# PATTERN OF SYMPTOMATIC IMPACTED MANDIBULAR THIRD MOLAR AMONG PATIENTS ATTENDEES AT EKITI STATE UNIVERSITY TEACHING HOSPITAL, ADO-EKITI. NIGERIA

BY

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## CERTIFICATION

This is to certify that this research work titled **"symptomatic impacted mandibular third molar teeth – prevalence and associated pathology among patients presenting at Ekiti State Univ.Teaching Hospital, Ado-Ekiti. Nigeria"** was carried out by **Oluwabunmi Samuel Ibitoye**, a postgraduate student of the Department of Epidemiology and Medical Statistics – Clinical Epidemiology, Faculty of Public Health, College of Medicine, University of Ibadan.

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## DECLARATION

I, Ibitoye Oluwabunmi Samuel, hereby declare that the work on which this dissertation is based, is original (except where acknowledgements indicate otherwise) and neither the whole work nor any part of it has been, is being, or shall be submitted for another degree at this or any other university, institution for tertiary education or examining body.

Signed: 

O. S. IBITOYE (175358)

## DEDICATION

This work is dedicated to the shepherd of my soul.

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The contribution of the following persons to my life within the last two years and towards the successful completion of this research work cannot be overemphasized.

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# ABSTRACT

## Introduction

Impacted mandibular third molar is the most frequently impacted teeth in the mouth and its prevalence varies widely (16.7% – 68.6%) from one geographical location to the other. Though studies have examined impacted mandibular third molar (IMTM) in developed countries very few have done so in sub-Saharan Africa especially with respect to different quadrant of the mandible. This study therefore aimed at determining the prevalence of symptomatic impacted mandibular third molar with specific reference to the quadrant of the mandible and its association with commonly found pathologies.

## Methodology

A descriptive cross sectional study was carried out on 1857 patients presenting at Oral and Maxillofacial Surgery (OMS) clinic, dental department of Ekiti State University Teaching Hospital, Ado-Ekiti; using purposive sampling technique. Patients' records with periapical radiographs were examined for mandibular impaction(s). Socio-demographic characteristics, family and social history, clinical characteristics (weight, height, position of impaction, associated pathology and depth of impaction) and other relevant data were extracted and recorded on a spreadsheet (Excel 2010). Analysis was done using the Statistical package for social sciences (version 20). The variables were analysed using frequencies and Pearson's $X^2$ with 5% level of significance for all tests.

## Results

The mean age was 30.5 years (SD = 10.9) and prevalence of IMTM was14.9%. IMTM occur mostly between age group 21 – 30 years ($P < 0.001$) and 53.6% of the patients were female. The proportion with bilateral mandibular impaction was 35.9% of which 72.7% had same impaction subtypes. Mesioangular impaction was the most common angulation subtype (58.6%), horizontal (13.5%), Distoangular (13%), vertical (8.8%) and buccolingual (6%). Pericoronitis was the main associated pathology (64%) and observed in patients that exhibited depth A and B level; ($P < 0.001$). Carious lesion was the second in prevalence and observed in patients that exhibited depth A mainly.

**Conclusion**

Overall, the prevalence of IMTM was slightly low with females having higher proportion. The most common angulation subtype was mesioangular especially on the left quadrant of the jaw and over two third of the bilateral cases were of the same angulation. Pericoronitis was the associated pathology most prevalent.

**Keywords:**

Impacted mandibular third molar (IMTM), Periapical radiograph (PAR), Panoramic radiograph, Pericoronitis.

## ACRONYMS

IMTM – Impacted mandibular third molar

PAR - Periapical radiograph

MA - Mesioangular

DA - Distoangular

VT - Vertical

HO - Horizontal

BL - Buccolingual

CEJ - Cemento-Enamel Junction.

CL - Cervical line.

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# CHAPTER 1

# INTRODUCTION

## 1.1 Background

The most frequently impacted tooth/teeth in the mouth or oral cavity is the mandibular third molar [Hupp JR, Ellis III E, and Turker MR, 2014], [Syed et al., 2013], [Juodzbalys and Daugela, 2013], [Bansal et al, 2012], [Ioannis, 2011], [Peterson LJ, 2003], [Dimitroulis, 1997], [Mwaniki and Guthua, 1996] and surgical extraction has become one of the commonest dentoalveolar procedure [Gbotolorun et al., 2007], [Akadiri et al., 2009], [Grossi et al., 2007], and [Leung and Cheung, 2009].

Systematic review of journals posited that third molars exhibit the greatest variability in timing in development, crown and root morphology and position. They are the last teeth to erupt into the oral cavity and supplement the function of the second molars. The average age for third molar crypt formation is around five to seven years with initial cusp calcification occurring between seven to 12 years [Banks, 1934], [Garn et al., 1962], [Baba-Kanawo et al., 2002]. Crypt formation has been shown to occur up to 16 years of age [Richardson, 1980]. Third molars are the most commonly missing permanent teeth with the percentage of persons with one or more missing third molars ranging from 9 to 20 per cent [Hugoson and Kugelberg, 2008], [Nanda, 1988]. Third molars have been found to be the teeth most often impacted. Of the total number of molars present, Dachi and Howell found 29.9 per cent and 17.5 per cent of third molars were impacted in the maxilla and mandible, respectively [Dachi and Howell, 1961]. Chu et al., [Chu et al., 2003] however, found a greater prevalence of impacted mandibular third molars in comparison to maxillary third molars.

Impaction of Mandibular third molar is a common phenomenon [Chu et al., 2003] and is of major concern to every Dental Surgeon as it results in excruciating pain and usually results in loss of time and resources (productivity loss) on the part of the patients [Slade et al., 2004], even though some of the impacted mandibular third molar may be asymptomatic [Polat et al., 2008]. Tooth impaction is presently being diagnosed more often than the past fifteen years. When compared with the primitive races, the modern man seems to have a higher incidence of third molar

impaction. Theories on the aetiology of impacted third molars are many and varied but there seems to be a consensus on the association between a modern civilized diet and the occurrence of impactions [Olasoji and Odusanya, 2000].

Impaction of the third molars results either by insufficient maxillofacial skeletal development or a low correlation between maxillofacial skeletal development and third molar maturation leading to a lack of space between the second molar and the ramus [Obimakinde, 2009]. Impacted teeth therefore are teeth that do not or fail to erupt in the dental arch within the expected time of eruption [Nazir et al., 2014], [Hupp et al., 2014]. An impacted tooth is also defined as a tooth that is not in the normal upright position, such that the occlusal surface of its crown does not reach the occlusal level line of the dentition, after the processes and stages of eruption are completed [Bishara and Andreasen, 1983]. An impacted tooth is one that is erupted, partially erupted, or unerupted and will not eventually assume a normal arch relationship with the other teeth and tissues [Mwaniki and Guthua, 1996]. Impacted tooth was defined as a tooth that is prevented from erupting into position because of malposition, lack of space, or other impediments [Archer WH, 1966]. Impacted teeth are characterized as those teeth that fail to erupt into the dental arch within the expected time [Peterson LJ, 1998]. In 2004, it was posited that impacted teeth are those teeth that are prevented from eruption due to a physical barrier within the path of eruption [Agarwal et al., 2004]. Such a tooth may either be completely buried within alveolar bone entirely covered by mucosa or parts of the crown may show in the mouth.

The mandibular third molar which is also known as the wisdom tooth is the most commonly impacted tooth in the oral cavity (mouth), followed by the maxillary third molar (also known as wisdom tooth), maxillary canine and mandibular canine [Obiechina et al., 2003], [Brasileiro et al., 2012], [Jerjes et al., 2006], [Frost et al., 2000]. It was also observed that mandibular third molars are the most commonly impacted teeth followed by maxillary third molars, maxillary canines and mandibular canines [Obimakinde, 2009], and according to the three years study conducted by Nzima, [2005], in which a total of 171 patients had presented with impacted teeth in the Radiology department of the faculty of Dentistry, University of Limpopo. Literature reported that there is considerable variation in the prevalence and distribution of impacted teeth in different regions of the jaw [Ahlqwist M, Grondahl HG, 1991], [Hattab et al., 1995], [Peltola JS, 1993], [Yamaoka et al., 1995]. Impaction of the mandibular third molar is about 73% among young

adults in Europe [Mwaniki and Guthua, 1996]. Generally, third molars have been found to erupt between the ages of 17 and 21 years [Elsey MJ, Rock WP. 2000], [Archer WH, 1966], [Peterson LJ, 1998]. Also, the eruption time of third molars has been reported to also vary with race [Archer WH, 1966], [Peterson LJ, 1998], [Agarwal et al., 2004], [Obiechina et al., 2003], for example, mandibular third molars may erupt as early as 14 years of age in Nigerians [Agarwal et al., 2004], and up to the age of 26 years in Europeans [Obiechina et al., 2003]. The average age for the eruption of mandibular third molars in male is approximately 3 to 6 months ahead of females [Brasileiro et al., 2012]. Most authors claim that the incidence of mandibular third molar impaction is higher in females and prevalence ranges between 16.7% and 68.6% [ Syed et al., 2013], [Hupp et al., 2013], [Secic et al., 2013], [Hashemipour et al., 2013], [Sheikh et al., 2012] [Brasileiro et al., 2012], [Alhaija et al., 2011], [kaya et al., 2010], [Polat et al., 2008], [Tang, 2006], [Adeyemo et al., 2006], and [Chu et al., 2003] but Quek, *et al.* [2003], reported that the occurrence of third molar impaction was between 18% and 32%. It occurs at the population level in Western Australia with a frequency of approximately 20% [George, Kruger and Tennant, 2011], however a Nigeria study reported a prevalence of 15.1% and 1.9% in urban and rural population respectively[Olasoji and Odusanya, 2000].

Dental impaction is generally influenced by environmental and genetic make-up of the individual in question. [Akinbami BO, Didia BC. 2010], [Frost et al., 2000], [Bishara et al., 1996], [Bjork et al., 1956], [Brickly, et al.,1993]. Specifically, these factors are grouped into the patients related factors (Age, sex, weight, height, body mass index, diet, race, length and width of the mandible, ethnic background and oral hygiene) and tooth related factors (Type of impaction, depth of impaction, relationship of impacted tooth with inferior dental nerve, associated pathology, existing pathology and bone density), these factors may in parts or whole interact to predispose to impaction of lower third molar.[Akinbami BO, Didia BC. 2010], [Berge TI. 1997], [Bishara, et al., 1989], [Bishara, et al., 1997]. Mandibular third molar impaction is frequently associated with an insufficient growth of the mandible, length of the mandible and difference in the size of the dental arch and the total teeth size are the most important factors responsible for the occurrence of the third molar impaction.[Ades, et al., 1990], [Akinbami BO, Didia BC. 2010], [Bishara, et al., 1989], other researcher reported lack of space; early physical maturation; and delayed mineralization of the tooth [Bouloux, 2007], [Richardson, 1977], [Hellman, 1936], [Montelius, 1932]. The third molars can vary considerably in size, contour and relative position to the other

teeth. Most of the mandibular third molars are undersized. The Mandibular third molar(s) can be wholly or partially be impacted in the jaw. The lack of space accommodation has been proposed as the chief cause [Bansal et al., 2012]. During the correction of the malocclusion, it is the duty of the orthodontist to correct all the possible tooth misalignments and as most of the orthodontic patients are in the growing age group, early knowledge of the third molar eruption status will help in better treatment of the patient. Castella et al [1998] as cited by Bansal et al [2012] found that the impaction of third molars in the mandible was a predictable event both in extraction and non-extraction patients.

Impacted mandibular third molars are often associated with one form of pathology or the other, these pathology include: pericoronitis, periodontitis, period ostitis, cystic lesions, pathologic root resorption and neoplasm; these can cause detrimental effects on adjacent tooth [Ma'aita and Alwrikat, 2000] and studies have shown that patients with retained impacted third molars are significantly more susceptible to mandibular angle fracture of the mandible [Fuselier et al., 2002], [Meisami et al., 2002]. Patients with impacted mandibular third molar may present with pain, caries, gingivitis and oral infections [McGrath et al., 2003]. Studies suggest that third molars play at least some role in crowding [Beeman, 1999] and in severe cases, removal of the impacted molars could be recommended [Lindqvist and Thilander, 1982].

Management and diagnosis are important to the patient as well as the dental surgeon. Panoramic radiograph and computed tomography are used to provide accurate localization for diagnosis and treatment of impacted teeth; they are the radiograph of choice in this case. However, peri-apical radiograph could also be used but often; the initial radiograph used is panoramic radiograph which provides information about the whole dentition and surrounding bony structures. A major advantage of panoramic radiograph is that it helps in evaluating the whole oral cavity and shows teeth in their normal places as well as in ectopic sites in the maxilla and mandible [Breik and Grudor, 2008].

## 1.2 RESEARCH QUESTIONS

1. What is the prevalence of impacted mandibular third molar (IMTM)?
2. What are the patients characteristics with respect to impacted mandibular third molar? (IMTM) subtypes?
3. What is the prevalence of bilateral impaction with preference for same angulation subtypes?
4. What are the common pathologies of impacted mandibular third molar (IMTM)?
5. What is the relationship between associated pathology and the depth of impaction?

## 1.3 PROBLEM STATEMENT

Third molar teeth are the last to erupt and have a relatively high chance of becoming impacted [Hassan, 2010] and Mandibular Third Molar is the most frequently impacted tooth/teeth in the mouth or oral cavity [Syed et al., 2013], [Bansal et al, 2012], [Ioannis, 2011]. Impacted Mandibular Third Molar teeth are believed to be mainly due to space deficiency which is attributed to many factors some of which are: soft diet, insufficient eruption forces, environmental and hereditary factors. The prevalence rates of Impacted Mandibular Third Molar varies from one population to another and several authors have reported prevalence rates ranging from 9.5% to 50%, higher in the western region of the world (Obimakinde, 2009). Studies done in the Nigerian population reported a prevalence rate of impacted mandibular third molar teeth as 1.9% & 15.1% for rural and urban populations respectively (Obiechina, et al. 2001).A study done in Kenya reported a prevalence rate of impacted mandibular third molar teeth as 15.8/1000 (1.6%) (Mwaniki and Gutha, 1992). Studies by the following authors states a prevalence that ranges between 16.7% and 68.6% [ Syed et al., 2013], , [Brasileiro et al., 2012], [kaya et al., 2010], [Polat et al., 2008], [Tang AT. 2006].

Little is known about the prevalence of Impacted Mandibular Third Molar teeth in Nigeria as there are few studies available particularly in Ekiti State where the only study on prevalence was the one reported five years ago by [Obimakinde, 2009]. It is therefore necessary to determine the

prevalence of Impacted Mandibular Third Molar teeth and associated pathology on the basis of patients' characteristics, and angulation in relation to Impacted Mandibular Third Molar (IMTM) subtypes among patients who presented at the Oral and Maxillofacial Unit of Dental Department of Ekiti State University Teaching Hospital Ekiti State.

This study will provide vital information on Impacted Mandibular Third Molar and assist or help the surgeons not only to decide about the prophylactic removal of impacted mandibular third molars but also help in better management planning for the related pathologies.

## 1.4 JUSTIFICATION OF THE STUDY

The prevalence of mandibular third molar impaction ranges from 16.7% to 68.6% [Syed et al., 2013], [Kaya et al., 2010], [Tang et al., 2006], [Chu et al., 2003] other authors reported a prevalence rates ranging from 9.5% to 50%, emphasizing a higher value in the western region [Obimakinde, 2009]. However in Nigeria, authors reported a prevalence rate of impacted mandibular third molar teeth as 1.9% to 15.1% for rural and urban populations respectively [Obiechina, et al. 2001]

The disparity in male to female mandibular third molar impaction predilection as claimed by some authors, it was said to be more common in females [Kim et al., 2006], [Quek et al., 2003], [Ma'aita and Alwrikat, 2000], no sex predilection [Kaya et al., 2010], [Ananthalakshmi et al., 2012], [Ali HH, 2010] and more common in males by other authors hence the need to find the sex prevalence.

The result of this study can be used as a baseline for future studies especially with respect to bilateral impaction (Same impaction subtype and different impaction subtypes in the mandible).

Most studies have focused on general angulation forms of impaction, therefore, the purpose of this study is to assess in specific terms patient having different forms of impaction in the mandible in the same individual amongst others.

## 1.5 BROAD OBJECTIVE

To determine the prevalence and associated pathology of symptomatic Impacted Mandibular Third Molar among patients presenting at EKSUTH Dental Clinic, Ekiti State, Nigeria.

## 1.6 SPECIFIC OBJECTIVES

i. To determine the prevalence of symptomatic impacted mandibular third molar in Ekiti State University Teaching Hospital (EKSUTH) Ado-Ekiti
ii. To assess the influence of patients characteristics on symptomatic impacted mandibular third molar (IMTM)
iii. To assess different presentations of impaction in patients with bilateral cases of IMTM
iv. To document the association between commonly found pathologies and symptomatic impacted mandibular molar third molar (IMTM) subtypes (tooth angulations)
v. To evaluate the relationship between the associated pathology and depth of impacted mandibular third molar (IMTM).

## 1.7 STUDY VARIABLES

**1.7.1 Dependent or Outcome Variables:** The dependent variable in this study is Symptomatic Impacted Mandibular Third Molar teeth.

**1.7.2 Independent or Explanatory Variables:** The independent variables in this study include: age, gender, religion, level of education, occupation, ethnicity, family history, habits (smoking and intake of alcohol), body mass index, oral hygiene status.

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• When involved in or within the field of tumour resection

[SIGN, 1999], [Pogrel et al., 2009].

### 1.16 Other indications for removal

- For the autogenous transplantation into another area
- Prophylactic removal of a third molar which is likely to erupt in the presence of certain specific medical conditions, where the risk of retention outweighs the complications associated with removal
- When there is atypical pain from an unerupted third molar to avoid any confusion with temporomandibular joint or muscle dysfunction
- When a partially erupted or unerupted third molar is close to the alveolar surface prior to denture construction or close to a planned implant
- In patients with predisposing risk factors whose occupation or lifestyle precludes ready access to dental care
- Where a general anaesthetic is to be administered for the removal of at least one third molar, consideration should be given to the simultaneous removal of the opposing or contralateral third molars when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal
- When the eruption of the second molar prevented by the third molar
- When the third molar is impeding surgery or reconstructive jaw surgery.

[SIGN, 1999], [Pogrel et al., 2009].

# CHAPTER TWO

## LITERATURE REVIEW

Mandibular third molar is also known as 'wisdom tooth'. It is the only tooth that erupts during adolescence and sometimes in adulthood; since it is last to erupt, it often experiences impaction. Mandibular third molar is characterized by its variability in formation, timing crown and root morphology [Ramamurthy et al., 2012].

A literature review of impacted mandibular third molar (IMTM), the aetiological factors, classification, signs and symptoms and indication for third molar surgery are presented in this chapter. It consists of the following sections:

- Definition
- An overview of IMTM
- Epidemiology
- Aetiological factors
- Predisposing factors
- Classification
- Risk factors
- Signs and symptoms
- Indication for third molar surgery
- Gender distribution
- Imaging techniques
- Complications of IMTM
- The third molar extraction decision
- Guidelines for extraction of IMTM associated with a pathology.

### 2.1 Definition

An Impacted tooth is defined as a tooth which is completely or partially erupted and positioned against another tooth, bone or soft tissue so that its further eruption into occlusion would be unlikely [Ramamurthy et al, 2012]. A tooth impaction is a pathological situation in which a

tooth cannot, or will not; erupt into its normal functioning position, unless facilitated by treatment [Hassan, 2010]. It occurs at the population level in Western Australia with a frequency of approximately 20% [George, Kruger and Tennant, 2011]. The vast majority of impacted teeth are the mandibular and maxillary third molars [Chu et al, 2003], [Obiechina, Arotiba and Fasola, 2001].

## 2.2 Overview of IMTM

Mandibular third molar are the most likely teeth to be impacted than any other teeth in the oral cavity [Bansal et al, 2012]. The third molars can vary considerably in size, contour and relative position to the other teeth. Most of the mandibular third molars are undersized. Mandibular third molars are the most likely to be impacted, wholly or partially in the jaw. The lack of space in the lower jaw to accommodate the size of the teeth in question has been proposed as the main reason for the impaction [Bansal et al., 2012]. During the correction of the resultant malocclusion, it is the duty of the orthodontist to correct all the possible tooth misalignments and as most of the orthodontic patients are in the growing age group, early knowledge of the third molar eruption status will help in better treatment of the patient. Castella et al. [1998] as cited by Bansal et al. [2012] found that the impaction of third molars in the mandible was a predictable event both in extraction and non-extraction patients. Agenesis of the third molar is also a common occurrence, but its frequency varies in different studies [Sandhu and Kaur, 2005]. Impacted teeth are those teeth that are prevented from eruption due to a physical barrier within the path of eruption. The physical barrier could be the adjacent tooth which is the second molar or the ascending ramus of the mandible [Agarwa et al, 2004].

It is common to find the impacted mandibular third molars resulting from the shift to modern dietary habits, with a decrease in masticatory loading and from hereditary, embryological reasons or other etiologic factors [Khan et al, 2006]. Many studies have shown a direct relation between the presence of impacted mandibular third molars and a greater likelihood of mandibular angle fractures, with 2- to 3-fold increase in risk [Woldenberg, Gatot and Bodner, 2007].

The non-erupted teeth may be subdivided into those that are obstructed by a physical barrier,non-erupted (impacted) and those that appear to exhibit a lack of erupted force (embedded) [Neville, et al. 2002].

Eruption times of third molars are variable, ranging from age 16 to 24 years [Fayad, et al. 2004]. The mean age for third molar eruption is 17years. The wide age range found with third molar eruption, as well as positional changes that occur after eruption may be due to differences in race, nature of the diet, the intensity of the use of the masticatory apparatus and possibly due to genetic background [Qirreish, 2005].

## 2.3 Epidemiology of impacted mandibular third molar

The prevalence of impacted mandibular third molars in the population varies in different studies ranging from 16.7% to 68.6% [Hassan, 2010]. A prevalence of 39% was reported in Finns, 82.5% in Hong Kong and Chinese population and in Indians, it ranges from 22% - 27.4 % [Reddy and Prasad, 2011], [Guttal et al., 2011].

According to Elsey and Rock, impaction of the third molar is occurring in up to 73% of young adults in Europe. Generally, third molars have been found to erupt between the ages of 17 and 21 years [Elsey and Rock, 2000]. Furthermore, third molar eruption time have been reported to vary with races [Elsey and Rock, 2000], [Kruger, Thomson and Konthasinghe, 2001]. The average age for the eruption of mandibular third molars in male is approximately 3 to 6 months ahead of females [Guttal et al., 2011]. Most authors claim that the incidence of mandibular third molar impaction is higher in females [Yuasa H, Sugiura,2004], [Kruger, Thomson and Konthasinghe, 2001].

The studies of Quek, et al. [2003], showed that mesio-angular impactions had the highest frequency, followed by horizontal and then the vertical impactions. According to the study done on Jordanian patients, the mesio-angular impaction was the most common, followed by vertical, disto-angular and horizontal impactions [Ma'aita, 2000].

Chu, et al. [2003] in Hong Kong reported the classification according to angulation of the impacted wisdom teeth as: horizontal, mesio-angular, vertical, disto-angular and others in order of decreasing prevalence. In another study done in Nigeria, the most prevalent third molar impactions were the mesio-angular, vertical, horizontal, disto-angular and others in the decreasing order of prevalence [Obiechina, et al. 2001].

In a study done at the University of Western Cape, the prevalence of impacted third molars was found to be in the following order: vertical position predominant (33.6 %), followed by the mesio-angular angulation (32.4%) and the horizontal impaction (28.1%). The disto-angular angular position was the least common type of impactions encountered (1.2%). Buccal and lingual angulation types of impactions were included in the category denoted under "other", from which it was shown that the prevalence of these angulations makes up 4.6% of all cases of impactions [Qirreish, 2005].

Mandibular third molars are sometimes congenitally missing which could be attributed to the evolutionary changes affecting the jaw and teeth size and also changes in the dietary habits [Sandhu and Kaur, 2005].

Most studies have reported no sexual predilection in third molar impaction. Some studies, however, have reported a higher frequency in white European females and Singapore Chinese females than males and female Caucasians [Quek et al., 2003].

Higher frequencies of third molar impactions have been reported among females [Quek et al., 2003]. The higher frequency reported in females was explained as a consequence of the difference between the growth rate of males and females. Females jaw usually stop growing when the mandibular third molars just begins to erupt, whereas in males, the growth of the jaws continues during the time of eruption of the third molars, creating more space for third molar eruption [Quek et al., 2003]. However, the majority of international studies showed no sex predilection [Hassan. 2010].

Factors affecting the prevalence include the selected age-group, timing of dental eruption, and the radiographic criteria for dental development and eruption [Chu et al., 2003].

Clinical, diagnostic information and radiologic assessments provide the presence and types of impaction (mesial, vertical, horizontal, distal, transverse, ectopic) [Gintaras and Povilas, 2013].

## 2.4 Predisposing factors

The main cause of impaction of teeth is lack of space (Qirreish, 2005). A study of radiographs (Orthopamthomographs) from 3,874 dental patients aged over 20 years determined the prevalence of impaction to be 17%; hence, this condition can be considered among the most significant/dominant group seeking dental care. The most frequently affected regular teeth are the third molars (especially in the mandibular teeth) and the permanent maxillary canines as observed on the radiograph. Impactions can occur simply due to dental crowding, space reduction following premature loss of primary teeth, or an errant path of eruption [Farman, 2004].

The mandibular third molar teeth are the last to erupt and may either be partially erupted through the gums or completely hidden. The etiology of the third molar impaction has been investigated in many international studies and several factors were reported as possible causes, these include; lack of space distal to the permanent second molar and the ascending ramus, retarded third molar mineralization and the improper angulation of the tooth [Hassan, 2010].

Many authors have proposed several theories for the high frequency of mandibular third molars impaction and they include low correlation between maxillofacial skeletal development and mandibular third molar maturation leading to reduced arch length between the second molar and the ascending ramus of the mandible, late mineralization and late physical maturation of mandibular third molar and shortening of the dental arch length due to consumption of refined carbohydrate [Obimakinde, 2009].

The Mendelian theory states that the coarse nature of Stone Age man's diet had the effect of producing extensive tooth wear. Tooth wear would reduce the collective length of the teeth, thus creating enough space to accommodate the wisdom teeth by the time they erupt. Our modern diet does not usually cause a significant amount of this type of tooth wear hence the reduction in available space. It has also been argued that the coarse nature of Stone Age man's diet, as compared to modern man's diet which is relatively soft; probably require more activity of the chewing muscles. The activity could have stimulated greater jawbone growth, thus providing more space for wisdom teeth [Kaifu, et al. 2003].

Other theories include lack of sufficient eruption force, hereditary factors and not enough mesial movement of the dentition due to lack of interproximal attrition [Nzima, 2005]. Richardson

[1977] had found that patients with skeletal class II occlusion were more prone to present with impacted mandibular third molar teeth.

## 2.5 Aetiology

The etiology of impactions can be subdivided into local and systemic causes. Local causes include irregularities in the position of adjacent teeth, density of the surrounding bone, long periods of chronic inflammation of the overlying mucosa, prolonged deciduous tooth retention, premature loss of primary teeth, malposed tooth germs, arch-length deficiency, supernumerary teeth, odontogenic tumors, abnormal eruption path and acquired diseases. Systemic causes include prenatal causes such as hereditary and miscegenation factors. Postnatal causes are rickets, anaemia, congenital syphilis, tuberculosis and malnutrition. There are also rare conditions such as cleidocranial dysplasia, progeria, achondroplasia and cleft palate which are associated with impactions [Qirreish, 2005], [Hassan, 2010].

The etiologic factor of the third molar impaction has been investigated in many international studies and several other factors were reported as possible causes for third molar impaction: including lack of space distal to the permanent second molar; retarded third molar mineralization; and early physical maturation. [Hassan 2010].

Mandibular third molar eruption and continuous positional changes after eruption can be related not only with race but also with nature of the diet, the intensity of the use of the masticatory apparatus and possibly due to genetic background [Guttal et al., 2011]. Apart from dental caries, impaction of the mandibular third molar contributes to a significant proportion of the conditions that require dental management and attention [Akinbami and Didia, 2010].

The impacted tooth may be obstructed on its pathway of eruption by an adjacent tooth, bone or soft tissue [Chu, et al. 2003]. It can therefore be concluded that mandibular third molar impaction is a result of interplay of these factors.

## 2.6 Classification

Several methods have been used to classify impaction of the mandibular third molar, in which impaction is described based on the level of impaction, the angulations of the molars and the relationship to the anterior border of the ascending ramus of the mandible [Hassan, 2010], [Quek et al., 2003].

Impacted third molars can be classified according to their depth in relation to the adjacent second molar according to Pell and Gregory [Farman, 2004; Obimakinde, 2009]. Also according to Hassan [2010], depth or level of mandibular third molars can be classified using the Pell and Gregory Classification System, where the impacted teeth are assessed according to their relationship to the occlusal surface (OS) of the adjacent second molar.

1. □ Position A: the highest point of the tooth is on the level at or above the occlusal plane of the second molar.
2. □ Position B: the highest point of the tooth is below the occlusal plane, but above the cervical line of the second molar.
3. □ Position C: the highest point of the tooth is below the cervical line of the second molar.

Another classification was given by Pell and Gregory, this relates the position of the tooth to the ascending ramus of the mandible and the second molar [Hupp, et al. 2008];

□ Class I : there is sufficient amount of space between the ramus and the distal surface of the second molar for the accommodation of the mesio-distal size of the crown of the third molar

□ Class II: the space between the ramus and the distal surface of the second molar is less than the mesio-distal size of the crown of the third molar.

□ Class III : all or most of the third molar is located within the ramus

Third molars can also be classified according to the relationship between the Cemento-Enamel Junction (CEJ) of the impacted tooth and the associated bone level. Level A is assigned to any impacted third molar that is not buried in bone. Level B is assigned to any impacted third molar that is partially buried in bone, when any part of the CEJ is lower than the bone level. Level C is assigned to impacted third molars that are completely buried in bone. The B level was the most common level of impaction in mandibles [Quek et al., 2003], [Hassan , 2010].

An impacted third molar is also classified according to their angular relationship to the adjacent second molar. Angulation of the impacted third molar can be determined by evaluating the angle formed between the intersected longitudinal axes of the impacted third molar and the adjacent second molar, as described by Winters in 1926, either visually or by using an Orthodontic protractor [Obimakinde, 2009]; [Hupp, et al., 2008]; [Quek et al., 2003].

- Mesio-angular impaction means that the wisdom tooth is angled forward, toward the front of the mouth, more towards the adjacent second molar and generally in contact with the distal surface of the second permanent molar.

- Vertical impaction is where the long axis of the tooth runs parallel to the long axis to the second molar. The vertical type is directed towards the occlusal plane.

- The horizontal type has its long axis lying perpendicular to the second molar, within the mandible and has the crown facing the roots of the adjacent second molar.

- The distal or disto-angular impaction has its long axis angled away from the second molar, the crown facing towards the ramus of mandible.

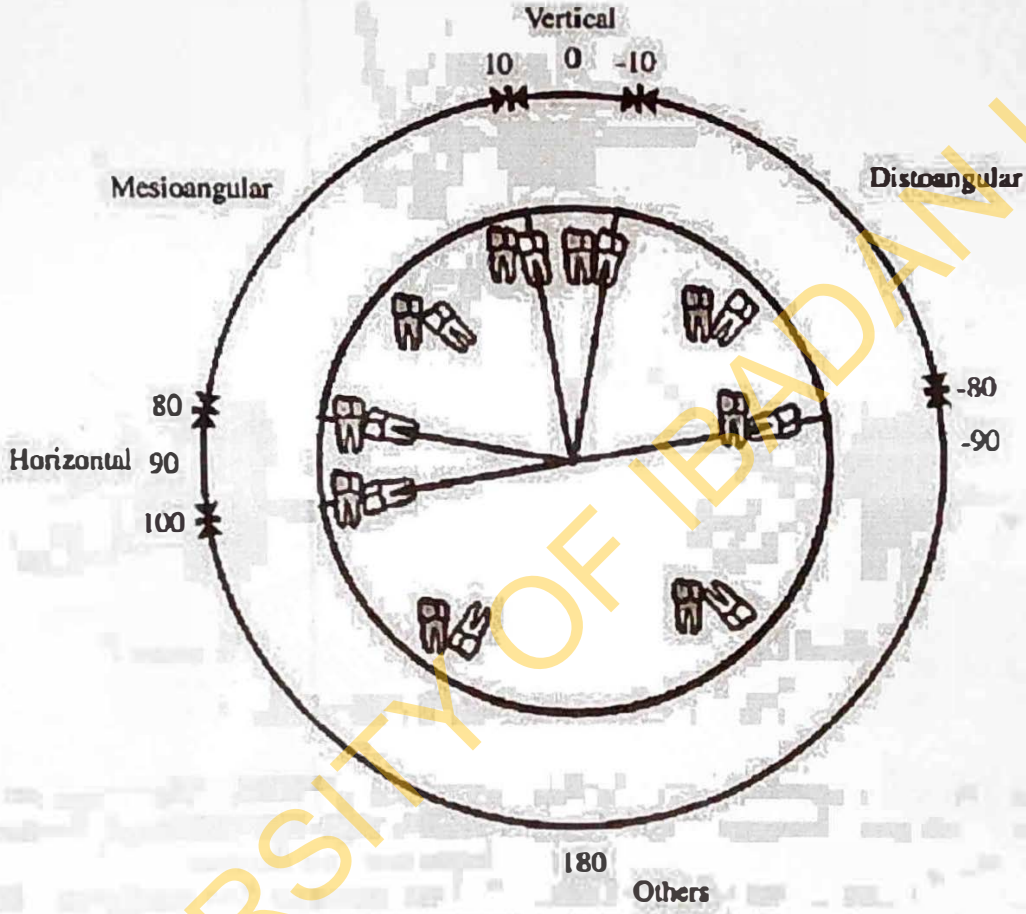
- Transverse/bucco-angular impactions have the crown directed mainly towards the buccal or lingual side of the face.

- The inverted type of impaction takes a vertical position with the crown directed towards the inferior alveolar canal.

Quek, et al. [2003] proposed a classification system using orthodontic protractor. In their study angulation was determined by the angle formed between the intersected long axis of second and third molars. They classified mandibular third molar impaction as follows:

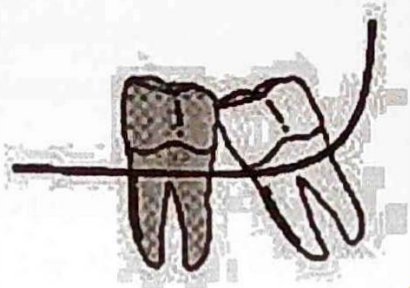
a. Vertical (0°to 10°)
b. Mesioangular (11° to 79°)
c. Horizontal (80°to 100°)
d. Distoangular (-11° to -79°)
e. Others (-111° to -80°).

PATTERN OF THIRD MOLAR IMPACTION

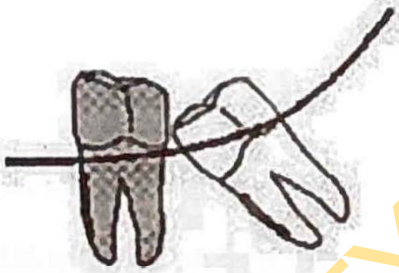



ANGULATION POSITION OF IMPACTED THIRD MOLAR [Queck et al., 2003]

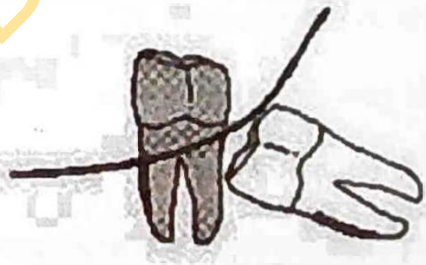
CLASSIFICATION OF DEPTH OF IMPACTION [Queck et al., 2003]



Level A



Level B



Level C

Thoma, as quoted by Obimakinde [2009], classified the curvature of the roots of the impacted mandibular molars into three categories:

a. Straight roots (separated or fused)

b. Curved roots in a distal position

c. Roots curved mesially.

The number of roots may be two or multiple.

Other forms of classifications are the following:

(i) Root curvature (favorable or unfavorable)

(ii) Root divergence (fused, modest, or excessive)

(iii) Number of roots

(iv) Periodontal membrane space (normal, widened, or obliterated)

(v) Relative horizontal position (lingual or buccal tilt)

(vi) Proximity to the inferior alveolar nerve (distant or close).

Mesioangular (48.3% and 63%) followed by horizontal (29.3% and 26%) type of impaction are the most common [Sonti, 2014], [Quek et al., 2003], [Hassan 2010], [Ramamurthy et al., 2012]. It appears that mesioangular impactions are probably the commonest type and this may be due to their late development and maturation, path of eruption and lack of space in mandible at later age. 75% of impacted lower third molars were in mesio-angular and horizontal angulation. The angulation of an impacted tooth against the second molar has potential clinical implications, as outlined by Yamaoka et al.[1998]. However, some studies show that vertical impaction is the most common [Bataineh, Albashaireh and Hazza'a. 2002], [Almendros-Marquésm, Berini-Aytés and Gay-Escoda, 2006]. Impaction depth classification of IIA and IA are the teeth most inclined to develop complications.

The bilateral impaction of mandibular third molar is more common than unilateral impaction (left or right side) impaction [Ramamurthy, 2012].

## 2.7 Type of impaction

In addition to the above mentioned classification of impactions, wisdom teeth can also be described as soft tissue or bony impactions.

The term bony impaction indicates that the wisdom tooth is still fully enveloped in the jaw's bone while a soft tissue impaction is one in which the upper portion of a wisdom tooth that is, the tooth's crown has penetrated through the bone, but has not yet fully erupted through the gums [Farman, 2004].

Impacted third molars can also be classified as erupted when the crown can be seen totally in the mouth, partially erupted when the crown has penetrated the oral mucosa and is partially visible in the mouth or unerupted when the tooth has not penetrated the oral mucosa [Obimakinde, 2009], [Kaushik and Gupta, 2010]. The teeth can either be completely enveloped by the jaw bone or soft tissue or part of their crown exposed to the oral environment. Several authors have reported that the partial impaction were most common type [Chu, et al. 2003; Quek, et al. 2003].

## 2.8 Risk factors

Body stricture like weight, height, body mass index and skull/jaw factors like the length and width of the body and ramus of the mandible may be risk factors of mandibular third molar impaction [Akinbami and Didi, 2010]

Weight is a measure of the amount of muscle and bone content of the body, while height assesses the vertical extent of the bones in the axial and appendicular skeleton. Body Mass Index (BMI) assesses the amount of fat as it relates to the weight and height of the height of the body. Sizes of individual bone/tooth can be related to the total height and weight of the individual and there may be a direct or indirect relationship between BMI and impaction. BMI is calculated as the weight in kilograms divided by the square of height in metres (weight [kg]/ height$^2$ [m$^2$]). An individual with a BMI of 25.0 to 29.9 is overweight; an individual with BMI $\geq$30 is obese.

The predictability index of mandibular third molar impaction is an important tool which is useful both for determination of the probable occurrence of impaction and averting the associated pre and post morbid problems through proper counsel, evaluation and timely intervention [Akinbami and Didi, 2010]. These body strictures are invariably determined by a complex interplay of

environmental and genetic impacts on the pattern and direction of the whole skull. Akadiri et al. [2008] described various factors influence the eruption of the third molar and predict the degree of difficulty of the surgical extraction of this tooth. Furthermore difficulties with surgical removal of mandibular third molar are related to the depth of impaction and most probably the density of cortical bone around the tooth. However the relationship between the density and prevalence of impaction is not well established [Akadiri et al., 2008). Some authors [Akinbami et al., 2010], have asserted that mandibular third molar impaction is associated with insufficient growth of the mandible. They recognized mandibular length as the single important factor in the determination of third molar impaction.

The amount of space in the arch between the distal surface of the second molar and the anterior border of the ascending ramus has been invaluable in predicting the eruption of the tooth into its proper position of functional occlusion [Akinbami and Didi, 2010]. There is an inverse relationship between the distance variable and occurrence of impaction. [Akinbami and Didi, 2010] Impaction has a tendency of occurrence when there is crowding in the spacing of the anterior segment of the alveolar arch. Small mandible, small dental alveolar arch and large teeth are strongly associated with the occurrence of third molar impaction [Akinbami and Didi, 2010].

**2.9 Signs and symptoms**

Impacted wisdom teeth without a communication to the oral cavity (mouth), that have no pathology associated with the tooth and have not caused tooth resorption on the blocking tooth rarely have symptoms. In fact, only 12% of impacted wisdom teeth are associated with pathology [Friedman, 2007].

When wisdom teeth communicate with the mouth, the most common symptom is localized pain, swelling and bleeding of the tissue overlying the tooth. This tissue is called the operculum and the disorder called pericoronitis which means inflammation around the crown of the tooth [Peterson and Miloro, 2004], [Dodson, 2012]. Low grade chronic periodontitis commonly occurs on either the wisdom tooth or the second molar, causing less obvious symptoms such as bad breath and bleeding from the gums. The teeth can also remain asymptomatic (pain free), even with disease [Dodson, 2012]. As the teeth near the mouth during normal development, people sometimes report mild pressure of other symptoms similar to teething.

The term asymptomatic means that the person has no symptoms. The term asymptomatic should not be equated with absence of disease. Most diseases have no symptoms early in the disease process. A pain free or asymptomatic tooth can still be infected for many years before pain symptoms develop [Dodson, 2012].

## 2.10 Indications for mandibular third molar extraction

A school of thought believes that both impacted and erupted mandibular third molars with evidence of follicular enlargement should be removed electively and that the associated soft tissue should be submitted for microscopic examination. Impacted teeth with pericoronitis should also be extracted electively because of their known potential for repetitive infection and morbidity. Furthermore, third molars with non-restorable carious lesions and third molars contributing to resorption of adjacent teeth should be also extracted [Guttal et al., 2011].

According to Gintaras and Povilas, [2013]; the following are the indications for mandibular third molar extraction were existing pathology or pain due to pericoronitis, periodontitis, periapical abscess, cysts or neoplasms, resorption of adjacent roots, and inflammation of the opposing soft tissue; aberrant positions in which the tooth is oriented buccally or lingually; preceding dental work with fixed or removable appliances; arch length discrepancy in cases when the impacted third molars are affecting the stability of orthodontic treatment[Gintaras and Povilas, 2013]. Infection around the impaction; loss of bone around the impacted teeth; dental caries and damage of adjacent teeth; crowding of the dental arch; cysts and tumours associated with impacted teeth; pre-irradiation removal of impacted teeth; for prosthodontic reasons; and for chronic facial pain [Gintaras and Povilas, 2013].

Certain radiographic factors are significant in the assessment of difficulty of third molar surgery such as depth of an impacted tooth, space distal to the second molars, ramus relationship, root morphology and the number of the roots [Akinbami and Didi, 2010]. Patient variables as age, gender, body weight, BMI and body surface area (BSA) have recently been emphasized [Akinbami and Didi, 2010], [Yuasa et al., 2002].

## 2.11 Gender distribution

Most studies on gender distribution have reported no sexual predilection in third molar impaction [Hassan, 2010]. However, some studies have shown that impacted mandibular third molars are more prevalent in females than in males [Quek, et al., 2003], [Hassan, 2010]. In contrast, the study by Nzima [2005] showed that males had a higher risk than females to develop mandibular third molar impactions.

## 2.12 Imaging techniques

Several radiographic techniques have been described for assessment of impacted mandibular third molars. A good radiograph should demonstrate the whole tooth, the investing bone, the adjacent tooth, inferior alveolar canal and anterior aspect of the ascending ramus [Bell, et al. 2003], [Sarawati, et al.,2010].

Imaging techniques for impacted mandibular third molars include: intra oral periapical radiography, occlusal techniques, lateral oblique and orthopantomograph, skull radiography, stereoradiography, xeroradiography, computed tomography (CT) and magnetic resonance imaging (MRI). The orthopantomograph remains the radiograph of choice for impacted third molar teeth [Sarawati, et al., 2010].

## 2.13 Complications of impacted mandibular third molars

Impacted teeth are considered non - functional, abnormal and pathological due to the positions they assume in the jaw. The mandibular third molar teeth are often associated with pain, pericoronal infection, cyst formation, benign tumors, root resorption, bone loss, periodontal disease, dental caries and subsequently secondary facial space infections [Kaushik and Gupta, 2010], [McGrath et al., 2003]. They can also cause pathologic root resorption of the adjacent teeth [Ma'aita, 2000]. Bataineh, et al. [200] noted that cysts were associated with 1.6% of cases of impacted mandibular third molars.

Studies have also shown that patients with retained impacted third molars are significantly more susceptible to mandibular angle fractures [Fuselier et al., 2002], [Meisami, et al. 2002].

## 2.14 The third molar extraction decision

The removal of impacted third molars is the most common surgical procedure in dentistry and is one of the most common day case and in-patient surgical procedures in the National Health System (NHS) [Shepherd and Brickley, 1994]. As a result of the huge cost of surgical extraction to the patients, most patients with the condition will not seek care until there is an associated pathology which in-turn disturb their daily routine, hence the decision to extract mandibular third molars be based on sufficient evidence. There are well-established indications for the removal of symptomatic third molars. However, there still exists some controversy and debate about the routine removal of asymptomatic, pathology free third molars. It must be made clear at this stage that when reference is made to "asymptomatic", the authors refer to not only the absence of symptoms but also any sign of disease. As a result, Dental surgeons are expected to make evidence-based decisions about the surgical extraction treatments they carry out, especially when there is no pathology associated with the third molars; though from experience, this scenario is detected when patients come to the hospital for other complaints. [Brickley et al., 1995], [Tullock et al., 1987], [Tullock and Antczak-Bouckoms, 1987], [AAOMS, 2011].

## 2.15 Guidelines for third molar extractions associated with pathology

- Unrestorable caries
- Periodontal disease
- Non-treatable pulpal and/or periapical pathology
- Cellulitis, abscess and osteomyelitis
- Internal/external resorption of the tooth or adjacent teeth
- Fracture of tooth
- Disease of follicle including cyst/tumour
- Recurrent pericoronitis

• When involved in or within the field of tumour resection

[SIGN, 1999], [Pogrel et al., 2009].

### 1.16 Other indications for removal

- For the autogenous transplantation into another area
- Prophylactic removal of a third molar which is likely to erupt in the presence of certain specific medical conditions, where the risk of retention outweighs the complications associated with removal
- When there is atypical pain from an unerupted third molar to avoid any confusion with temporomandibular joint or muscle dysfunction
- When a partially erupted or unerupted third molar is close to the alveolar surface prior to denture construction or close to a planned implant
- In patients with predisposing risk factors whose occupation or lifestyle precludes ready access to dental care
- Where a general anaesthetic is to be administered for the removal of at least one third molar, consideration should be given to the simultaneous removal of the opposing or contralateral third molars when the risks of retention and a further general anaesthetic outweigh the risks associated with their removal
- When the eruption of the second molar prevented by the third molar
- When the third molar is impeding surgery or reconstructive jaw surgery.

[SIGN, 1999], [Pogrel et al., 2009].

# CHAPTER THREE

# METHODOLOGY

## 3.1 STUDY AREA

The study was conducted in the Ekiti State University Teaching Hospital (EKSUTH) is situated in Ado-Ekiti, the capital of Ekiti State and it is the first and one of the two tertiary health institutions in the state. It also serves as the main referral center to other six secondary health facility in the state. Ekiti State is one of the 36 states that make the Federal Republic of Nigeria.

## 3.2 STUDY SITE

The study site was at the Dental department of Ekiti State University Teaching Hospital Ado-Ekiti in Ado-Ekiti local government area of Ekiti State. The hospital was established in 1976 as a general hospital in the old Ondo State serving the Ekiti region as a referral centre. It later became or metamorphosed into a State Specialised Hospital in 1982 with increased bed space of about thirty (30) per ward and an operatig theatre. The hospital has seven wards amongst which are: Accident and Emergency ward, male and female medical wards, male and female surgical wards, pre and post natal wards and children ward. The hospital has several other clinics amongst which are: Dental Clinic, Ophthalmology Clinic, Chest Clinic, Medical and Surgical Outpatient Clinics as well as HIV/AIDS Clinic. The hospital became a full-fledged teaching hospital in October 2008.

The Dental department is made up of four units namely: Oral diagnosis, Oral surgery/Oral and Maxillofacial Unit, Restorative (Conservative and prosthetics unit) and Periodontology Unit with each unit headed by a specialist except the Oral diagnosis unit headed by a Senior Medical Officer. The manpower distribution by categories are as follows: three specialists (One Oral and Maxillofacial Surgeon, one Periodontologist and one restorative specialist), seven Medical Officer, four House Officers, two Dental Nurses, thirty-six Dental Surgery Assistants(DSA), four Dental Technologist, three Dental Therapists and Medical Record Officers.

## 3.3 STUDY POPULATION

The category of patients enrolled into this cross sectional study consists of those who were patients aged sixteen years and above. The patients must have had an impacted mandibular third molar in one quadrant or both quadrants of the mandible. Their case file must contain the vital information as well as the periapical radiograph to confirm other variables relating to the impaction.

## 3.4 STUDY DESIGN

A cross-sectional descriptive hospital-based study was carried out on patients aged seventeen years and above. The case notes of all patients that presented at the Dental Clinics of EKSUTH Ado-Ekiti Ekiti State between July 2012 and June 2014 were retrieved and from which vital and necessary information needed were documented.

## 3.5 SAMPLE SIZE DETERMINATION

Sample size estimation for single proportion at 95% Confidence level was used to calculate the minimum sample size

$$n=\frac{\left(Z_{1-\alpha/2}+Z_{1-\beta}\right)^2}{d^2}p(1-p) \qquad \text{[Kish, 1990]}$$

where:

**n** is the desired sample size.

$Z_{(1-\alpha/2)}$ is the standard normal deviate set at 1.96 [corresponding to 95% confidence interval] = 1.96

$Z_{(1-\beta)}$ is the power of the study = 1.28 ( at 90% power)

**p** is the proportion in the target population estimated to have a mandibular third molar impaction. Prevalence = 68.6% or 0.686 [ Syed et al., 2013]

**q** = (1 – p) = 1 – 0.686 = 0.314

and **d** is the precision at 10% level = 0.1

$n = (1.96*1.28)^2 * 0.686*0.314/ 0.01$

**n = 135.57 = 136 subjects,** i.e. minimum subject expected to have the outcome - impacted mandibular third molar.

## 3.6 INCLUSION CRITERIA:

1. All patients that presented at Dental Clinic of Ekiti State University Teaching Hospital above sixteen years of age with complete Mandibular Third Molar root formation, and were attended to at the clinic
2. Patients with chief complaints related to Impacted Mandibular Third Molar (IMTM) or their associated pathologies.

## 3.7 EXCLUSION CRITERIA:

1. Patients with systemic/pathological diseases/craniofacial anomaly or syndrome for example, Cleido-cranial dysplasia and Down syndrome
2. Patients without the presence of mandibular second molar.

## 3.8 DATA COLLECTION INSTRUMENT

Four (4) key data sets were collected. These included socio-demographic characteristics, such as Age, Sex, Level of education, Religion, Occupation, Marital status and anthropometric measurements of weight and height, social history (Smoking and Alcohol consumption), clinical and radiological examination. All information was obtained from patients' case files.

## 3.9 DATA MANAGEMENT AND ANALYSIS

3.9.1 Data management: Data management plan involve data collection data entry, data cleaning, data analysis.

3.9.2 **Data Collection:** Data collected or obtained from patients' case files were recorded on a spreadsheet (Excel 2010; Microsoft) with the help of trained research assistants. Information on the case files was coded and the data was cleaned prior to analysis.

**Anthropometric Measurement:** Measurements were extracted from the case notes.

Weight were measured and recorded by the dental nurse on duty using a digital weighing scale after calibration to zero error at each measurement and the reading was taken to the nearest 0.1 kg. Respondents were weighed standing still either barefoot or wearing socks, and in minimal clothing. Belts and other accessories were removed and pockets emptied with body weight evenly distributed between both feet.

Height were measured and recorded with a stadiometer to the nearest 0.5 cm with the subjects barefoot or with socks, standing erect with heels together and looking straight ahead, two measurements required in order to reduce error and therefore obtain a more accurate calculation of BMI.

The BMI was calculated using the formula $= \dfrac{\text{(Weight in Kilograms)}}{\text{(Height in meters x Height in meters)}}$

Body Mass Index Categories

Underweight = <18.5

Normal weight = 18.5–24.9

Overweight = 25–29.9

Obesity = greater than or equal to 30.

The pattern of impaction is determined by measuring the angle formed between the lines intersecting the long axis of second lower molars. The long axis runs through the midpoints of

the occlusal surface and the bifurcation of the second lower molar. The angle formed is used to interpret and determine the mesial or distal inclination in relation to the second molar (Tooth angulation (Mesioangular, Distoangular, Horizontal/Transverse, Vertical, Buccolingual).

All patients had a standard periapical radiograph of their impacted molars taken and reviewed by using a fluorescent radiograph view box. The radiographic features recorded were as follows:

Depth of impaction (Type A, B, or C)

(i) **Type A or Depth A**: The highest portion of the mandibular third molar is at level with or above the occlusal plane of lower second molar.

(ii) **Type B or Depth B**: The highest portion of the mandibular third molar is below the occlusal plane but above the cervical line of the second lower molar.

(iii) **Type C or Depth C**: The highest portion of the mandibular third molar is below the cervical line of the lower second molar.

**3.9.3 Data Analysis:** All analyses were carried out using Statistical Package for the Social Sciences (SPSS) version 20 to achieve summary and inferential statistics. Results was interpreted as statistically significant at 5% level or less ($p \leq 0.05$).

- The prevalence of Impacted Mandibular Third Molar (IMTM) among patients presenting at EKSUTH Dental Clinic was determined using frequencies and proportions
- The association between commonly found pathology and IMTM subtypes as well as the relationship between the associated pathology and depth of impaction were done using cross-tabulation

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- The association between commonly found pathology and IMTM subtypes as well as the relationship between the associated pathology and depth of impaction were done using cross-tabulation.

## 3.10 ETHICAL CONSIDERATIONS

Ethical clearance was obtained from the Research and Ethics Committee of the tertiary institution ( Ekiti State University Teaching Hospital - EKSUTH) Ado-Ekiti. Ekiti State.

**3.10.1 Confidentiality of data collected:** Data collected were saved on a password protected computer and data back-up to an external hard-drive. Only authorized individuals were allowed to handle participant's information.

# CHAPTER FOUR

## 4.0 RESULTS

All patients records presenting at the clinic from July 2012 to June 2014 making a total of 1857 were retrieved, 294 patients had impacted mandibular third molar, however only 276(14.9%) patients met the criteria.

Table 1 below shows that the patients were aged 16 to 100 years (mean age ± SD) = 39.2 ± 17.2years. However, the age of the patients are not normally distributed hence the median age is 34years while the interquatile range is 25 years. Twenty-four (24.4%) of the patient are above 50years while 334(18.0%) and 331(17.8) of them were between 21-25years and 26-30years of age respectively. Only 118(6.4%) of the patients were aged 41-45 years.

There was no significant difference in the proportion of female 935(50.4%) and 922(49.6) male patients. Majority of the patients are Christians (90.0%). One thousand, one hundred and sixty-one {1161(62.5%)} of them had at least post-secondary education. Patients were mainly of Yoruba ethnic group were (89.3%). Most of the patients were either married (58.5%) or single (40.0%) while few others were separated, divorced or widowed (1.5%). The occupations with the highest frequency were those grouped under the professionals for example bankers, civil servants, biochemists and nurses (38.3%) while (29.5%) were students.

**Table 1: Socio-demographic Characteristics of the total patient that attended the Dental Clinic within the period under review(July 1st 2012 – June 30th 2014)**

**N = 1857**

| | VARIABLE | FREQUENCIES | PERCENTAGES (%) |
|---|---|---|---|
| **Age (Years)** | <=20 | 146 | 7.9 |
| | 21-25 | 334 | 18.0 |
| | 26-30 | 331 | 17.8 |
| | 31-35 | 196 | 10.6 |
| | 36-40 | 150 | 8.1 |
| | 41-45 | 118 | 6.4 |
| | 46-50 | 128 | 6.9 |
| | >50 | 454 | 24.4 |
| **Sex** | Female | 935 | 50.4 |
| | Male | 922 | 49.6 |
| **Level of Education** | No education | 16 | 0.9 |
| | Primary education | 96 | 5.2 |
| | Secondary education | 584 | 31.4 |
| | Tertiary education | 1161 | 62.5 |
| **Religion** | Christian | 1672 | 90.0 |
| | Islam | 180 | 9.7 |
| | Others | 5 | 0.3 |
| **Marital status** | Single | 742 | 40.0 |
| | Married | 1087 | 58.5 |
| | Separated/Divorced/Widowed | 28 | 1.5 |
| **Ethnic group** | Yoruba | 1659 | 89.3 |
| | Hausa | 56 | 3.0 |
| | Igbo | 140 | 7.5 |
| | Others | 2 | 0.1 |
| **Occupation** | Student | 547 | 29.5 |
| | Professionals | 711 | 38.3 |
| | Trader | 369 | 19.9 |
| | Clergy | 20 | 1.1 |
| | Military | 5 | 0.3 |
| | Artisan | 133 | 7.2 |
| | Farmer | 72 | 3.9 |

Table 2 shows that the total population of patients that presented at Dental Clinic of Ekiti State University Teaching Hospital Ado-Ekiti from July 2012 to June 2014 was 1857(100%) among which 276(14.9%) had symptomatic impacted mandibular third molar.

The **prevalence** of Impacted Mandibular Third Molar from the study is **14.9%.**

**Table 2: Prevalence of Impacted Mandibular Third Molar**

| | Frequency | Percentage (%) |
|---|---|---|
| No | 1581 | 85.1 |
| Yes | 276 | 14.9 |
| **Total** | 1857 | **100.0** |

**Table 2: Prevalence of Impacted Mandibular Third Molar**

| | Frequency | Percentage (%) |
|---|---|---|
| No | 1581 | 85.1 |
| Yes | 276 | 14.9 |
| **Total** | 1857 | **100.0** |

Table 3 shows that the age group 21 – 25years of the patients, presented at the clinic with the highest frequency of symptomatic impacted mandibular third molar {85(30.8%}); this was closely followed by the age group 26 - 30 years with 77(27.9%) of impaction while the least count was among the 46 – 50 year age group.

Impacted mandibular third molar occurred more in female patients 148(53.6%) than in male 128(46.4%) ones. Majority of the patients are of Yoruba ethnic group 243(88%) but those of Hausa ethnic group are just 4(1.4%). The table also shows that the impacted mandibular third molar is more common t in patients that had post-secondary education {220(79.7%)} then, those that had no formal education 2(0.7%). Most of the patients with this condition are students 126(45.7%) and professionals 91(33.0%). Christians are 255(92.4%) and single 174(63.0%) but few are separated, divorced and widowed 4(0.4%). Of the 276 patients, the proportion of smokers to non-smokers was 1:29.7 and that of those that drinks alcohol to non-alcoholics was 1:3.6.

**Table 3: Distribution of impaction according to socio-demographic characteristics**

**N = 276 (The actual number of patients with the expected outcome)**

| | VARIABLE | FREQUENCIES | PERCENTAGES (%) |
|---|---|---|---|
| **Age (Years)** | <=20 | 23 | 8.3 |
| | 21-25 | 85 | 30.8 |
| | 26-30 | 77 | 27.9 |
| | 31-35 | 38 | 13.8 |
| | 36-40 | 17 | 6.2 |
| | 41-45 | 11 | 4.0 |
| | 46-50 | 06 | 2.2 |
| | >50 | 19 | 6.9 |
| **Sex** | Female | 148 | 53.6 |
| | Male | 128 | 46.4 |
| **Level of Education** | No education | 02 | 0.7 |
| | Primary education | 04 | 1.4 |
| | Secondary education | 50 | 18.1 |
| | Tertiary education | 220 | 79.7 |
| **Religion** | Christian | 255 | 92.4 |
| | Islam | 21 | 7.6 |
| | Others | 00 | 00 |
| **Marital status** | Single | 174 | 63.0 |
| | Married | 98 | 35.5 |
| | Separated/Divorced/Widowed | 4 | 1.4 |
| **Ethnic group** | Yoruba | 243 | 88.0 |
| | Hausa | 04 | 1.4 |
| | Igbo | 29 | 10.5 |
| | Others | 00 | 00 |
| **Occupation** | Student | 126 | 45.7 |
| | Professionals | 91 | 33.0 |
| | Trader | 38 | 13.8 |
| | Clergy | 4 | 1.4 |
| | Military | 3 | 1.1 |
| | Artisan | 11 | 4.0 |
| | Farmer | 3 | 1.1 |
| **Smoking** | Yes | 9 | 3.3 |
| | No | 267 | 96.7 |
| **Alcohol intake** | Yes | 60 | 21.7 |
| | No | 216 | 78.3 |

Table 4a shows that the patients were divided into three major age groups which are ranging from 25years and below, 26 to 35years and 36years and above. The distribution of Impacted mandibular third molar teeth according to patients age was found to be statistically significant with highest frequency occurring among patients below the age of 35years 222(80.4%) that is, this age group had the highest prevalence of mandibular third molar impaction; this count decreases with increasing age.

**Table 4a: Distribution of Impacted mandibular third molar according to patients' age**

**N = 276**

| Age Group (years) | Not Impacted | Impacted | Total | $X^2$ | $P_{value}$ |
|---|---|---|---|---|---|
| <25 | 372(77.3%) | 109(22.7%) | 481(100%) | | |
| 26-35 | 412(78.5%) | 113(21.5%) | 525(100%) | **90.314** | **< 0.001** |
| 36 and above | 797(93.7%) | 54(6.3%) | 851(100%) | | |

Chi-square tests applied, P <0.001 i.e. statistically significant.

Table 4b shows the distribution of impacted mandibular third molar subtypes (angulation) according to patients' age on the right quadrant of the jaw, this distribution was not statistically significant but was statistically significant with the impacted mandibular third molar on the Left quadrant of the jaw of the patients as observed in table 4c.

Table 4 also shows that majority occur among the 26 – 35 years age group with the proportion of mesioangular impaction being the highest. The distribution on the right quadrant of the jaw is as follows: MA = 34 (49.3%), DA = 16(23.2%), HO = 11(15.9%), VT = 5(7.2%), BL = 3(3.4%).

In table 4c, mesioangular subtype was still predominant but the distribution on the left quadrant is as follows: MA = 53(55.2%), HO = 19(19.8%), DA = 12(12.5%), VT = 9(9.4%), and BL = 3(3.1%).

**Table 4b: Distribution of impacted mandibular third molar subtypes (angulation) according to patients' age on the right jaw (right section of the mandible)**

| | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | Total | Fisher s | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Age group** | | | | | | | | |
| <25 | 30(46.2%) | 18(27.7%) | 9(13.8%) | 7(10.8%) | 1(1.5%) | 65(100%) | **29.14** | **0.18** |
| 26-35 | 34(49.3%) | 16(23.2%) | 5(7.2%) | 11(15.9%) | 3(4.3%) | 69(100%) | | |
| 35 and above | 21(70%) | 2(6.7%) | 2(6.7%) | 5(16.7%) | 0 | 30(100%) | | |

Not statistically significant, that is, p>0.05

**Table 4b: Distribution of impacted mandibular third molar subtypes (angulation) according to patients' age on the right jaw (right section of the mandible)**

| | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | Total | Fisher s | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Age group** | | | | | | | | |
| <25 | 30(46.2 %) | 18(27. 7%) | 9(13.8%) | 7(10.8%) | 1(1.5%) | 65(100 %) | **29.14** | **0.18** |
| 26-35 | 34(49.3 %) | 16(23. 2%) | 5(7.2%) | 11(15.9% ) | 3(4.3%) | 69(100 %) | | |
| 35 and above | 21(70% ) | 2(6.7 %) | 2(6.7%) | 5(16.7%) | 0 | 30(100 %) | | |

Not statistically significant, that is, p>0.05

**Table 4b: Distribution of impacted mandibular third molar subtypes (angulation) according to patients' age on the right jaw (right section of the mandible)**

| | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | Total | Fisher s | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Age group** | | | | | | | | |
| <25 | 30(46.2 %) | 18(27. 7%) | 9(13.8%) | 7(10.8%) | 1(1.5%) | 65(100 %) | **29.14** | **0.18** |
| 26-35 | 34(49.3 %) | 16(23. 2%) | 5(7.2%) | 11(15.9% ) | 3(4.3%) | 69(100 %) | | |
| 35 and above | 21(70% ) | 2(6.7 %) | 2(6.7%) | 5(16.7%) | 0 | 30(100 %) | | |

Not statistically significant, that is, p>0.05

**Table 4b: Distribution of impacted mandibular third molar subtypes (angulation) according to patients' age on the right jaw (right section of the mandible)**

| | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | Total | Fisher s | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Age group** | | | | | | | | |
| <25 | 30(46.2 %) | 18(27. 7%) | 9(13.8%) | 7(10.8%) | 1(1.5%) | 65(100 %) | **29.14** | **0.18** |
| 26-35 | 34(49.3 %) | 16(23. 2%) | 5(7.2%) | 11(15.9% ) | 3(4.3%) | 69(100 %) | | |
| 35 and above | 21(70% ) | 2(6.7 %) | 2(6.7%) | 5(16.7%) | 0 | 30(100 %) | | |

Not statistically significant, that is, p>0.05

**Table 4c: Distribution of impacted mandibular third molar subtypes (angulation) according to patients' age on the left jaw (Left section of the mandible)**

| | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | Total | Fisher s | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Age group** | 47(54%) | 16(18.4%) | 8(9.2%) | 7(8%) | 9(10.3%) | 87(100%) | **19.304** | **0.013** |
| <25 | | | | | | | | |
| 26-35 | 53(55.2%) | 12(12.5%) | 9(9.4%) | 19(19.8%) | 3(3.1%) | 96(100%) | | |
| 35 and above | 26(58.6%) | 0 | 2(6.2%) | 3(9.4%) | 1(3.1%) | 32(100%) | | |

Chi-square tests applied, P <0.05 that is, statistically significant.

Table 4d shows the distribution of the angulation subtypes of impacted mandibular third molar quadrant wise. The table showed that impacted mandibular third molar occur more on the left quadrant of the mandible with mesioangular subtype having the highest proportion 126(58.6%) and the buccolingual subtype being the least 13(6.0%).

**Table 4d: Distribution of impacted mandibular third molar subtypes (angulation) by side (Right versus left quadrant).**

| Impaction Subtypes | Right quadrant | Left quadrant |
|---|---|---|
| Mesioangular | 85(51.8%) | 126(58.6%) |
| Distoangula | 36(22%) | 28(13%) |
| vertical | 16(9.8%) | 19(8.8%) |
| Horizontal | 23(14%) | 29(13.5%) |
| Buccolingual | 4(2.4%) | 13(6%) |
| Total | 164(100%) | 215(100%) |

Table 5a shows the angulation subtypes according to patients' sex which was found to be statistically significant.

The pathology (IMTM) occurred more in females 92(100%) than in males 72(100%) but with respect to the angulation, the mesio-angular subtype was the predominant type with the bucco-lingual form of impaction being the least in both sexes – female 46(50%)} and {439(54.2%)}. The order of the angulation was also different; among the female, the mesio angular was followed by disto angular, vertical, horizontal and bucco lingual while among the male folk, the order was follows: mesio angular, horizontal, disto angular, vertical, ,and bucco lingual but distoangular and vertical impaction have the same proportion of 10(10%).

Table 5a shows the angulation subtypes according to patients' sex which was found to be statistically significant.

The pathology (IMTM) occurred more in females 92(100%) than in males 72(100%) but with respect to the angulation, the mesio-angular subtype was the predominant type with the bucco-lingual form of impaction being the least in both sexes – female 46(50%)} and {439(54.2%)}. The order of the angulation was also different; among the female, the mesio angular was followed by disto angular, vertical, horizontal and bucco lingual while among the male folks, the order was follows: mesio angular, horizontal, disto angular, vertical, ,and bucco lingual but distoangular and vertical impaction have the same proportion of 10(10%).

**Table 5a: Distribution of Right Impacted mandibular third molar (angulation) according to patients' sex**

N = 164

| Sex/angulation | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | *Total* | $X^2$ | $P_{value}$ |
|---|---|---|---|---|---|---|---|---|
| **Female** | 46(50%) | 24(26.1%) | 12(13%) | 7(7.6%) | 3(3.3%) | 92(100%) | **10.82** | **0.029** |
| **Male** | 39(54.2%) | 12(16.7%) | 4(5.6%) | 16(22.2%) | 1(1.4%) | 72(100%) | | |

Chi-square tests applied, P <0.05 That is, statistically significant

**Table 5b: Distribution of Left Impacted mandibular third molar (angulation) according to patients' sex**

N = 215

| Sex/angulation | Mesio angular | Disto angular | Vertical | Horizontal | Bucco lingual | *Total* | $X^2$ | $P_{value}$ |
|---|---|---|---|---|---|---|---|---|
| **Female** | 74(64.3%) | 18(15.7%) | 9(7.8%) | 9(7.8%) | 5(4.3%) | 115(100%) | **10.047** | **0.04** |
| **Male** | 52(52%) | 10(10%) | 10(10%) | 20(20%) | 8(8.%) | 100(100%) | | |

Chi-square tests applied, P <0.05, That is, statistically significant

Table 6a shows that out of the 276 patients that present at the clinic for one complaint or the other related to impaction of the mandibular third molar, 99 of them had bilateral third molar impaction of the mandible of which 72(72.7%) are of the same angulation subtype and 27(27.3%) had different angulation subtypes in different sides of the jaw.

Table 6a: Distribution of Bilateral Impacted Mandibular Third Molar

| Bilateral Form of Impaction | | |
|---|---|---|
| | Frequency | Percentage (%) |
| Same impaction subtypes(Angulation) | 72 | 72.7 |
| Different impaction subtypes(Angulation) | 27 | 27.3 |
| **Total** | **99** | **100** |

Table 6b shows the distribution of the bilateral impacted mandibular third molar angulation wise. It is also worthy of note that mesio angular subtype/angulation was predominant bilaterally i.e. both right and left quadrant of the mandible {27(27.3)}, and bilateral buccolingual mandibular third molar impaction was the least predominant {1(1.01%)} while the combination of any of the subtypes was 46(46.46%).

**Table 6b: Distribution of Bilateral Impacted Mandibular Third Molar according to subtypes**

| IMTM Angulation (Right and Left quadrant of mandible) | Count/% |
|---|---|
| Mesioangular | 27(27.3%) |
| Distoangular | 9(9.1%) |
| Vertical | 3(3.03%) |
| Horizontal | 13(13.1%) |
| Buccolingual | 1(1.01%) |
| Total bilateral impaction | 53(53.54%) |
| Combination of impaction | 46(46.46%) |
| Total | 99(100%) |

Table 7 a & b shows the associated pathology as related to the impacted mandibular third molar in both right and left quadrant of the jaw (Mandible). Pericoronitis was the main reason for presentation at the clinic. .

On the right quadrant of the jaw (The mandible), a total of 161 pathologies were observed in 276 patients that presented at the clinic for treatment. The main reason for the clinic attendance was due to pericoronitis affecting the tooth in question. Meanwhile, the total number of pathologies associated to impacted mandibular third molar on the left quadrant of the jaw was 213 in 276 patients with pericoronitis being the main associated pathologies. The right quadrant of the jaw showed that pericoronitis (64.6%) followed by caries (16.7%), periodontitis (11.8%), apic al abscess (6.21%) and cyst (0.62%) in that order. The order of the pathologies was the same as that on the right jaw follow: pericoronitis (49.3%), caries (25.35%), peridonititis (17.37%), apical abscess (7.04%), cyst (0.94%). Carious lesion was the second most common pathology in both right and left jaw (16.77%) and (25.35%) respectively. Periodontitis was the next as far as both quadrant of the mandible are concerned (11.80%) for the right and (7.04%) for the left quadrant; when carious lesions, periodontics, dental abscess and cyst were grouped together as other pathology, pericoronitis remained predominant.

**Table 7a: Distribution of commonly found pathology on the right quadrant of the jaw angulation wise**

| | Mesio angular | Disto Angular | Vertical | Horizontal | Bucco lingual | Total | $X^2$ | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Assosiated Pathology** | | | | | | | | |
| Pericoronitis | 48(46.2%) | 29 (27.9%) | 11 (10.6%) | 13 (12.5%) | 3 (2.9%) | 104 (100% | **6.795** | **0.147** |
| Others | 37(63.8%) | 7(12.1%) | 5(8.6%) | 8(13.8%) | 1(1.7%) | 58(100 %) | | |

P >0.05 that is, statistically not significant

**Table 7b: Distribution of commonly found pathology on the left quadrant of the jaw angulation wise.**

| | Mesio angular | Disto Angular | Vertical | Horizontal | Bucco lingual | Total (%) | $X^2$ | $P_{val}$ |
|---|---|---|---|---|---|---|---|---|
| **Assosiated Pathology** | 63(60%) | 17(16.2%) | 9(8.6%) | 10(9.5%) | 6(5.7%) | 105(100) | **4.094** | **0.393** |
| Pericoronitis | | | | | | | | |
| Others | 63(57.3%) | 11(10%) | 10(9.1%) | 19(17.3%) | 7(6.4%) | 215(100) | | |

P >0.05 That is, statistically not significant

Table 8a shows that on the right quadrant, pericoronitis was related more to IMTM with depth A or type A depth of impaction 61(58.7%) and the type C depth was mere (1.0%). Most of the other pathologies are also related type A depth than any other depth of impaction.

On the left quadrant, pericoronitis account for more than two third as related to type A depth 72(69.9%) while only (1.0%) is related to Type C depth of mpaction.

**Table 8a: Distribution of associated pathology with depth of impaction on the right quadrant of the mandibular**

| | Not Applicable | Depth A | Depth B | Depth C | Total | Fishers | $P_{val}$ |
|---|---|---|---|---|---|---|---|
| **Associated Pathology** | | | | | | | |
| **Pericoronitis** | 7(6.7%) | 61(58.7%) | 35(33.7%) | 1(1%) | 104(100%) | **2.971** | **0.396** |
| **Others** | 1(1.7%) | 39(67.2%) | 18(31%) | 0 | 58(100%) | | |

Fishers exact test= 2.971, P >0.05 i.e. statistically not significant

**Table 8b: Distribution of associated pathology with depth of impaction on the left quadrant of the mandibular**

| | Depth A | Depth B | Depth C | Total | Fishers | $P_{val}$ |
|---|---|---|---|---|---|---|
| **Associated Pathology** | | | | | | |
| **Pericoronitis** | 72(69.9%) | 31(30.1%) | 0 | 103(100%) | **1.952** | **0.377** |
| **Others** | 66(62.9%) | 38(36.2%) | 1(1%) | 105(100%) | | |

Fishers exact test= 1.952, P >0.05 i.e. statistically not significant

# CHAPTER FIVE

## DISCUSSION, CONCLUSION AND RECOMMENDATION

### 5.1 DISCUSSION

The most common of all the impaction in human jaw is that of the mandibular third molar [Hupp et al., 2014]. Dental impaction was reported by many to have been generally influenced by environmental factors and general make-up of the individual [Akinbami and Dibia 2010] [Frost et al, 2000] [Bishara et al., 1996]. The environmental factors were grouped into Age, Sex, Weight, Height, Body mass index, Diet, Race, Length and width of the mandible, Ethnic background and Oral hygiene. Tooth related factors include: type of impaction, depth of impaction, relationship of impacted tooth with inferior dental nerve, associated pathologies, existing pathologies and bone density. Other researchers reported lack of space, early physical maturation and delayed mineralization of the tooth [Bouloux, 2007].

The result of this study revealed that most of the patients were between 16 and 92 years, with the minimum inclusion age for females being 16years and 92years maximum while the minimum age for males was 19years and 73years maximum. The median age was 27.0 years. The age sixteen was included because researchers had reported eruption of the mandibular third molar in Nigerian population to have occurred at age 14years [Agarwal et al., 2004]. The impacted mandibular third molar teeth occur more commonly among those patients that are in the 21 – 25years age group, [Obiechina et al., 2001]; this was closely followed by those patients in the 26-30years age group. It is evident from the above study that the frequency of the impacted mandibular third molar was highest among patients that are in their third decade of life [Syed et al, 2013].

Slightly more than half of the patients were females. This may be due to the fact that females have better health seeking behavior than males. This assertion agrees with the finding of Kreamer, [2000] who reported that men are slower to notice signs of a dental condition hence will not seek medical attention on time.

Most of the patients in this study were single, same as the study by Venta et al., [2004] and the prevalence of this condition decreases with increase in age of the patients. This phenomenon is probably due to increased extraction of impacted third molar in older patients as reportedly by Hugoson and Kugelberg,[1988] that 23% of 20years old and 68.3% of 30years old patients had one or more third molar extraction or surgery.

The male to female ratio of this study group showed a distribution that was in contrast to that reported by Nzima, [2005] and where female to male ratio was 1:1.5 [2005]. Similar to our findings Syed et al., [2013], Hupp et al., [2013], Secic et al., [2013], Hashemipour et al., [2013], Sheikh et al., [2012], Venta et al [2004], Quirreish [2005], Alhaija et al[2001], Brasilero et al., [2012], Kaya et al [2010], Polat et al [2008], Tang [2006], Adeyemo et al., [2006] and Chu et al., [2003] also found higher female predilection. These observations are in favour of Hellman's theory which states that "jaws of female stop growing when third molar just begin to erupt, whereas in males growth of the jaws continues beyond the time of eruption of the third molar resulting in decreased incidence of the third molar impactions in males compared to females [Reddy, 2012].

Quek et al., [2003], Hugoson and Kugelberg [1988], Hellman [1936] and Murtomaa et al., [1985] reported higher frequency among females than in males; but Haidar and Shalhoub, [1986] reported higher frequency among males than in females.

Kramer and Williams [1970], Morris and Jerman [1971] Aitasalo et al [1972], Brown et al [1982], HaHab et al [1995], and Hassan [2010] reportedly no sex predilection.

An overwhelming majority of patients were of Yoruba ethnic group, this reflects the fact that Ado-Ekiti is occupied by predominantly Yoruba. The Igbo, which constitute the second highest proportion as well as the Hausas are residents in the city for trading and other commercial activities. Most of the patients presenting at the clinic are married and most of them are professionals while very few are unemployed.

Also, majority of the patients were Christians as this was the main religion in the city, the very few that are Islamic practitioner are migrants that settled there.

The result of the prevalence of symptomatic impacted mandibular third molar for this study among 1857 patients presenting at the dental clinic of the Ekiti State University Teaching

Hospital was similar to that reported by Olasoji and Odunsanya [2000], who reported the prevalence of 15.1% in a Nigerian urban population. Our result is about half the frequency reported by Montelius in a Chinese population; Morris and Jerman reported a much higher prevalence similar to the frequency of 65.6% reported by Quek et al., [2003]. Dental records and radiographic findings (PAR-peri-apical radiograph) were used to establish diagnostic validity. The measurements of heights and weight (BMI) showed no significance.

Mesio-angular subtype was the predominant type with the bucco-lingual form of impaction being the least in both sexes. The order of the angulation were also different; among the female, the mesio angular was followed by disto angular, vertical, horizontal and bucco lingual while among the male folks, the order is as follows: mesio angular, disto angular, horizontal, vertical and bucco lingual. The following studies are in agreement with the result of our study; Quek et al, [2003], Kramer and Williams, [1970] and Moris and Jerman, [1971] that reported mesioangular impaction as the most common impaction. Hugoson and Kugelberg, [1988], and Almendros-Marqués et al., [2006] reported vertical angulation as the most common orientation form of impaction in the Swedish population.

Nigerian studies also showed that mesioangular subtype of impaction was the most common form of impaction [Gbotolorun, et al. 2007], [Obiechina, et al. 2001]. Similarly, it was also the most common type among Chinese (80%) and Korean populations (46.5%) [Quek, et al., 2003]. A study in Thailand revealed that out of 680 impacted molar extractions, 402 teeth were mesio-angularly impacted [Unwerawattana, 2006]. One Spanish study done by Chaparro-Avendaño, et al. [2005] showed similar results where mesio-angular was the most common (71.5%). Bilateral occurrences of impacted mandibular third molar studies are scarce.

Dachi and Howell, [1961] discovered and reported that unilateral and bilateral impaction of third molars had almost the same frequency which was contrary to their general clinical impression. Ramamurthy et al. [2012] reported that bilateral impaction was more common than the unilateral impaction. This study showed that unilateral occurrence of impaction was more common than bilateral impaction (about one third was bilaterally impacted) contrast to the report by Quek et al., [2003]. This could be as a result of having different eruption rate of the mandibular third

Hospital was similar to that reported by Olasoji and Odunsanya [2000], who reported the prevalence of 15.1% in a Nigerian urban population. Our result is about half the frequency reported by Montelius in a Chinese population; Morris and Jerman reported a much higher prevalence similar to the frequency of 65.6% reported by Quek et al., [2003]. Dental records and radiographic findings (PAR-peri-apical radiograph) were used to establish diagnostic validity. The measurements of heights and weight (BMI) showed no significance.

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Nigerian studies also showed that mesioangular subtype of impaction was the most common form of impaction [Gbotolorun, et al. 2007], [Obiechina, et al. 2001]. Similarly, it was also the most common type among Chinese (80%) and Korean populations (46.5%) [Quek, et al., 2003]. A study in Thailand revealed that out of 680 impacted molar extractions, 402 teeth were mesio-angularly impacted [Unwerawattana, 2006]. One Spanish study done by Chaparro-Avendaño, et al. [2005] showed similar results where mesio-angular was the most common (71.5%). Bilateral occurrences of impacted mandibular third molar studies are scarce.

Dachi and Howell, [1961] discovered and reported that unilateral and bilateral impaction of third molars had almost the same frequency which was contrary to their general clinical impression. Ramamurthy et al. [2012] reported that bilateral impaction was more common than the unilateral impaction. This study showed that unilateral occurrence of impaction was more common than bilateral impaction (about one third was bilaterally impacted) contrast to the report by Quek et al., [2003]. This could be as a result of having different eruption rate of the mandibular third

molars. Also, it was observed that more than two third of the bilateral impaction are of the same subtype angulation wise with mesioangular impaction being the majority.

On the right quadrant of the jaw (The mandible), a total of 161 pathologies were observed in 276 patients that presented at the clinic for treatment. The main reason for the clinic attendance was due to pericoronitis affecting the tooth in question. Meanwhile, the total number of pathologies associated with impacted mandibular third molar on the left quadrant of the jaw (the mandible) was 213 in 276 patients with pericoronitis being the main associated pathologies. The right quadrant of the jaw also showed that pericoronitis was the main associated pathology followed by caries,periodontitis, apical abscess and cystic lesion respectively. The order of the pathologies was the same as that found on the right quadrant of the jaw. These findings are in agreement with the study done in Lahore (53%), shati et al, [2006] and Peshawa (48.5%), Ishaq et al., [2006].

Pericoronitis is an acute condition resulting in inflammation of the gum over and around the mandibular third molar; hence patients seek attention at the dental clinic more than any other pathology associated with impacted mandibular molar (IMTM) (Krishnan et al., 2009). This is because or was due to the fact that patient will not be able to close the teeth together as the opposing teeth and/or food that touched the area would result in an excruciating pain. The fact that patients experience a high degree of discomfort could be the reason why dental Centre's experiences a high turn-out of patients. However, it was noticed that very few patients present at the clinic on account of asymptomatic impacted mandibular third molar. It is a general knowledge in Dentistry and especially in developing countries; 'until a condition disturbs a patient's routine, then it is not yet time to visit the hospital' this could be the reason why every patient that presented with impacted mandibular third molar already had an associated pathology (Already symptomatic).

It is important to note that all patients that presented at the dental clinic were all symptomatic in contrast to the report by Nazir A et al., [2014] that reported that 6.73% of teeth studied were asymptomatic and extracted for prophylactic reason which is also a little bit different from the finding of Krishnan et al., [2009].

Unilateral form of impacted mandibular third molar was more common than the bilateral form and different angulation of IMTM in the right and left side of the mandible was about one-third of same angulation of IMTM in the mandible. This could be as a result difference in the time of

eruption and also difference in the morphology of the mandibular third molar (Normal anatomical variations).

Carious lesion was the second most common pathology in both right and left quadrant of the jaw; it develops gradually as a result of food impaction in the angle formed by the standing (upright) second lower molar and the mandibular third molar. This could be as a result of lack of oral health measures taken by the patients under study [Nazir et al., 2014], [figure 4]. Pain results when the vital part of the tooth is affected.

Periodontitis was the next most common pathology in both quadrant of the mandible, the Important clinical finding in this case was the presence of periodontal pocket with probing depth of more than 5mm related to the second mandibular molar and associated with the adjacent impacted mandibular third molar, Moss et al., [2007], and White et al., [2008] observed similar scenario in their studies. The associated pathology on both quadrant of the mandible next in line was Dental abscess also referred to as facial space infection (figure 5). The result obtained from this study was similar to those reported in the literatures [Krishnan, 2009] and [Litonjua, 1996]. The reason for the low count of dental abscess reported (<10%) could be attributed to the fact that patients seek dental attention early especially when the condition disturbs their daily routine. The least prevalent of the pathological condition was the cystic lesion associated with impacted mandibular third molar. This information support the rationale for no treatment of asymptomatic impacted mandibular third molar teeth [Jung and Cho, 2013], [Stanthopoulos et al., 2011], [Krishnan et al., 2009], [Yamaoka et al., 2009]. Studies reported less than 2% of cystic lesions associated with impacted mandibular third molar, the reason adduced was that teeth with pathological process e.g. Odontogenic cyst take longer to make a third molar symptomatic and patients presents at later age the removal of the lesion as well as the third molar. Literatures posited that the highest number of cystic lesions were seen in patients in third decade of life and this could be a justification for prophylactic removal of impacted mandibular third molars in certain patients [Jung and Cho, 2013], [Stanthopoulos et al., 2011], [Litonjua, 1996].

Pericoronitis was found to be most frequently present in patients that exhibited depth A and depth B position especially in the left quadrant of the mandible along with caries. The finding by Nazir et al., [2014] was consistent with this finding except for the fact that caries as an associated pathology was found to be more in frequency than pericoronitis as we had found out. Pericoronitis was observed more in patients that exhibited depth A and depth B because these depths are associated with soft tissue impaction. This form of impaction is also said to be partial or submucosal impaction and it is a significant risk factor for acute pericoronitis in impacted mandibular third molars (IMTM) as supported by Prockt et al., [2008] and Yamaoka et al., [2009]; after grouping the associated pathology into just two groups, pericoronitis and others, more than half of pericoronitis was related to IMTM with depth A or type A depth of impaction and the type C depth was insignificant. Most of the other pathologies are also related type A depth than any other depth of impaction. On the left quadrant, pericoronitis account for more than two third as related to type A depth.

## 5.2 CONCLUSION

The result of this study revealed that about one-seventh of the patients attending oral and maxillofacial clinic had one form of impaction or another despite the fact that asymptomatic cases were not included. The low frequency of impacted mandibular third molar (IMTM) indicates that there are many unreported cases of asymptomatic impacted mandibular third molar as they do not see the need in reporting the case.

The mandibular third molar impaction was observed to be more commonly the younger population especially those in the third decade of life and more prevalent among females. Also, a tall and heavily built person would most likely not have this condition.

Unilateral form of impacted mandibular third molar was more common than the bilateral form and different angulation of IMTM in the right and left side of the mandible was about one-third of same angulation of IMTM in the mandible. The most common presentation of the IMTM was the mesioangular form. Pericoronitis was found to be the most frequently associated pathology in patients that exhibited depth A and depth B position (depth of impaction).

## 5.3 RECOMMENDATIONS

The prevalence of impacted mandibular third molar was conducted in a hospital setting with one hundred percent of the patients being symptomatic, meaning that there are more people in the community with asymptomatic impacted mandibular third molars that are not captured in this study.

The following recommendations are hereby made:

- Efforts should be made to identify and reduce barriers as regarding patient's regular and routine dental check-up for early detection, prevention and management of impacted mandibular third molar. Dental lifestyle modification should also be promoted.
- Effective oral health education especially on the presentation, pattern of growth, and related clinical challenges of mandibular third molar.
- Improve parental knowledge on related clinical scenarios with mandibular third molars
- Developments of a guideline, whereby clinicians can assess and diagnose related challenges with respect to impacted mandibular third molar patients.

## 5.4 LIMITATION OF THE STUDY

1. Missing information or data from some of the patients case files, this is a peculiar limitation with all secondary data
2. Unavailability of modern/standard radiographic machine and measurement tools such as orthopanthomograph which is the standard; however other radiographic investigation are available and acceptable for example periapical radiograph
3. Under reporting: The results of this study may not be generalizable as some of the patients with asymptomatic impacted mandibular third molar could not be captured.

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# EKITI STATE UNIVERSITY TEACHING HOSPITAL
# ADO-EKITI, NIGERIA.

## ETHICS AND RESEARCH COMMITTEE

## CLEARANCE CERTIFICATE

*PROTOCOL NUMBER*: EKSUTH /A67/2014/12/006

*PROJECT TITLE*: IMPACTED MANDIBULAR THIRD MOLAR-PREVALENCE AND ASSOCIATED PATHOLOGIES AMONG PATIENTS ATTENDING EKSUTH DENTAL CLINIC EKITI STATE NIGERIA.

*INVESTIGATOR(S)*: DR. IBITOYE OLUWABUNMI SAMUEL .
*SUPERVISOR(S)*: DR. BABATUNDE ADEDOKUN / DR.JOSHUA AKINYEMI.

*DEPARTMENT: DEPARTMENT OF EPIDEMIOLOGY AND MADICAL STATISTICS*
*INSTITUTION: FACULTY OF PUBLIC HEALTH, UNIVERSITY OF IBADAN.*

*DATE CONSIDERED:29\12/2014.*

*DECISION OF COMMITTEE:* APPROVED

*CHAIRMAN:* Dr. Obitade S. OBIMAKINDE *SIGNATURE & DATE:* 24/2/15

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**DECLARATION BY INVESTIGATOR/PRINCIPAL INVESTIGATOR**

PROTOCOL NUMBER (Please quote in all enquires) EKSUTH /A67/2014/12/006

*To be completed in three copies and two copies returned to the Secretary; Ethics and Research Committee, University Teaching Hospital, Ado-Ekiti, Nigeria.*

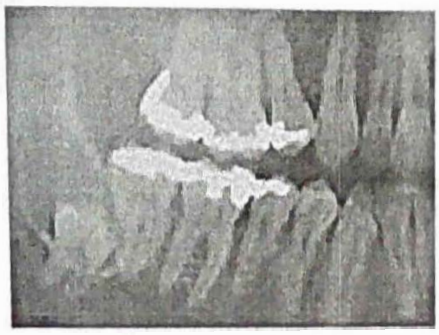
I/we fully understand the conditions under which I am/we are authorise to conduct the above-mentioned research and I/we guarantee that I/we will ensure compliance with these conditions. Should any departure be contemplated from the research procedure as approved, I/we undertake to resubmit the protocol to the Ethics and Research Committee.

Signature _____ Date: 24/2/2015

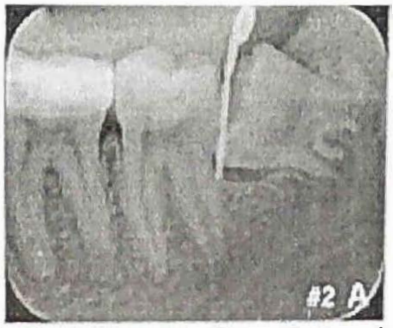
*NB: Any erasure, cancellation or alteration renders this certificate void.*

**Figure 1: IMPACTED MANDIBULAR THIRD MOLAR**

**ANGULATION SUBTYPES AND DEPTH TYPES**

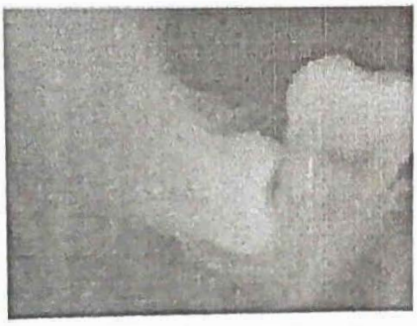


Vertical/Type C depth



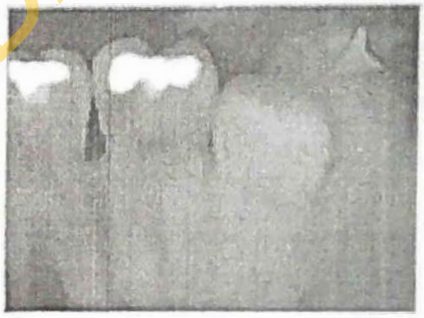
Mesioangular/Type A depth

Mesioangular/Type B depth



Horizontal/Type C depth

Horizontal/Type C depth



Distoangular/Type B depth

Buccolingual/Type C depth

Figure 2: A patient with an inflamed gingivae (Pericoronitis) over and distal to right distoangular impacted last molar at depth A position – shown by the green arrow

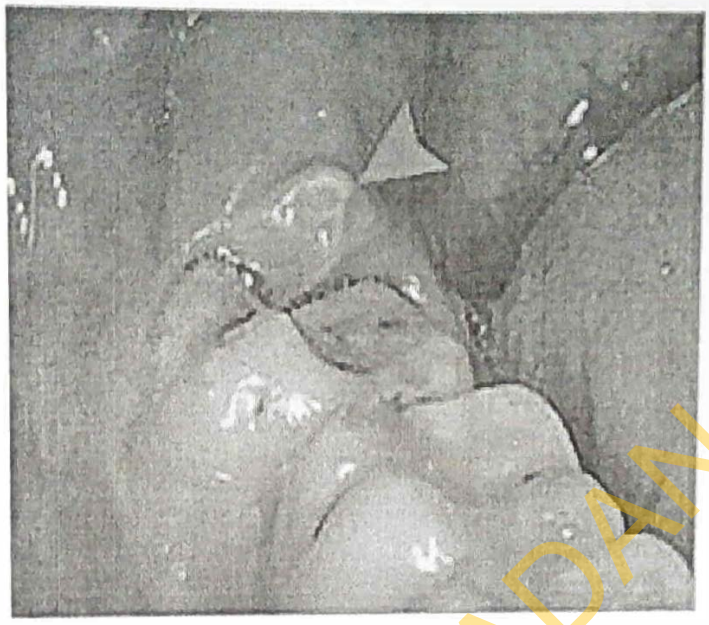


Figure 3: Carious lesion showing on the last molars of both quadrants. Left – vertical impaction at depth B position

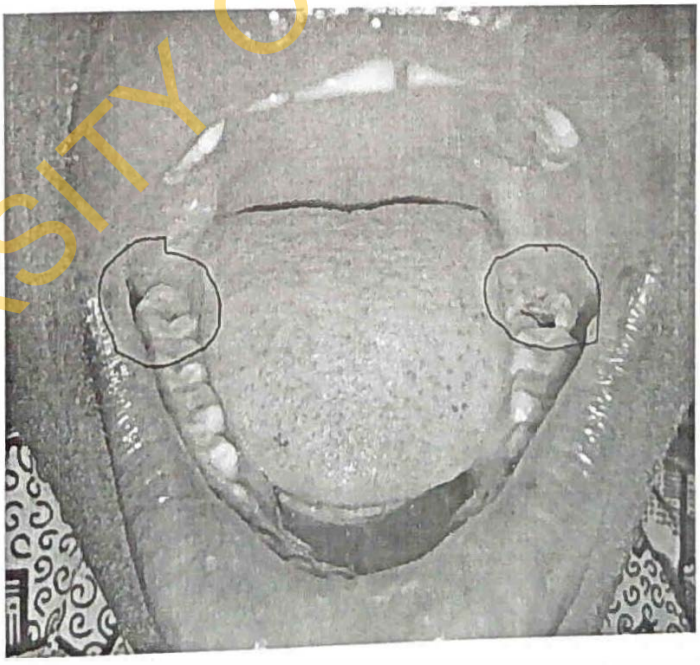


Figure 4: A 16year old male patient with Dental abscess

Figure 5 below: Shows a 28 year old female patient with an unerupted impacted mandibular third molar (completely buried) on the right quadrant and a horizontal impacted third molar on the left at depth B position.

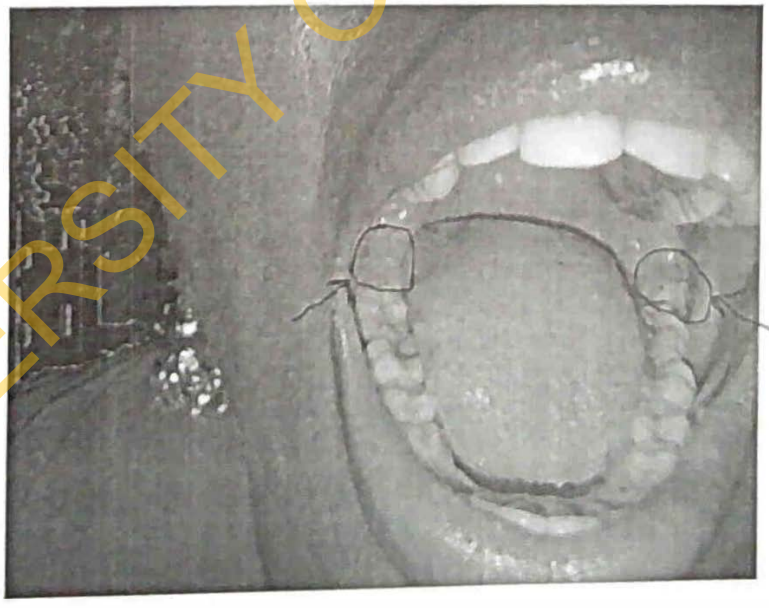


Figure 6: A 48 year old male with completely unerupted IMTM on the right jaw and mesioangular impaction on the left with depth B position.

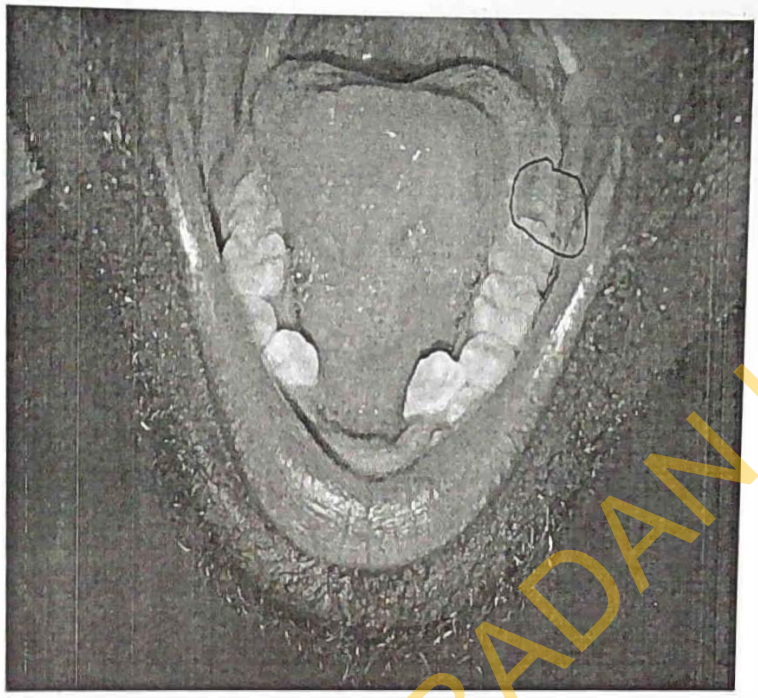


Figure 7 below: Shows 27 year old female patients with Right vertical and Left mesioangular impaction both at depth B position

**Figure 8: A 30 year old female patient with bilateral horizontal impaction, both at depth B position.**

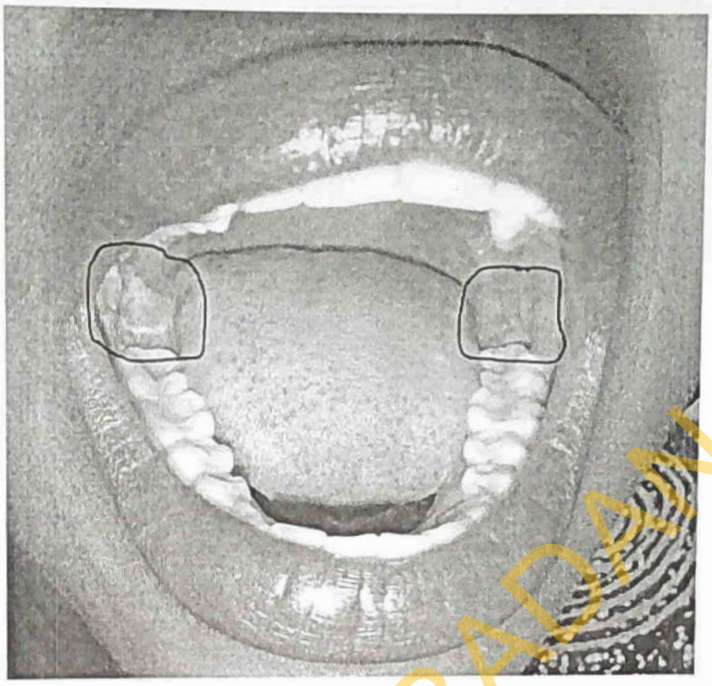


**Figure 9 below: A 40 year old female patient with Right erupting impacted mandibular third molar at depth C position and Left vertical impaction at depth B position**

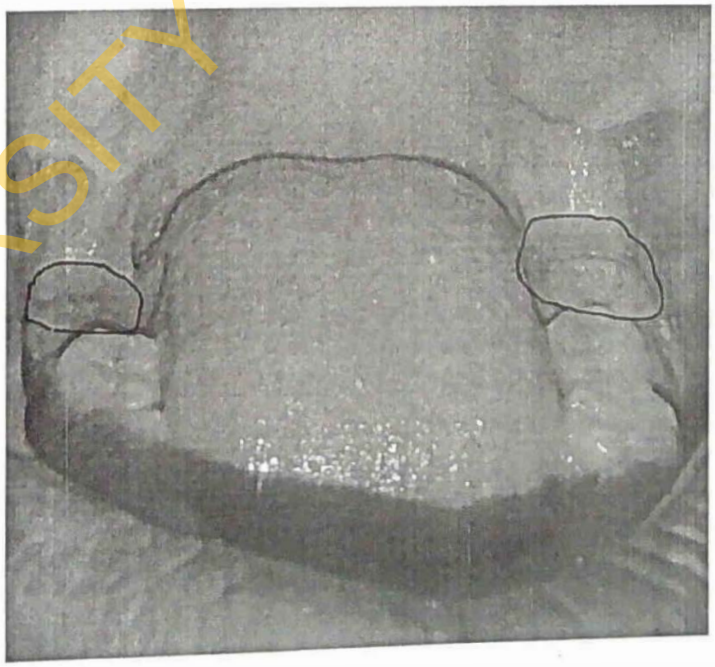


Figure 10: A 27year old female patient with Left vertical impaction at depth B position

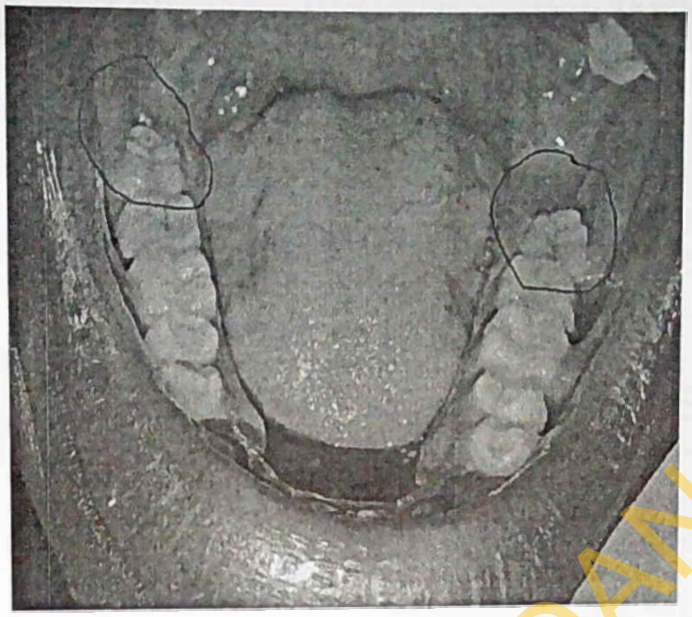


Figure 10: A 27year old female patient with Left vertical impaction at depth B position