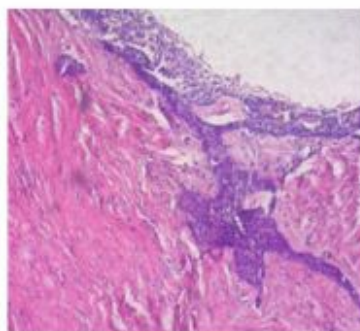
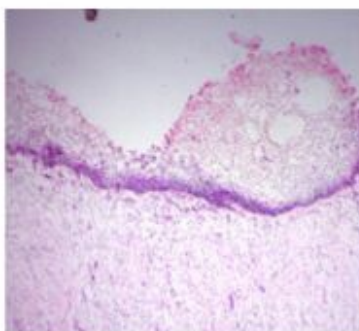
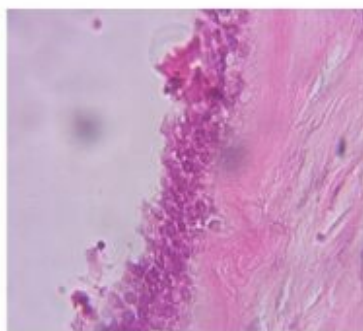


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Estimation of Maximum Mouth Opening among Healthy Adults in Benin-City, Nigeria

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ABSTRACT

Objective: Maximum mouth opening is a simple clinical sign for the evaluation of acute conditions such as orofacial infections and trauma, as well as chronic condition such as disorders of the temporomandibular joint and tumours. The objective was to estimate maximal mouth opening of healthy adults.

Methods: This study was descriptive cross-sectional study that involve the measurement of mouth opening from the mesio-incisal angle of the upper central incisor to the mesio-incisal angle of the corresponding lower incisor. Two measurements were taken and the average recorded as the mouth opening for the subject. The findings were analysed, using excel statistical software and results presented as simple bar charts.

Results: This study estimated the maximum mouth opening of 1331 individuals, made up of 643 (48.3%) females and 688 (51.7%) males. The age ranged from 18-75 years and 621 (46.7%) were in their third decade of life. There was a slight increase in mean maximal mouth opening from 18-20 year old group to 21-30 year old group. Thereafter it declined gradually over the age groups to age 71 years and above. This trend is similar in both gender: 18-20 year old group has 50.4mm and 50.7mm for females and males respectively. The opening peaked in the 21-30 year old group; 50.5mm in females and 50.8mm in males and declined over the age groups to 47.3mm in females and 47.6mm in males among those aged 71 years and above.

Conclusion: The findings in this present are in keeping with research findings elsewhere with age and gender as factors that affect the maximum mouth opening of a population.

Keywords: Adult, mouth opening, Nigerians

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INTRODUCTION

The dentists, and related professionals including anaesthetists, ear, nose and throat (ENT) surgeons as well as maxillofacial surgeons practice their profession in the mouth and anatomic regions related to or around the mouth. The dental professionals are concerned with the patients' mobility and mouth opening, for optimal dental care encounters. Maximum mouth opening (MMO) is maximal inter-incisal distance following an unassisted active mouth opening and reflects mandibular range of motion.¹ Limitations of mouth opening may be isolated or a part of general musculoskeletal disorder;^{2,3} and may be one of the first clinical signs of pathological changes in the masticatory system.¹ In the course of clinical examination, MMO is a simple sign for evaluation of acute conditions such as orofacial infections and trauma, as well as chronic condition such as disorders of the temporomandibular joint and tumours.^{1,3-9} The

use of MMO as a clinical parameter for follow-up and outcome assessment is documented.¹ Concern about MMO include, challenges with compliance with oral healthcare practices, information for design of oral appliances, effectiveness of mouth opening to allow for optimum dental, oral or maxillofacial surgical procedures, issues that borders on the provision of general anaesthesia and access to airway, for cardiopulmonary resuscitation.^{2,3,9}

Studies elsewhere have put the normal range of mouth opening at 40-60mm.¹⁰ The mean mouth opening of a study made up of 36.7% Pakistani, 35.6% Indians and 27.8% United Arab Emirates (UAE) nationals was 53.12±7.95mm with minimum and maximum mouth opening of 39 and 69mm respectively.¹¹ Limited mouth opening is a well-documented morbidity following head and neck cancer treatment. It has been reported in newly diagnosed patients, and induced through surgery or radiotherapy in about 8% of patients.¹⁰⁻

¹² Iatrogenic causes such as mandibular third molar surgeries (in which the muscles of mastication may be bruised, torn, or the joints hyperextended and strained) hematomas secondary to dental injection and late effects of mandibulo-maxillary fixation after mandibular fractures or other trauma can cause limitation in

mouth opening.¹⁰⁻¹⁶

The measurement of maximal mouth opening in normal subjects is a guide for the management of individuals with maxillofacial trauma and/or pathologies following treatment to restore the mouth opening to values considered as 'normal'.¹⁰ The objective of the study was to estimate maximal mouth opening in the University of Benin Teaching Hospital. Findings will provide baseline data for use as basis for clinical evaluation and follow-up as well as inter-population comparison and validation of outcomes of research findings elsewhere.

MATERIALS AND METHODS

The study was designed as an observational cross sectional study, to estimate the maximal mouth opening. The study was approved by the Ethics and Research Committee of the University of Benin Teaching Hospital with clearance certificate reference no as: ADM/E 22/A/VOL VII/763 of 17th January, 2012. This study was a preliminary and integral part of a larger scale study to assess treatment outcomes, with maximal mouth opening as one of the indices measured. The study was conducted over a twelve-month period February, 2012 to January, 2013 in the outpatient clinic of the Department of Maxillofacial Surgery, University of Benin Teaching Hospital, Benin-City. A purposive, non-probability sampling method was used to select the studied population.

Inclusion criteria

Subjects aged 18 years and above, with full complement of upper and lower anterior teeth and who never had a history of maxillofacial trauma.

Exclusion criteria

Subjects less than 18 years of age or those with fractured or missing upper and/or lower anterior teeth. Those with prostheses replacing missing upper and/or lower anterior teeth were also excluded from the study. Also excluded are subjects with recent history of infections, maxillofacial trauma, and temporomandibular joint challenges. Patients on antipsychotic medications, anxiolytics or on muscle relaxants were also excluded.

Measurement of maximum mouth opening

A single assessor measured the mouth opening of all subject meeting inclusion criteria. The subjects were asked to voluntarily open their mouths maximally. Assessment of mouth opening was done by measuring the inter-incisal distance in millimeters, using a Veneer's calipers. The central incisors were employed.¹¹⁻¹⁸ The mesio-incisal angle of the upper central incisor to the mesio-incisal angle of the corresponding lower incisor

were used as reference points for this measurement. The measurements were repeated twice and the average value recorded as the MMO for the subject.^{17,18} The findings were analysed, using excel statistical software and results presented as simple bar charts.

RESULTS

This study estimated the MMO of a study population totaling one thousand, three hundred and thirty-one, made up of 643 (48.3%) females and 688 (51.7%) males. The age ranged from 18-75 years and most are in their third decade of life. The least age group represented are those aged 71 years and above. There were 27 persons in this group, made up of 12 (44.4%) females and 15 (55.6%) males (Figure 1).

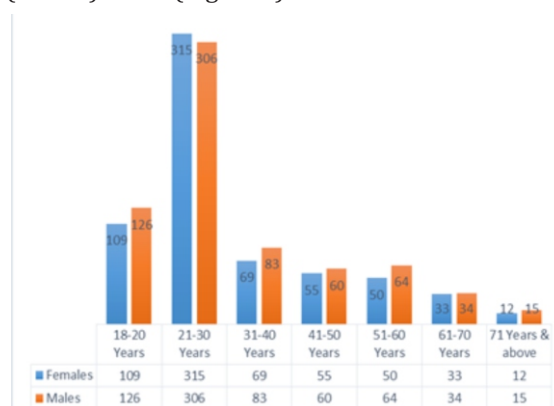


Figure 1: Age and gender distribution of the study population

In this study, there was an increase in mean maximum mouth opening from 18-20 year old group for both females (50.4mm) and males (50.7mm) to 21-30 year old group; 50.5mm in females and 50.8mm in males. Thereafter it declined gradually over the age groups to 47.3mm in females and 47.6mm in males among those aged 71 years and above (Figure 2)

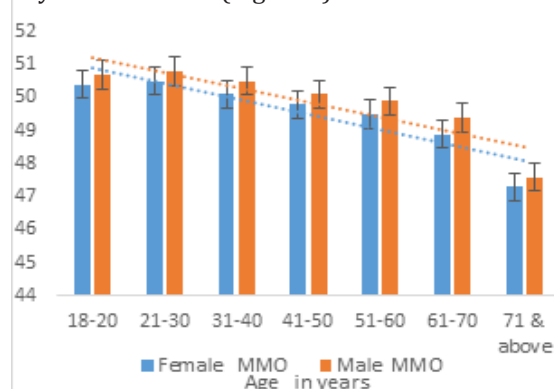


Figure 2: Mean maximal mouth opening in millimeters

DISCUSSION

The MMO has been defined as the “the greatest distance between the incisal edge of the maxillary central incisors to the incisal edge of the mandibular central incisors at the midline when the mouth is open as wide as possible”.^{1,11} This study employed simple and quick method of assessing range of mouth opening. It has revealed an increase in MMO through the second decade of life to the third decade and thereafter a gradual decrease over the decades to the eighth decade. No local data are available for comparison but finding is similar to the trend seen in a Jordanian study, where the MMO declined as the population aged.²⁰ Decrease in muscle strength and age related changes in the temporomandibular joints may be responsible for this observation.

Males showed a slightly higher MMO for all age groups. This may be due to more active actions of the masticatory muscles or a gender difference in mandibular lengths.^{19,20,21} Another factor that could explain this finding is the fact that it is not possible to determine the MMO in practice; therefore tendency of the males to open their mouths more than the females may contribute to this finding. Stature has also been suggested as a factor in the differences noticed in MMO, but the correlations have not been investigated. This difference in gender, are similar to the findings of Sawair et al.²⁰ and a study conducted in the United Arab Emirate, but in this present study, the differences between males and females were not statistically significant.

The study revealed that the Nigerian females have a greater mouth opening compared to the counterparts from India, UAE and Pakistan. The MMO was 50.4 ± 5.3 mm in females among the Nigerians in this study, findings in another study revealed MMO of 46.30 ± 3.21 mm among Indian females, 47.06 ± 3.55 mm among females of UAE nationals and 46.37 ± 3.31 mm among Pakistani females. Whereas Nigerian males in this study have smaller mouth opening than their counterparts of the compared nationals. MMO for the Nigerian males in this study is 50.7 ± 5.4 mm while males from India have MMO of 59.01 ± 5.36 mm, those from UAE have MMO of 59.42 ± 5.36 mm and the Pakistani males have MMO of 60.80 ± 4.95 mm.^{18,20} This means that the values of MMO for Nigerians fall between the values for males and females of the evaluated nationalities. Culture, diets, genetic variations, stature and traditional practices of the various nationals may account for this differences in MMO. The trend showed a decline gradually from the third to the eighth decade of life for both genders

(Figure 2). This decline in MMO is similar to that recorded by Sawair et al.²⁰ up to the sixth decade but differed thereafter as there was an increase in MMO from the sixth to seventh decade. This decline can be attributed to the general degenerative processes in muscles masses and actions as well as in the joints associated with aging.

Whereas this study has provided a scientific basis for assessment of MMO among patients in Benin-City, it is limited in accuracy because it was impossible to determine if what was obtain was actually the MMO, when patients were asked to open their mouths maximally. Another limitation was the size of the study population.

CONCLUSION

Within the limitations of this study, findings are in keeping with research findings elsewhere with age and gender as factors that affect the MMO of a population. It is recommended therefore that a larger population be studied and correlations with other variable such as body mass index, social habits, ethnicity and other suitable variables be evaluated.

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