjects****Figure 2. Frequency Distribution of the occlusion pattern among study subjects**

This also is in line with the study of Singh and Sengupta (Singh, 2004), which showed the mild overbite pattern to be the most common, present in 36.73% of males and 32.0% females. Results also show the negative overbite to be the rarest type of occlusion pattern (Table 1-2). This agrees with results from previous studies by Anibor (Anibor, 2020) among the Hausas in Zaria which accounted for 2.9% males and 1.8% females. Furthermore, our results revealed that no significant association was observed between type of occlusion pattern and sex ($p=0.84$) (Table 1) and age group ($p=0.88$). This is also in agreement with previous work by Anibor¹⁰ as well as Singh and Sengupta (Singh, 2004). However, we discovered the second most common type of occlusion pattern in the age group range of 15-19 years was the severe overbite occlusion pattern (28%), whereas in the other age groups (20-24 years, 25-30 years), the edge to edge bite occlusion pattern was the second most common (28.2% and 32.8% respectively).

The variety of teeth occlusion prototypes in the diverse studies described may well be owed to factors such as methodology, race, ethnic ties and body type. We recommend that future studies on this subject should focus on occlusion pattern and its association with different age groups and ethnic sets.

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KEY POINTS

- ✓ The mild overbite occlusion pattern is the most prevalent type found among the Ika people.
- ✓ There is no significant association between sex or age group and type of occlusion pattern.

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