PREVALENCE AND BACTERIOLOGY OF TONSILLITIS AMONG PATIENTS ATTENDING OTORHINOLARYNGOLOGY SERVICES AT MUHIMBILINATIONAL HOSPITAL DAR ES SALAAM, TANZANIA.

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CERTIFICATION

The undersigned certifies that they have read and hereby recommends for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled **"*Prevalence and bacteriology of tonsillitis among patient attending ORL services at Muhimbili National Hospital in Dar es salaam, Tanzania*"**, in fulfillment of the requirements for the degree of Master of Medicine (Otorhinolaryngology) of the Muhimbili University of Health and Allied Sciences.

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DECLARATION AND COPYRIGHT

I, **Jane Bazilio**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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DEDICATION

I dedicate this work to my husband Xavery Komba and my daughter and son Caren and Calvin for their love, support and encouragement.

ABSTRACT

Introduction

Tonsillitis is a common infectious disease contributing to significant social-economic impact worldwide. Like other infectious diseases, the determination of the pathogenic agent is important in antibiotic selection for the medical treatment of tonsillitis.

Objective To determine the prevalence and bacteriology of tonsillitis among patient attending Otorhinolaryngology services at Muhimbili National Hospital.

Method: This was descriptive cross-sectional study**.** That was carried out at Muhimbili National hospital, ORL department, both inpatients and outpatients from June to December 2016. Interview was conducted through special questionnaire and clinical examination forms, thorough ENT examination, throat swab for culture and sensitivity was done. Culturing for colony characteristics followed by gram stain was used for provisional identity of bacteria. Further identification was done by a set of biochemical test. Antimicrobial susceptibility pattern of pathogenic bacteria was determined by Kirby Bauer disc diffusion method.

A total of 485 patients were involved in this study and the data was analyzed using the SPSS program. Frequency distribution and two way tables were used to summarize the data and Chi-square test was used to determine the association between independent and dependent variables and p-value of less than 0.05 was considered as statistically significant.

Results: Out of 485 patients attending ORL services at MNH 100(20.6%) had tonsillitis. Prevalence was higher in males 23.7% as compared to females 18.3%.The most affected age group was 1-10years 42.6%.

Nearly quarter of patient had family history of tonsillitis 21% siblings being commonly affected. The most common isolated bacteria were Coagulase negative staphylococcus, Streptococcus pyogenes and Bacillus species. Streptococcus pyogenes was susceptible to most of the drugs available at our setting and resistant to penicillin G.

Contents

ABBREVIATIONS

MNH – Muhimbili National Hospital.

MUHAS – Muhimbili University of Health and Allied Sciences.

ORL – Otorhinolaryngology.

ENT – Ears, Nose and Throat.

MALT – Mucosa Associated lymphoid tissue

DCs – Dendritic Cells.

GAS –Group A Streptococcus.

EBV – Epstein Bar Virus.

GABHS – Group A B Hemolytic Streptococcus.

PTA – Peritonsillar Abscess.

UARS – Upper Airway Resistance Syndrome.

CNS – Central Nervous System.

CBC – Complete Blood Count.

RADT – Rapid Antigen detection test.

CO – Carbon dioxide

OCDS –Obsessive Compulsive disease.

CT –Computed Tomography

OSAS –Obstructive Sleep Apnea Syndrome

BLPB –beta-lactamase producing bacteria

Definition of key terms

Acute tonsillitis is defined as an acute infection of the tonsils not more than two weeks.

Sub-acute tonsillitis is defined as infection of tonsillitis more than two weeks but less than eight weeks.

Chronic tonsillitis is defined as persistent tonsillar infection for more than eight weeks.

Recurrent tonsillitis is defined as from four to seven episodes of acute tonsillitis in 1 year, five episodes for 2 consecutive years, or three episodes per year for 3 consecutive years.

Tonsilloliths are concretions of epithelial debris that develop within the depth of the tonsillar crypts.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND AND LITERATURE REVIEW

Tonsillitis is inflammation of the pharyngeal tonsils. The inflammation usually extends to the adenoid and the lingual tonsils; therefore, the term pharyngitis may also be used (1).

Tonsillitis most often occurs in children; however, the condition rarely occurs in children younger than 2 years. Tonsillitis caused by Streptococcus species typically occurs in children aged 5-15 years, while viral tonsillitis is more common in younger children (1).

Most cases of bacterial tonsillitis are caused by group A beta-hemolytic Streptococcus pyogenes (GABHS). The oropharynx and Waldeyer tonsillar ring are normally colonized by many different species of aerobic and anaerobic bacteria, including Staphylococcus, non-hemolytic streptococci, Lactobacillus, Bacteroides, and Actinomyces. These organisms, as well as many other pathogenic bacteria, viruses, fungi, and parasites, can cause infections of tonsillar tissue. Oropharyngeal cultures obtained during the infection are not always useful in distinguishing the offending pathogen as they often yield multiple organisms, reflecting the normal flora of the oral mucosa (2).

Like other infectious diseases, the determination of the pathogenic agent is important in antibiotic selection for the medical treatment of tonsillitis.

There was a positive correlation between frequent tonsillitis and tonsillar hypertrophy; thus frequent tonsillar infection may cause tonsillar hypertrophy. The history of frequent tonsillitis and tonsillar hypertrophy decreased with increasing age (3).

1.2 BACKGROUND

1.2.1 Anatomy

The palatine tonsils, pharyngeal tonsils (adenoids), tubal and lingual tonsils are known as Waldeyer's ring and are part of the mucosa-associated lymphoid tissue (MALT) system. The nasopharyngeal tonsil which is located behind the nasal cavity is better known as adenoids while the palatine tonsils are usually referred to as the 'tonsils' by convention. Inflammation or hypertrophy of these two structures causes the majority of symptoms from these lymphoid tissues (5,6).

The palatine tonsils form the lateral aspects of the ring. The adenoids, or pharyngeal tonsils, located in the nasopharynx, form the superior aspect of the ring. The lingual tonsil, which resides at the base of the tongue, forms the inferior aspect of the ring (5).

The lymphoid tissue of Waldeyer tonsillar ring contains B-cell lymphocytes, T-cell lymphocytes, and a few mature plasma cells. This tissue is primarily involved in inducing secretory immunity immunoglobulin production. There are most active from the ages of 4 to 10 and tend to involutes after puberty. After their involution, the secretory immune function of these tissues remains, but not at the same level as previously (2,5,6).

In this study palatine tonsils are the study subject.

Palatine Tonsils

The palatine tonsils are the largest component of the ring, paired, generally ovoid-shaped masses located on the lateral walls of the oropharynx. Palatine tonsils contain crypts which are lined with stratified squamous epithelium and extend deeply into the tonsillar tissue. Though they maximize the exposure of tissue to surface antigen, they can also harbor debris and bacteria and may be the reason that tonsils are so commonly infected (7).

A specialized portion of the pharyngobasilar fascia, forming a distinct fibrous capsule, binds the deep surface of the tonsil. The lymphoid tissue is very adherent to the capsule, thus making it difficult to separate, but there is loose connective tissue between the capsule and the muscles of the tonsillar fossa. With the inflammation resulting from either acute or chronic infection, which is limited by this capsule, tonsillar tissue swelling usually extends medially into the oropharyngeal airway. The potential space between the tonsil and the pharyngeal muscles is the usual site of a peritonsillar abscess (2).

Three thin pharyngeal muscles form the tonsillar fossa**.** The palatoglossus muscle forms the anterior tonsillar pillar whereas the palatopharyngeal muscle forms the posterior tonsillar pillar. The base of the tonsillar fossa is formed by the pharyngeal constrictors (primarily the superior constrictor) (2).

The arterial blood supply and innervation of the tonsil is primarily based at the inferior pole. The tonsillar branch of the dorsal lingual artery, the ascending branch of the palatine artery, and the tonsillar branch of the facial artery enter the inferior pole of the tonsil. The superior pole receives its blood supply from the ascending pharyngeal artery and anteriorly, from the lesser palatine artery (2,4).

Venous drainage is more d iffuse, with a venous peritonsillar plexus about the capsule. This plexus drains into the lingual and pharyngeal veins, which feed into the internal jugular vein (2,4).

Lymphatic drainage is usually to the tonsillar lymph node, or to the jugulodigastric or other upper cervical lymph nodes (2).

The nerve supply of the tonsil is primarily from the tonsillar branch of the glossopharyngeal nerve, but also has contributions from the descending branches of the lesser palatine nerve (2).

1.2.2 Immunology

The tonsils are inductive sites for humoral and cell-mediated immune responses. They are predominantly B-cell organs; B cell account for 50% to 65% of all tonsillar lymphocytes. Approximately 40% are T cells, and 3% are mature plasma cells. The immunoreactive lymphoid cells of tonsils are found in four distinct areas: the reticular cell epithelium, the extra follicular area, the mantle zone of the lymphoid follicle, and the germinal center of the lymphoid follicle (6,7).

Immune responses against foreign antigens arise in crypt epithelium with the uptake of the antigen by epithelial cells. The antigen is then processed and presented by DCs to CD4+ T-cells under the epithelium. The activated CD4+ T-cells then activate B-cells to induce differentiation of antigen-specific B-cells in the follicles. B-cells finally differentiate into immunoglobulin-secreting plasma cells in the interfollicular area. In contrast to lymph nodes, the tonsils have no afferent lymphatics; therefore, their specialized epithelium plays an important role in antigen presentation and processing (5,8).

The tonsil produces antibodies locally as well as B cells, which migrate to other sites around the pharynx and periglandular lymphoid tissues to produce antibodies. T-cell functions, such as interferon-γ production and, presumably, production of other important lymphokines, have been shown to be present in tonsils (4).

1.2.3 Microbiology

Tonsillitis is one of the most prevalent infections in children and adolescents. The etiologic agents might be viral or bacterial. About 30% of cases are reported to be of bacterial origin, mainly due to group A Streptococcus (1).

Many other organisms are involved of particular importance are beta-lactamase producing organisms like Staphylococcus aureus, Moraxella catarrhalis, and

Hemophilus influenza. In polymicrobial infections beta-lactamase producing organisms can protect GAS from eradication with penicillins.

A polymicrobial bacterial population is observed in most cases of chronic tonsillitis, with alpha- and beta-hemolytic streptococcal species, S aureus, H influenza, and Bacteroides species having been identified.

Streptococcus pneumoniae, Staphylococcus aureus, and Haemophilus influenzae are the most common bacteria isolated in recurrent tonsillitis, and Bacteroidesfragilis is the most common anaerobic bacterium isolated in recurrent tonsillitis(4).

Table 1; Bacteria and Virus commonly cultured from the tonsils (7).

1.Bacteria
Aerobic Group A beta hemolytic streptococci Group B,C,G streptococcus HemophilusInluenza (type b and untypeable) Streptococcus pneumonia Moraxella cattarrhalis Haemophilusparainfluenza Neisseria species Mycobacteria species
Anaerobic Bacteriodes species Peptococcus species Peptostreptoccus species Actinomyces species
2.Viruses Epstain Barr Adenovirus Influenza A and B Herpes Simplex Parainfluenza Respiratory syncytial Other Mycobacterium (atypical nontuberculous) Candida albicans

1.2.4 Pathogenesis of Tonsillitis

The pathogenesis of infectious/inflammatory disease in the tonsils has its basis in their anatomic location and inherent function as organs of immunity. Viral infection with secondary bacterial invasion may be one mechanism of the initiation of chronic disease, but the effects of the environment, host factors, the widespread use of antibiotics, ecologic considerations, and diet may all play a role (7).

Inflammation and loss of integrity of the crypt epithelium result in chronic cryptitis and crypt obstruction, leading to stasis of crypt debris and persistence of antigen. Bacteria even infrequently found in normal tonsil crypts may multiply and eventually establish chronic infection. The role of mechanical trauma to the lymphocytes by excessive upper airway vibration as seen in snoring needs further investigation (7).

1.2.5 Epidemiology of Tonsillitis

In UK general practice, recurrent sore throat has an annual incidence of 100 per 1000 population. In the US, sore throat accounts for 2.1% of ambulatory visits. Tonsillitis most often occurs in children, a condition rarely appreciated in those younger than 2 years. Viral tonsillitis is more common in younger children. Acute tonsillitis is more common in children between the ages of 5 and 15 years.

The prevalence of bacterial tonsillitis, specifically group A beta-haemolytic streptococci (GABHS), is 15% to 30% of children with sore throat and 5% to 15% of adults with sore throat. Acute tonsillitis is most commonly seen in winter and early spring in temperate climates, although it may occur at any time of the year (1,10).

Studies have shown a significant relationship between the frequency of sore throats or tonsillitis and a history of parental tonsillectomy as well as a family history of atopy (11).

1.2.6 Clinical classification of Tonsillitis

Acute tonsillitis

Recurrent acute tonsillitis

Chronic (persistent) tonsillitis

Obstructive tonsillar hyperplasia

Acute Tonsillitis

Sore throat, fever, dysphagia, and tender cervical nodes in the presence of tonsils that are erythematous and have exudates are symptoms and signs consistent with a diagnosis of acute tonsillitis.

Recurrent Acute Tonsillitis

Recurrent acute infection has been variably defined as from four to seven episodes of acute tonsillitis in 1 year, five episodes for 2 consecutive years, or three episodes per year for 3 consecutive years.

Chronic (Persistent) Tonsillitis

Chronic sore throat, malodorous breath, excessive tonsillar debris (tonsilloliths), peritonsillar erythema, and persistent, tender cervical adenopathy are consistent with a diagnosis of chronic tonsillitis when no other source (such as the sinuses or lingual tonsils) can be identified.

Obstructive Tonsillar Hyperplasia

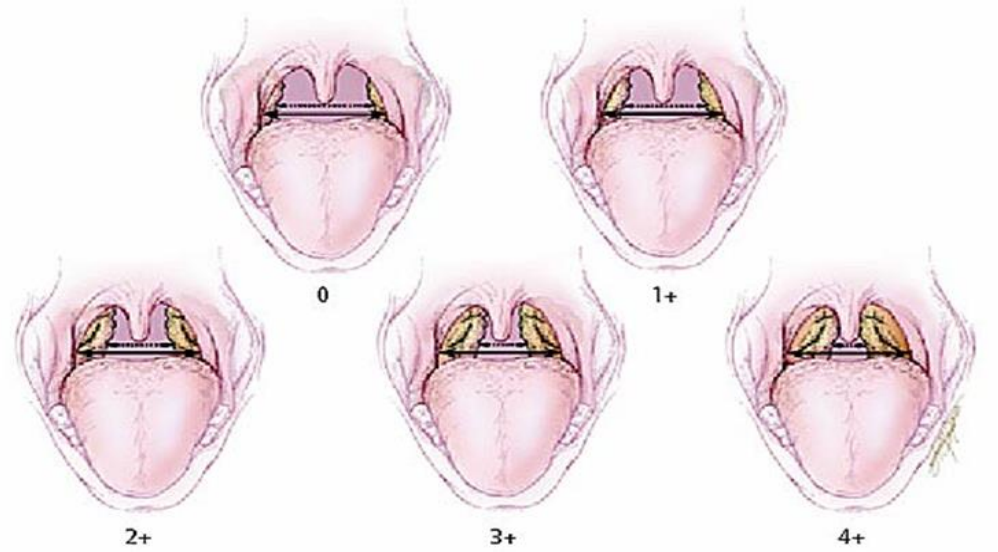
Enlarged tonsils can cause snoring, with obstructive disturbances (asleep and awake), dysphagia, changes in the craniofacial skeleton, and voice changes (muffling or hyper nasality). Enlarged tonsils, by themselves, in the absence of identifiable symptoms that affect health and well-being, need not be removed automatically.

Both benign and malignant neoplastic disease can occur in the tonsils. Unilateral tonsillar hyperplasia should raise this suspicion.

Standardized grading system of tonsils enlargement.

Brodsky and coworkers described an assessment scale for tonsillar hypertrophy.

In this scale, 0 indicates that the tonsils do not impinge on the airway; 1+ indicates less than 25% airway obstruction; 2+ indicates 25% to 50% airway obstruction; 3+ indicates 50% to 75% airway obstruction; and 4+ indicates more than 75% airway obstruction().



Grade 3+ and 4+ is considered as hypertrophied tonsillitis.

1.2.7 MANAGEMENT OF TONSILLITIS

Investigations

Tonsillitis is usually a clinical diagnosis but some investigation can be done to specific patient like obesity, trisomy 21, craniofacial or neuromotor disorders, sickle cell disease, bleeding disorders.

Main symptoms include fever, sore throat, foul breath, foreign body sensation in the mouth, painful swallowing, snoring and associated symptoms headache, nausea,

vomiting abdominal pain, bad taste in mouth, change in voice, difficulty swallowing, sleep apnea hence to make a diagnosis of tonsillitis in this study one will require two or more main symptoms and any accompanying/associated symptoms.

Laboratory test

Throat culture is the criterion standard for detecting groups A beta-hemolytic Streptococcus pyogenes (GABHS).

A Monospot serum test, CBC count, and serum electrolyte level test may be indicated.

A rapid antigen detection test (RADT)

Serum may be examined for antistreptococcal antibodies, including antistreptolysin O antibodies and antideoxyribonuclease (anti-DNAse)

Other investigation are not applicable in our setting like Polysomnography (PSG)which is recommended before tonsillectomy for children with clinical risk factors for severe OSAS However its use is still debatable (12).

TREATMENT

There are two modalities for treatment of tonsillitis.

Medical treatment

Treatment of tonsillitis usually depend on its clinical classification, it includes analgesic, antipyretic, corticosteroids and antibiotics.

Acute tonsillitis is largely supportive and focuses on maintaining adequate hydration and caloric intake and controlling pain and fever. Corticosteroids may shorten the duration of fever. Penicillin continues to be the first-line antibiotic used due to GABHS. Even when the throat culture is negative for GABHS, antibiotic therapy appears to be effective in improving symptoms (4,7).

In chronic tonsillitis and obstructive tonsillar hyperplasia, a therapeutic trial with an antibiotic effective against beta-lactamase-producing microorganisms or encapsulated anaerobes (such as amoxicillin-clavulanate or clindamycin) for 3 to 6 weeks may be beneficial and obviate the need for tonsillectomy in about 15% of children (7).

When enlarged tonsils cause an acute upper airway obstruction, a nasopharyngeal airway and intravenous steroids are the most effective ways to achieve immediate relief (7).

Surgical Treatment.

Indications for Tonsillectomy (4,5).

Infections

1.Recurrent acute tonsillitis - more than 6 episodes per year or 3 episodes per year for more than 2 years.

2. Recurrent acute tonsillitis associated with other conditions like;
   Cardiovascular disease associated with recurrent streptococcal tonsillitis,
   Recurrent febrile seizures.

3. Chronic tonsillitis symptoms that are unresponsive to medical management and associated with halitosis, persistent sore throat and cervical adenitis.

4. Streptococcal carrier state unresponsive to medical treatment.

5. Quinsy

6. Tonsillitis associated with abscessed nodes.

7. Infectious mononucleosis with severely obstructing tonsils that is unresponsive to medical management.

Obstructions

1.Sleep apnea

2.Adenotonsillar enlargement associated with corpulmonale, and failure to thrive

3. Dysphagia

4.Speech abnormalities (Rhinolaliaclausa)

5.Cranio facial growth abnormalities

6.Occlusal abnormalities

Neoplasm

Suspected neoplasm, either malignance or benign

Surgical technique

Tonsillectomy remains the most commonly performed major surgical operation among children. Studies have found tonsillectomy to be effective in reducing the occurrence of throat infection in children (13–19).

There is no evidence that tonsillectomy adversely affects immunity function, though, of course it may. If it does, this would not constitute a contraindication (20)

Many surgical techniques have been described for extirpation of the tonsils. Crowe and associates described the first meticulous surgical dissection technique with use of sharp instrumentation. More recently, however, dissection with electro cautery has become the most popular and common technique (4).

Other current techniques are the Coblator (ArthroCare Corporation), the Microdebrider, the ultra- sonic Harmonic Scalpel, bipolar electrocautery, and, less frequently, CO2 or KTP laser tonsillectomy (4).

1.2.8 COMPLICATIONS OF TONSILITIS

The emphasis on rapid diagnosis and the widespread use of antibiotics have markedly decreased the incidence of these complications. In contrast, suppurative complications of acute bacterial tonsillitis are still commonly encountered.

Non suppurative Complications

Scarlet Fever

Scarlet fever is associated with fever, severe dysphagia, a yellow membranous exudate covering the tonsils and the pharynx, and a diffuse erythematous rash, which usually follows pharyngeal symptoms. The tongue may also become red, with desquamation of the papillae ("strawberry tongue"); facial flush and petechial in body folds may be present. The eruptions, followed by desquamation, occur because of the erythrogenic exotoxin produced by the Streptococcus and are pathognomonic for this organism. The traditional treatment is with penicillin (3,5).

Otologic complications may include necrotizing otitis media with complete loss of the tympanic membrane and ossicles (4).

Acute Rheumatic Fever

Usually occurs 18 days after an infection caused by group A beta-hemolytic Streptococcus. Streptococcal infection results in production of cross-reactive antibodies, leading to damage of the heart tissues with subsequent endocarditis, myocarditis, or pericarditis.

Post streptococcal Glomerulonephritis

Occurs as an acute nephritic syndrome about 10 days after a pharyngotonsillar infection or as skin infections with a nephrogenic strain caused by group A beta-hemolytic Streptococcus, it involves injury to the glomerulus by deposition of the immune complexes as well as circulating autoantibodies of the streptococcal antigen (2).

Hotta et al first advocated the effects of treating IgAN patients with a combination of tonsillectomy and steroid pulse therapy not only on reducing hematuria/proteinuria, but also on long-term remission regarding renal function (20).

Suppurative Complications

Peritonsillar Abscess

Most commonly occurs in patients with recurrent tonsillitis or in those with chronic tonsillitis that has been inadequately treated. Patient present with pain and referred otalgia to the ipsilateral ear, drooling is caused by odynophagia and dysphagia, Trismus. Examination reveal gross unilateral swelling of the palate and anterior pillar with displacement of the tonsil downward and medially with reflection of the uvula toward the opposite side (4).

Management is controversial. Traditional management has consisted of incision and drainage, with tonsillectomy 4 to 12 weeks later however some surgeons advocate immediate tonsillectomy or Quinsy tonsillectomy as definitive management to ensure complete drainage of the abscess and to alleviate the need for a second hospitalization for an interval tonsillectomy (3,5).

Parapharyngeal Space Abscess

An abscess can develop in the parapharyngeal space if infection or pus drains from either the tonsils or from a peritonsillar abscess through the superior constrictor muscle. Patients characteristically exhibit fever, leukocytosis, and pain.

On Intraoral examination patient present swelling of the lateral pharyngeal wall, especially behind the posterior tonsillar pillar and antero- medial tonsil displacement Clinically this may be confused with a peritonsillar abscess, so if indicated, a CT scan with contrast enhancement should be obtained to distinguish them. Neurologic deficits may occur involving cranial nerves IX, X, and XII.

Management includes aggressive antibiotic therapy, fluid replacement, and close observation. Surgical intervention by external approach to the parapharyngeal space.

Retropharyngeal Space Infections

Retropharyngeal space infections occur most commonly in children younger than 2 year, usually present with irritability, fever, dysphagia, muffled speech, noisy breathing, stiff neck, and cervical lymphadenopathy. Physical examination usually shows unilateral posterior pharyngeal swelling, which is visualized on inspection of the child's pharynx.

Lateral neck radiography, CT, or ultrasonography.

Surgical intervention by trans oral approach but if the abscess extends inferiorly below the hyoid bone or if the abscess extends laterally to involve the parapharyngeal space, it should be drained through an external approach.

Chronic tonsillar Hypertrophy

Chronic tonsillar hypertrophy is the most common cause of sleep-disordered breathing in children, with symptoms ranging from upper airway obstruction to obstructive sleep apnea syndrome (OSAS).

Upper airway obstruction can manifest as loud snoring, chronic mouth breathing, and secondary enuresis. Common manifestations includes history of witnessed apneic episodes, hyper somnolence or hyperactivity, frequent nighttime awakenings, poor school performance, and a general failure to thrive are of obstructive sleep apnea. Over time, more severe cases of OSAS can lead to pulmonary hypertension, corpulmonale, and alveolar hypoventilation resulting in chronic CO_2 retention, which can be slow to resolve even after relieving the obstruction with tonsillectomy(4).

1.3 LITERATURE REVIEW

Tonsillitis is a disease that occurs with high frequency worldwide, population based prevalence estimates of tonsillopharyngeal infections were limited. Mattila et al reported tonsillitis to occur in children of school age, based on operative rates, other reports on tonsillitis have addressed specific bacterial agents or the effects of antibiotic treatment.

Prevalence of Tonsillitis

Prevalence of tonsillitis vary widely between countries, study done in Bangladesh by Shah and others showed the prevalence of tonsillitis to be 19.9% similar findings reported by Karevold et al who indicated the prevalence of tonsillitis to be 21.6%(n=737) in Oslo Norway. In contrast to study done by Kvestad E in Norwegian twin and Choudhry in Turkey which showed the lifetime prevalence of recurrent tonsillitis was 11.7% and 12.1% respectively (21–24).

Studies have shown children had higher incidence of tonsillitis, A randomized parallel group trial done in Finland reported tonsillitis highest incidence 240 (50.00%) in age range 4-7 years while the age range 12-15 years was the least affected 20 (4.17%) similar findings reported by John et al in Nigeria on pattern of acute respiratory infections in hospitalized children under five years of age showed that 15.8% had pharyngotonsillitis (25,26).

Study done by Kishve et al in India showed that tonsillitis was troubling in 11.7% (n=203/1726) of study population and it was more frequent among female children (12.9%) as compared to male (10.6%) similar findings reported by Matthew et al where females seem to suffer more episodes of recurrent tonsillitis than males (27,28).In contrary to study done in Egypt by Abdel Khaleck et al and Agrawal in India which showed tonsillitis was more common in males 47(65.3%) and 80(57.14%) than females 25(34.7%) and 60(42.86%) respectively(29,30)

Saad et al in Malaysia showed that the prevalence of clinical cases in tonsillar infection group was 20 (28.57%) cases of recurrent tonsillitis among paediatric patients and 29 (41.42%) cases among adult patients, whereas 4 (5.71%) cases of chronic tonsillitis among paediatric patients and 5 (7.14%) cases among adult patients (31).

Another study done by Howel D et all showed about half the children experienced 4–8 episodes of tonsillitis in a year while 15% of parents reported that their offspring had the symptoms almost constantly (32).

Tonsillitis and family history.

Study done by Capper R et al in UK to show if the incidence of tonsillectomy is influenced by family or social history reveal that there is a significant association between parental tonsillectomy and the frequency of tonsillitis in the control population almost similar findings reported in study done in Norway 2005 on heritability of tonsillitis showed that the genetic effects explained 62% of the variation in the liability of recurrent tonsillitis hence there is evidence for a substantial genetic predisposition for recurrent tonsillitis. More over Khasanov et al showed that family tonsillitis was found in 171 (53.3%) families and among 307 mothers of reproductive age, 84 (26.3%) were diagnosed to have chronic tonsillitis and 36 (11.2%) of them had a history of tonsillectomy(11,23,33).

Bacterial aetiology of tonsillitis.

Various studies have been done on bacterial etiology of tonsillitis. In USA studies have shown that overall, 35%(21 of 60) tonsils were positive for GAS by immunofluorescence similar results were observed by Johansson in Great Britain Among the 169 participating patients, growth of group A β-haemolytic streptococci (GAS) was found in (31%) 53 cultures (34,35).

Study done by Saad in Malaysia reported the total number of bacterial isolates recovered from tonsillar specimens was 464 isolates with 184 (39.65%) isolates of Staphylococcus aureus as the most common followed by 86 (18.53%) isolates of Haemophilus influenzae and 56 (12.06%) isolates of Streptococcus agalactiae. Moreover, a special group of pathogens designated the name ESKAPE was isolated. The total number of recovered ESKAPE pathogens was 225 isolates (48.46%) with 184 isolates (39.65%) of Staphylococcus aureus, 30 isolates (6.46%) of Klebsiella pneumoniae, 9 isolates (1.93%) of Pseudomonas aeruginosa, and 1 (0.21%) isolate for each of Acinetobacter baumannii and enterobacter cloacae (31)

A study done in Rostock Germany by Zautner et all showed that in recurrent tonsillitis the most prevalent pathogenic bacterial species was S. aureus (75 patients; 57.7%;), Haemophilus influenzae 23.1%, Haemophilus parainfluenzae 32.3% and Candida sp. 14.6% almost similar findings reported in Malaysia and Egypt where S. aureus and H. influenza were the commonest isolated organism followed by Streptococcus Group B (61), Haemophilus parainfluenza (33), Klebsiella pneumoniae (32), Streptococcus Group G (29), Streptococcus Group F (14), Streptococcus Group C (12), Pseudomonas aeruginosae (10),Streptococcus Group A (9) in Malaysia and GABHS had an incidence of 38.5%, Streptococcus pneumoniae 20% , Klebsiella pneumonia 7.7% in Egypt (29,36,37).

In 2001 Brook et al showed that two hundred twenty-four organisms (1I2 aerobes and facultative, 1I0 anaerobes, and 2 Candida albicans) were isolated from the tonsils. The production of BLPB was detectable in 72 isolates recovered from 22 tonsils. These included all isolates of Staphylococcus spp, M catarrhalis, and B fragilis group, 27 of 37 isolates (73%) of H.influenzae, 4 of7 (57%) of Haemophilus parainfluenzae, 22 of 46 (48%)of Fusobacterium spp, 20 of61 (33%) of Prevotella spp, and 3 of 7 (43%) of Porphyromonasa saccharolytica (38).

Various studies have shown S.aureus and Strep.pyogenes were the most isolated organism, a study done in India by Jayasimha reported the most frequently isolated organisms were Staphylococcus aureus, Streptococcus pyogenes and other organisms isolated were Klebsiella pneumoniae, Pseudomonas aeruginosa and Coagulase negative Staphylococcus, similarly Baidaa in Iraq reported Staphylococus aureus 64.58% and Streptococus pyogenes 35.42% to be most isolated. Frequent isolation of Staphylococus aureus 70%, Streptococus pyogenes 14% and Pseudomonas aeruginosa 2% also reported in Nigeria, contrally to study done by Taylan in India showed that most frequently isolated microorganisms were S. viridans (30.6%), Neisseria spp. (23.3%), H. influenzae (11%) another study done in India by Agrawal showed that Staphylococcus Aureus was the commonest isolate from 16 swabs (11.43%), followed By Streptococcus Pneumoniae in 7 swabs (5.00%), the other isolated bacteria include Pseudomonas Species, E. Coli, Beta Hemolytic streptococci and Proteus Vulgaris (30,39–42).

Antimicrobial susceptibility pattern

The microorganisms that cause this infection are undergoing constant changes with respect to their isolation and bio physiological features. Patients treated with multiple courses of antibiotics that failed to eradicate the infection completely this is due to increasing emergence of antimicrobial resistant pathogenic bacteria strains like MRSA making the choice of empirical treatment more difficult (41).

Study done by Zautner reported that a methicillin- resistant S. aureus strain was isolated only from one 29 year old female patient. All other strains were susceptible to oxacillin, cefuroxime, levofloxacin, moxifloxacin and gentamycin. All strains including the MRSA-isolate were susceptible to vancomycin, teicoplanin, cotrimoxacol and clindamycin in contrast to study done in Egypt by Abdel which reported most of S. aureus isolates (95%) had B-Lactamase activity, whereas only 11% was Oxacillin resistant S .aureus (ORSA). H. influenzae was isolated in (44.6%) of cases, mostly as core culture s with 58% of them showing B-Lactamase activity. GABHS had an

incidence of 38.5%, mostly as surface culture s with 26% of them showing B-Lactamase activity (29,36).

Print et all reported all Strep.pyogenes isolates were sensitive to both Vancomycin and Ceftriaxone and completely resistance to Ampicillin and Amikacin. Almost similar results were reported by Babaiwa in Nigeria where all bacterial isolates (staph aureus, strept. pyogenes and pseudomonas aeruginosa) were resistant to amoxicillin, amoxicillin /clavulanic acid and erythromycin to different degrees. Ciprofloxacin, gentamicin and cotrimoxazole; were moderately effective against the aetiologic tonsilar agent (40,41).

A study conducted in Malaysia by Saad three susceptibility patterns were found among S. aureus isolates in all cases, (89.4%) susceptible to all the selected antibiotics(methicillin, gentamycin ,erythromycin, cotrimoxazole, clindamycin and fusidic acid), (10.6%) resistant to fusidic acid only, whereas 0.5% resistant to both methicillin and fusidic acid (37)

Agrawal indicated sensitivity pattern of 16 isolates of Staphylococcus species, sensitivity of 81.25% with netilmycin, 68.75% with gentamicin and 62.50% with erythromycin and ciprofloxacin was observed. 100% resistance with chloramphenicol and cefeclor , 81.25% with tetracycline and tobramycin and 68.75% with ampicillin and cotrimoxazole was found against Staphylococcus spp. Out of the 16 isolates, 6 (37.50%) were methicillin resistant Staphylococcus aureus (MRSA). which were found 100% sensitive to Vancomycin. Beta haemolytic streptococci were found 100% sensitive with netilmycin, chloramphenicol, gentamicin, tobramycin, tetracycline and erythromycin. 66.67% strains of beta haemolytic streptococci were resistant to cotrimoxazole and cefaclor while 33.33% were resistant to ampicilline and ciprofloxacin. Proteus species were found 100.00% sensitive to netilmycin and resistant with all other antibiotics. E. coli were 100.00% sensitive with netilmycin and gentamicin and 50.00% with cefaclor and ciprofloxacin. It was 100.00% resistant with ampicilline while 75.00% resistance with cotrimoxazole, tetracycline, tobramycin and chloramphenicol was observed.

Pseudomonas species were found 100.00% sensitive with netilmycin and ciprofloxacin and 50.00% sensitive with gentamicin. It was 100.00% resistant with ampicilline, cotrimoxazole while 75.00% resistance with chloramphenicol, tetracycline and tobramycin was observed. Pneumococcus species were found 100.00% resistant with cefaclor, 85.71% with gentamicin, and 71.43% with tobramycin. This was 57.14% resistant with erythromycin, ampicilline, cotrimoxazole and tetracycline. 71.43% sensitivity with netilmycin and chloramphenicol and 57.14% with ciprofloxacin was found (30).

1.4 PROBLEM STATEMENT

Tonsillitis is a common childhood infectious disease and also occurs in adults .It has significant impact on health status and quality of life as it causes significant morbidity and time lost from school or work.

There is limited studies done in Tanzania regarding tonsillitis this poses a challenge in development of evidence based intervention for management of tonsillitis and most of the studies done in other countries regarding tonsillitis are limited to specific bacterial agent and effects of antibiotic drug treatment.

There is need to understand the magnitude of tonsillitis in Tanzania, relationship of tonsillitis and family history, bacterial etiology and antimicrobial susceptibility since little is known about tonsillitis in our country.

1.5 RATIONALE

The study results will offer local statistics on tonsillitis in Tanzania and the findings will act as baseline source for further studies.

Bacterial agent isolated and their susceptibility pattern together with clinical presentation will help clinicians and other health care providers to have evidence based appropriate plan of management for tonsillitis.

The results will provide relevant information which will be of much use by Ministry of Health in improving guideline for Management of tonsillitis, allocation of resources to health facilities and educating the community about the disease so as to avoid complications and morbidity of tonsillitis.

Lastly, this is primarily done as a requirement in fulfillments of my Masters of Medicine degree in Otorhinolaryngology.

CHAPTER TWO

2.0 OBJECTIVES

2.1 Broad Objective

To determine prevalence and bacteriology of tonsillitis among patients attending ORL services at MNH

2.2 Specific Objectives

1. To determine prevalence of tonsillitis by age and sex.
2. To determine proportion of family history among patient with tonsillitis
3. To determine common clinical classification of tonsillitis.
4. To determine bacterial etiology of tonsillitis.
5. To determine antimicrobial susceptibility pattern of pathogenic isolates from tonsillitis.

CHAPTER 3

3.0 METHODOLOGY

3.1 Study Area

This study was conducted at the ORL clinics and the ORL wards at Muhimbili National Hospital (MNH). This is a national referral hospital and a teaching hospital Collaborating with Muhimbili University of Health and Allied Sciences (MUHAS).It is also a research center as well as the national reference laboratory in Tanzania. It has bed capacity of 1500 and attends 1000 to 1200 outpatients in a day. Department of ORL at MNH has 2 wards; male and female with bed capacity of 64.Outpatient clinic in ORL operates for 5days in a week with average of 70 new cases per week and average of 60 patients attending per day.

3.2 Study design

This study was descriptive cross-sectional study design.

3.3 Study duration.

The study took six month from June to December 2016.

3.4 Study population.

The study population was all the patients attending ORL services at MNH during the period when the study was conducted.

3.5 Target population

All patients with symptoms and signs of tonsillitis.

3.6 Inclusion criteria

All patients attended at ORL Clinic and admitted in ORL wards and consented for study.

3.7 Exclusion criteria

All patients attending ORL Clinic and admitted in ORL wards but were not consent for the study.

3.8 Sampling

Convenient sampling was employed where by the available subjects at MNH was studied. Everyday new patients were enrolled until all sample size attained.

3.9 Data collection

Data was collected from the ORL Clinics and wards by the principal investigator, residents and specialists in the department of ORL using a special designed questionnaire/clinical form.

The questionnaire consist two parts

Part one; demographic profile

All patients were interviewed using a special designed questionnaire (appendix 11).

Part two;

A thorough history was taken and ENT examination was done. To make a diagnosis of tonsillitis patient required two or more main symptoms and any accompanying/associated symptoms. Throat examination was done to look for the palatine tonsil, size and asymmetry. Palpation of neck for cervical lymphadenopathy was done.

Clinical classification of tonsillitis was grouped into four

1. **Acute Tonsillitis**

   Symptoms and signs consistent with a diagnosis of acute tonsillitis will be sore throat, fever, dysphagia, and tender cervical nodes in the presence of tonsils that are erythematous and have exudates for not more than two weeks.

2. **Recurrent Acute Tonsillitis**

   a. Recurrent acute infection has been variably defined as from four to seven episodes of acute tonsillitis in 1 year, five episodes for 2 consecutive years, or three episodes per year for 3 consecutive years.

3. **Chronic (Persistent) Tonsillitis**

Chronic sore throat, malodorous breath, excessive tonsillar debris (tonsilloliths), peritonsillar erythema, and persistent, tender cervical adenopathy for more than eight weeks are consistent with a diagnosis of chronic tonsillitis when no other source (such as the sinuses or lingual tonsils) can be identified.

4. **Obstructive tonsillitis**

Enlarged tonsils that can cause snoring, with obstructive disturbances (asleep and awake), dysphagia, changes in the craniofacial skeleton, and voice changes (muffling or hyper nasality).

Investigations

All patients with tonsillitis underwent surface tonsilar swab for culture, microscopy and biochemical tests to determine bacterial agent involved and antimicrobial susceptibility was done for pathogenic bacteria.

3.10 Specimen collection

The specimens was collected aseptically using sterile cotton wool swab stick from both tonsils, swab collected was assigned serial numbers similar to that of questionnaire and transported to the laboratory with the assistance of microbiologist culture, microscopy and biochemical tests was done.

3.11 Laboratory procedures

Swab specimens were processed and tested in the Microbiology Laboratory,(Central pathology Laboratory MNH). Specimens were immediately cultured upon arrival in the laboratory. Culturing for colony characteristics followed by Gram stain and biochemical tests were used to identify pathogenic bacteria. Culture media used were blood agar, MacConkey agar, nutrient agar and fresh blood agar. Culture media were made by reconstituting the commercial powder in distilled water and sterilized at 127°C for 15 minutes in an autoclave as per manufacturer’s instruction

3.11.1 Microscopic examination and Culture

Smears was air dried; heat fixed and stained by gram's stain, in order to group pathogens into Gram positive and Gram negative depending on ability of bacterial cell to retain primary stain.

The stained slides were examined microscopically under oil immersion lens for pus cells, and bacterial cells. Specimens was inoculated on both differential and enriched media (MacConkey agar and blood agar) and incubated aerobically at 37°C for 24-48hrs. After 24 hours, another Gram stain from discrete colonies growing on media was made.

Isolated colonies were sub cultured in nutrient agar for biochemical testing. Specimens for anaerobic culture were inoculated onto fresh blood agar on which 5μg metronidazole disc was placed for presumptive recognition of anaerobes. Plates was placed in anaeropack system and incubated at 37°C for 2 to 5 days. Anaerobic plate was reexamined for a total of five days' incubation.

3.11.2 Identification of bacterial pathogens.

Preliminary identification of bacteria was on the colony characteristics of the organism i.e. colonial morphology, hemolysis on blood agar, changes in the physical appearance of the differential media and enzyme activities of the organisms and Gram staining.

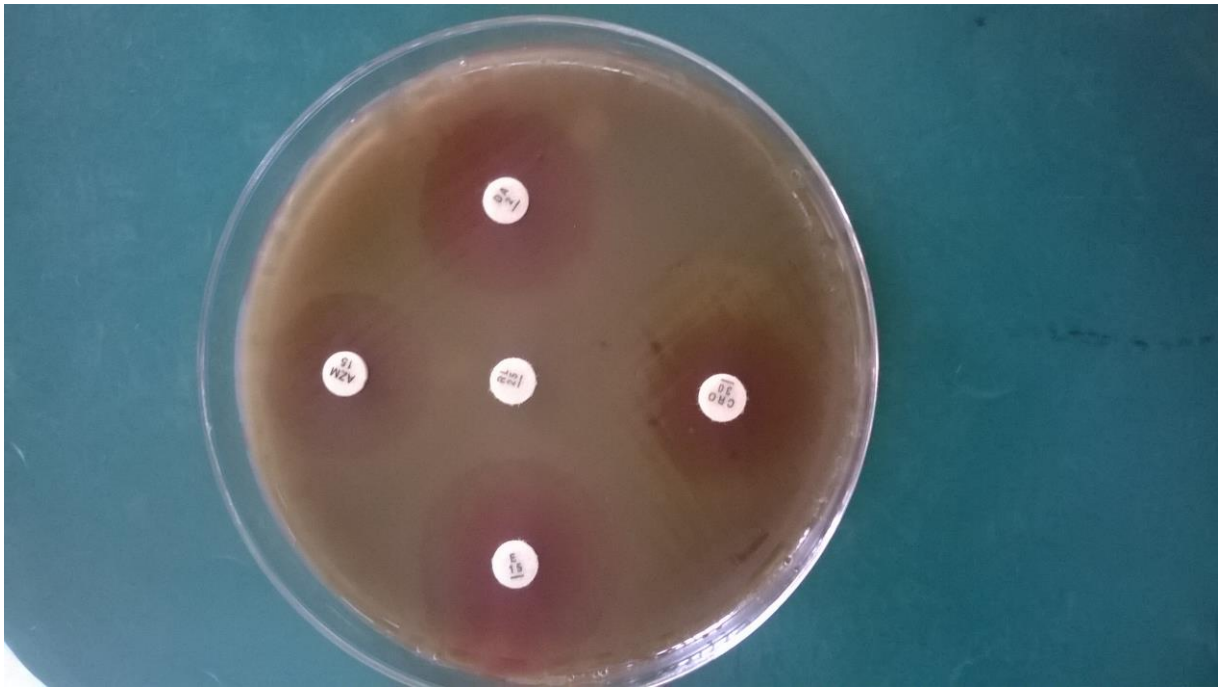
Biochemical tests were performed on colonies from the nutrient agar.

3.11.3 Antimicrobial susceptibility testing

Antimicrobial susceptibility pattern of isolated bacterial pathogens was performed by Kirby Bauer disc diffusion method according to the guidelines of the Clinical and Laboratory Standards Institute. Inoculum was prepared by picking parts of two or three identical colonies with a sterile wire loop. This was suspended in sterile peptone water (broth) and incubated up to two hours to allow organisms to reach their log phase of growth. The density of suspension to be inoculated was determined by comparison with the opacity standard on McFarland 0.5 Barium sulphate. Sterile swab was dipped into

the suspension of the isolate in the peptone water, squeezed free from excess fluid against the side of bottle and spread over the Mueller –Hinton blood agar plate. The test organism and the standard control from the broth were spread evenly over the surface of the Mueller –Hinton blood agar using sterile cotton wool swabs. Sensitivity discs for appropriate drugs was placed onto the media and incubated at 37°C for 24hrs. After 24 hours each plate was examined and growth zones were measured to the nearest millimeter, using sliding caliper which was held at the back of the inverted media plate. The Petri dish was held a few inches above a black, non- reflecting background and illuminated with reflected light. The inhibition zone margins were taken as the area showing no obvious, visible growth that could be detected with the unaided eye. Faint growth of tiny colonies, which could be detected only with a magnifying lens at the edge of the zone of inhibited growth, will be ignored. However, discrete colonies growing within a clear zone of inhibition was sub cultured, re-identified, and retested. The results were reported as sensitive or resistant to the agents that had been tested. Susceptibility of streptococcus pyogenes was tested against penicillin G (10unit), ampicillin (10µg), amoxicillin/clavulanate (20/10µg), erythromycin (15µg), clindamycin (2µg), azithromycin (15µg), ceftriaxone (30µg) and doxycline.

Figure 1. . The inhibition zone margins



3.11.4 Quality control.

Aseptic techniques were observed in all the steps of specimen collection and inoculation onto culture media to minimize contamination. All culture media was prepared according to the directions of the manufacturers. Three plates of each batch was incubated at 37°C for 48 hours to check for sterility.

Negative and positive controls were included to validate the biochemical reagents/test kits.

Follow up

Results was followed by principle investigator after seven days and filled into questionnaire according to serial numbers.

3.12 Sample size calculation

Sample size was calculated using a **Fisher's formula for sample size calculation for prevalence studies** as follows:

;

$$N = \frac{Z^2P(1-P)}{E^2}$$

- Where N = Estimated sample size

- E=margin of error (for this study I consider 3%)
- P=Prevalence of tonsillitis
- Z= standard normal deviation (1.96) which correspond to 95% confidence interval

The proportion (p) of patients with tonsillitis 11.7 % from a study in India

Therefore, from the above formula the required minimum sample size was 440patients.

Adjusting for the nonresponse rate which was 10%, **the sample size was 485**

3.13 Data handling and analysis

As soon as the data is collected was entered in my personal computer on the same day of collection.

Data quality check for inconsistence was done on daily bases to ensure that incomplete and missing data are identified and corrected immediately.

All information which was collected was confidential stored in locked filing cabinets and computer data was stored on secure, password-protected computers.

SPSS was used to analyze the Data.

Descriptive statistics such as proportions for categorical variables and means for continuous variables was estimated.

Frequency distribution and two way tables were used to summarize the data and Chi-square test or Fishers Exact Test was used to determine the association between independent and dependent variables and p-value of less than 0.05 was considered as statistically significant.

3.14 Ethical considerations

Proposal was submitted to Muhimbili University of Health and Allied Health Sciences (MUHAS) Directorate of Research and Publications for ethical review and clearance.

Study subjects were informed of the study and what it comprises. The informed consent was carefully reviewed with them so as to make an informed decision on either to participate or not.

For patients younger than 18 years informed consent was obtained from their parents or guardians. The patient's information's was confidential. After diagnosis, culture and sensitivity results of study participants was communicated to the attended clinician, for use in guiding patients' management and they were managed according to MNH protocol.

3.15 Study Limitations

Most of the patients seen at MNH have recurrent and chronic tonsillitis since it is tertiary hospital so acute tonsillitis were few

Due to financial constrains sensitivity was not done to all isolated microorganisms.

Limited sample size due to financial constraints and short time of study duration.

CHAPTER FOUR

4.1 RESULTS

TABLE1: Socio-demographic data of study population.

Variable	Socio-demographic data			
Age	**Mean = 27.55; SD= 20.984.**			
Gender		**MALE%**	**FEMALE%**	**TOTAL**
Age group	1-10	90 (41.9)	65 (24.1)	**155 (32)**
	11-20	21 (9.8)	33 (12.2)	**54 (11.1)**
	21-30	30 (13.9)	42 (15.6)	**72 (14.8)**
	31-40	24 (11.2)	36 (13.3)	**60 (12.4)**
	41-50	22 (10.2)	44 (16.3)	**66 (13.6)**
	>50	28 (13.0)	50 (18.5)	**78 (16.1)**
	TOTAL	**215 (44.3)**	**270 (55.7)**	**485 (100)**

Out of 485 patients 55.7% were females and 44.3% were males with mean age 27.7years.Majority of patients 32% were from age group 1-10 years.

TABLE2: Prevalence of tonsillitis by age

	TONSILITIS					
AGE GROUP	**YES**	**%**	**NO**	**%**	**TOTAL**	
1-10	66	(42.6)	89	(57.4)	155	(32)
11-20	10	(18.5)	44	(81.5)	54	(11.1)
21-30	7	(9.7)	65	(90.3)	72	(14.8)
31-40	5	(8.3)	55	(91.7)	60	(12.4)
41-50	7	(10.6)	59	(89.4)	66	(13.6)
>50	5	(6.4)	73	(93.6)	78	(16.1)
TOTAL	**100**	**(20.6)**	**385**	**(79.4)**	**485**	**(100)**

Out of 485 patients recruited in the study 100 (20.6%) had tonsillitis, of these 66(42.6%) were aged 1-10 years and 5(6.4%) were above 50 years. The p value was 0.00 which was statistically significant.

TABLE 3: Prevalence of tonsillitis by gender.

	TONSILITIS					
GENDER	YES	%	NO	%	TOTAL	
MALE	51	(23.7)	164	(76.3)	215	(44.3)
FEMALE	49	(18.1)	221	(81.9)	270	(55.7)
TOTAL	**100**	**(20.6)**	**385**	**(79.4)**	**485**	**(100)**

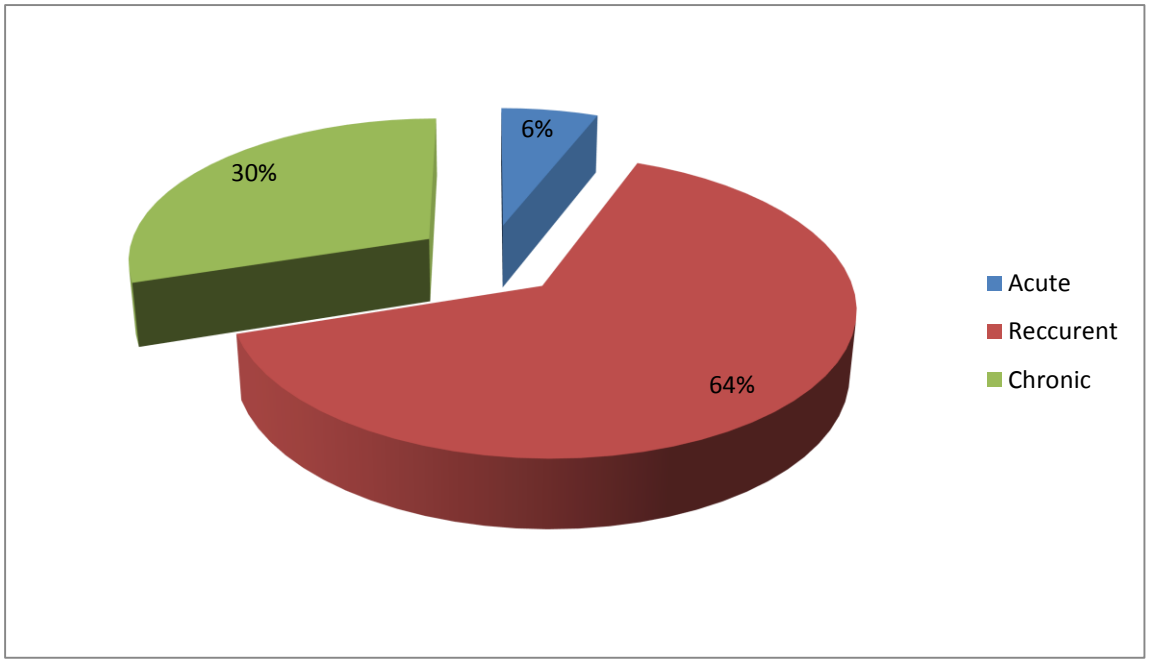
Out of 100 patients with tonsillitis 51(23.7%) were males where 49(18.1%) were females. The p-value was 0.082 which was statistically not significant.

Table 4: Proportion of Family history of tonsillitis among patient with tonsillitis

FAMILY HISTORY	N	%
YES	21	21
NO	79	79
TOTAL	100	100

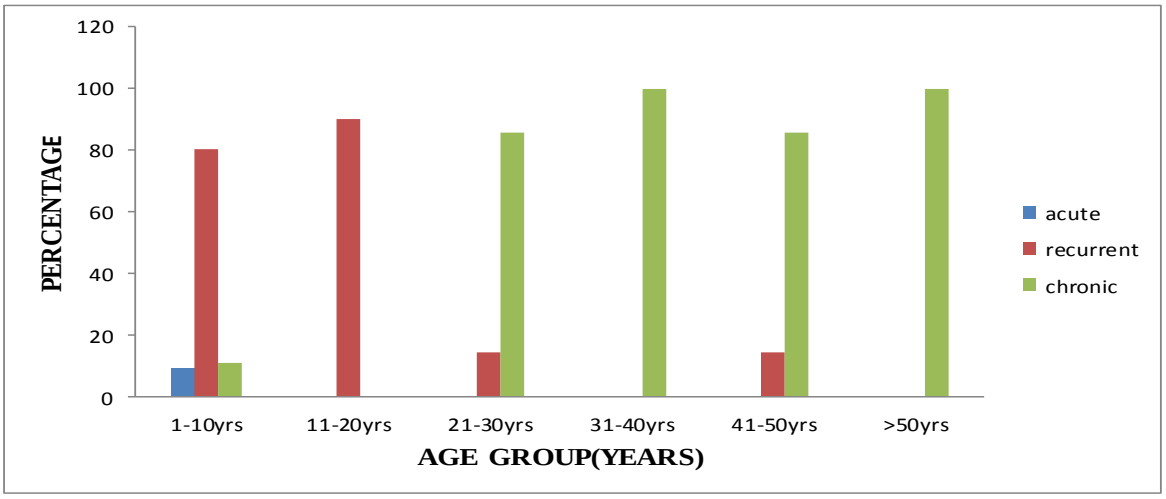
Out of 100 patients with tonsillitis 21(21%) had family history of tonsillitis while79% had no family history of tonsillitis.

Figure 2: Clinical classification of tonsillitis



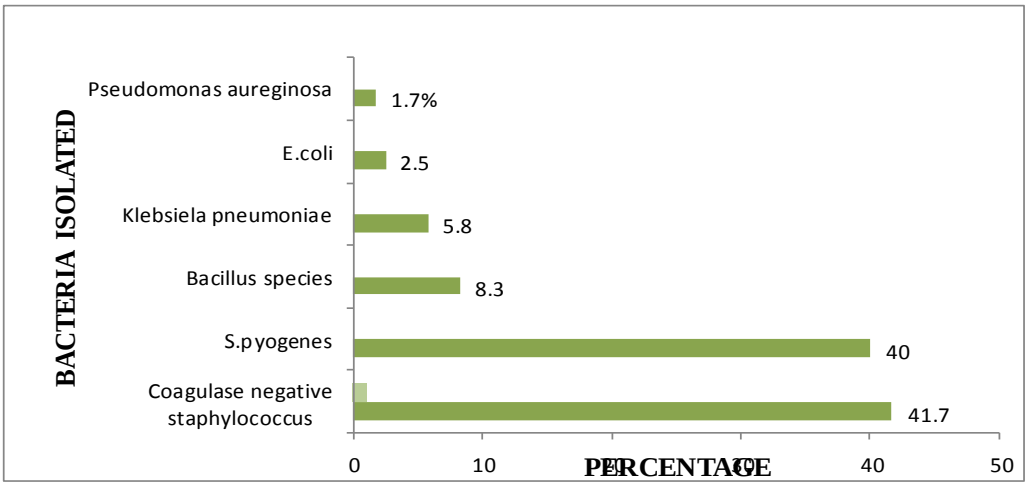
Among 100 patient with tonsillitis majority 64(64%) had recurrent tonsillitis, few 6(6%) had acute tonsillitis.

Figure 3: Frequency of clinical types by age



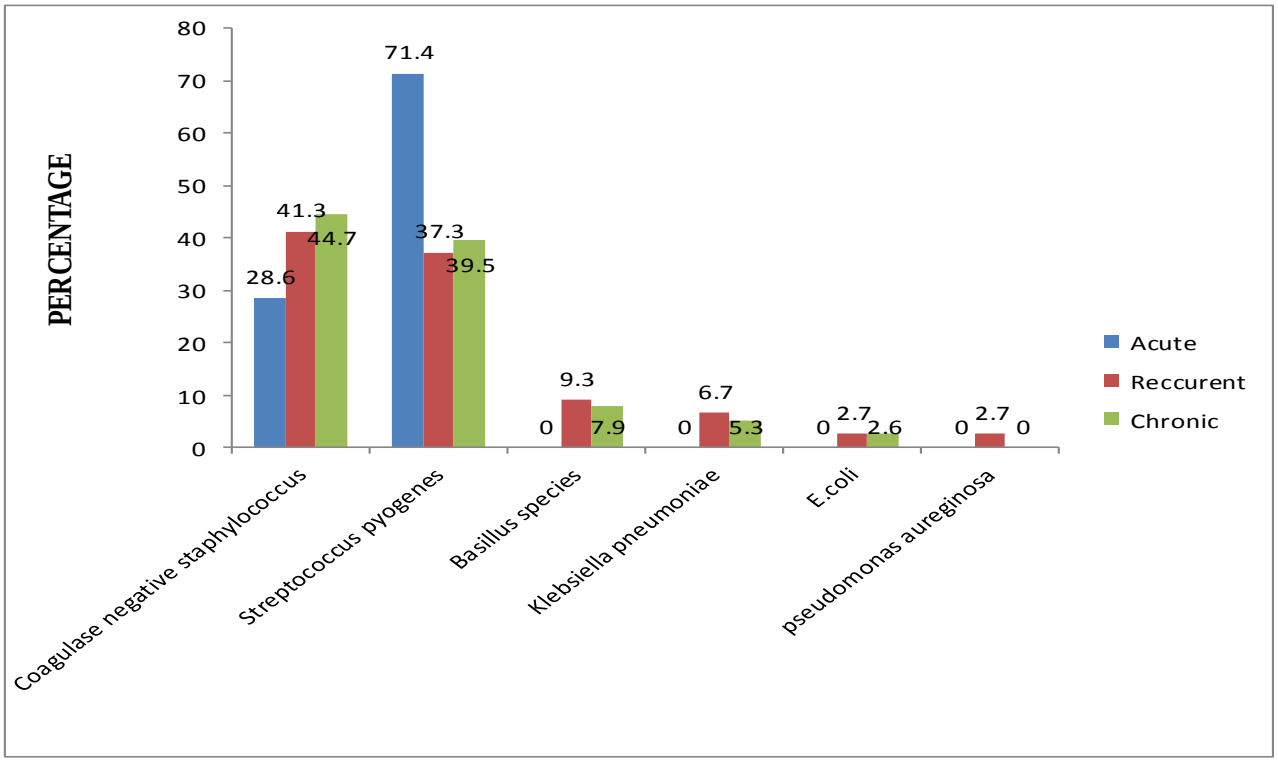
Out of 66 children aged 1-10 years 53(80.3%) had recurrent tonsillitis, 7(10.6%) had chronic while 6(9.1%) had acute tonsillitis. Among those aged >50 years all 5(100%) had chronic tonsillitis (P value 0.00)

Figure4: Frequency of bacteria isolated from patient with tonsillitis



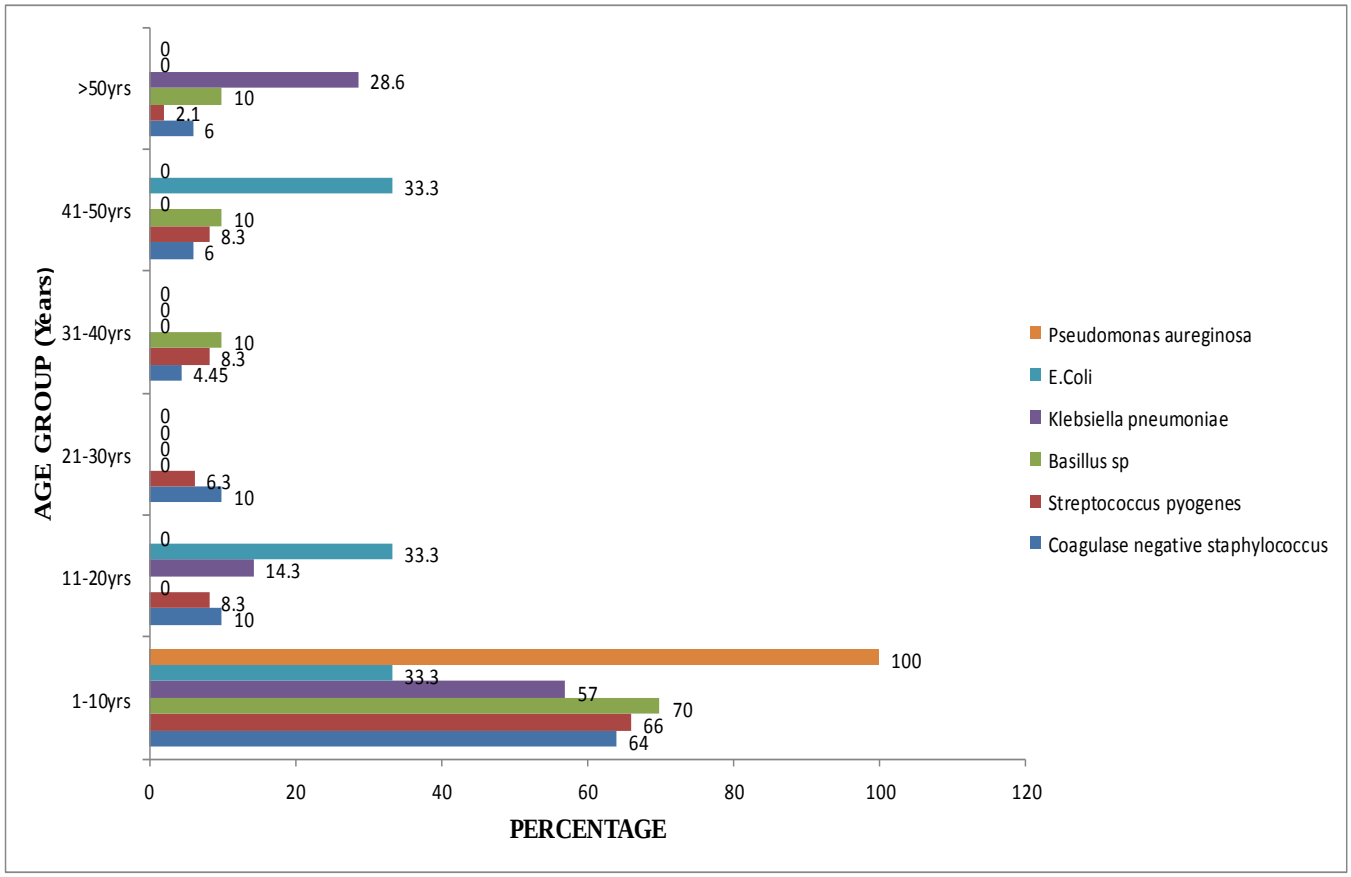
A total of 120 bacteria were isolated from 100 throat culture, the most commonly isolated bacteria were coagulase negative staphylococcus 0(41.6%), streptococcus pyogenes 48(40%) and Bacillus species 10(8.3%) and the least was E.coli 3(2.5%)

Figure 5: Frequency of isolated bacteria by clinical classification



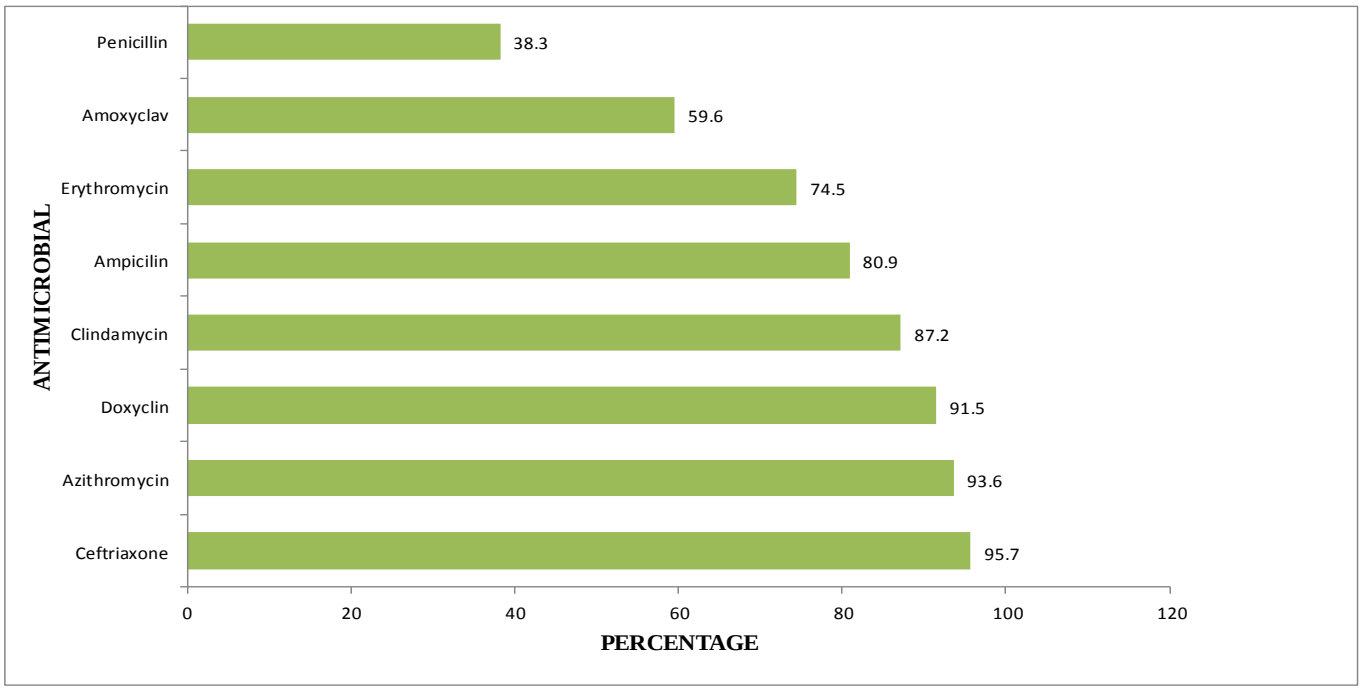
In acute tonsillitis majority of bacteria isolated were streptococcus pyogenes 5(71.4%) while in recurrent and chronic majority were Coagulase negative staphylococcus 31(41.3%) and 17(44.7%) respectively.

Figure 6: Frequency of bacterial isolated by age group



All the six categories of bacteria were isolated in age group 1-10 years. Pseudomonas aureginosa 100%, Bacillus species70% and Streptococcus pyogenes 66% being the most common while Klebsiella pneumoniae 28.6% was more isolated in age group >50 years.

Figure 7: Antimicrobial susceptibility of S.pyogenes



Majority of Streptococcus pyogenes isolated were sensitive to ceftriaxone 95.7%, Azithromycin 93.6%, doxycline 91.5%.

4.2 DISCUSSION

OVERALL PREVALENCE OF TONSILLITIS

Overall prevalence of tonsillitis is not well known in Tanzania, This study revealed the overall prevalence to be 20.6% this finding is almost similar to other studies done in Bangladesh by Shah et al and Karevold et al in Oslo Norway which showed the prevalence of tonsillitis to be 19.9% and 21.6% respectively (21,22). This finding is different from that which was obtained from the study done by Kvestad E in Norwegian twin and Choudhry in Turkey which showed the prevalence of tonsillitis to be 11.7% and 12.1% respectively. Another study done by Hannaford in Scotland reported prevalence of tonsillitis to be 30.8%.This could be due to different geographical condition of study population, study design and sample size. Most of the studies done elsewhere were community based with large sample size compared to the current study(23,24,43).

PREVALENCE OF TONSILLITIS BY AGE.

Studies have shown children to have higher incidence of tonsillitis .Findings from this study also revealed the most common involved age group to be 1-10 years and this constituted 42.6% as compared to other age groups. This finding is the same as those from a study which was done in Nigeria by John et al where 15.8% of under-five had pharyngotonsillitis. The study which was done in Scotland showed tonsillitis to be common in children as compared to adult (26,43) .

PREVALENCE OF TONSILLITIS BY GENDER

In this study prevalence of tonsillitis was higher in males 23.7% as compared to females18.3%.This finding is similar to study done by Abdel Khaleck et al and Agrawal in which males had more tonsillitis47(65.3%) and 80(57.14%) as compared to females 25(34.7%) and 60(42.86%) respectively(29,30).This is different from other studies done by Karevold et al and Alasir et al where females seem to have more tonsillitis than males(22,37).Kvestad et al also reported female had more tonsillitis 14.1% as compared

to males 8.8%.A study done in Benin reported female had more tonsillitis than male with male to female ratio 1:1.3 this could be due to different study population(23,44)

TONSILLITIS AND FAMILY HISTORY

The proportion of patient with family history of tonsillitis in this study was 21%, majority were siblings 38.1% followed by fathers 33.3%.This finding was different from another study done by Khasanov in Russia which show 53.3% of family history(33). A study done in Northern England by Denise et al also showed 50% of family members had history of tonsillitis and sibling were commonly affected followed by mothers, father and grandparents the difference could be explained by the fact that the current study has small sample size(32)

BACTERIA AETIOLOGY OF TONSILLITIS

In the current study 120 bacteria isolates were investigated to determine their type and susceptibility pattern, the most bacteria isolated was coagulase negative staphylococci 41.7% followed by streptococci pyogenes 40%, bacillus species 8.3%, Klebsiela pneumoniae5.8%, E.Coli 2.5% and Pseudomonas aureginosa1.7%.All these bacteria were found in age group 1-10 years.

In acute tonsillitis majority of bacteria isolated were streptococcus pyogenes 5(71.4%) while in recurrent and chronic majority were Coagulase negative staphylococcus 31(41.3%) and 17(44.7%) respectively.

These results differ from other studies obtained elsewhere in which the most common isolated bacteria was Staphylococcus aureus **(29,30,36,37,39,41)**.Another study done in Benin showed streptococcus pyogenes was the most isolated bacteria(44).The possible reason for variation in these studies could be attributed to differences in the population investigated, specimen collection technique and history of the type of antibiotic used.

In this study it was found that all bacteria were isolated in age group 1-10 years, Pseudomonas aureginosa 100%, Bacillus species70% and Streptococcus pyogenes 66% being the most common isolated while Klebsiella pneumoniae 28.6% was more isolated in age group >50 years. This is similar to study done by Babaiwa et al in Benin Nigeria where Pseudomonas 100% and Streptococcus pyogenes 29% were common in children also similar findings reported by Abdel Khaleck in India were Streptoccocus pyogenes 23% were prevalent in children and Klebsiella in Adult (29,41).

ANTIMICROBIAL SUSCEPTIBILITY OF STREPTOCOCCUS PYOGENES

This study showed that S.pyogenes was sensitive to ceftriaxone 95.6%, azithromycin 93.6%, doxycycline 91.5%, clindamycin 87.2%, Ampicilin 80.9%, Erythromycin74.5%, Amoxyclav 59.6% and resistant penicillin 38.3%.This is in keeping with previous reports,a study done by Print et al report streptococci pyogenes to be sensitive to ceftriaxone. Wilson et al also reported S.pyogenes to be sensitive to azithromycin and cefuroxime(40,44).

These results slightly differ from that obtained by Agrawal who reported Beta haemolytic streptococci were found 100% sensitive erythromycin. **,** 66.67% strains of beta haemolytic streptococci were resistant to cotrimoxazole and cefaclor while 33.33% were resistant to ampicilline and ciprofloxacin(30).

A study done by Babaiwa in Nigeria showed strept. pyogenes were resistant to amoxicillin, amoxicillin /clavulanic acid and erythromycin to different degrees(41) . Differences in these studies could be due to inappropriate administration of antimicrobial agents to patients who do not need them will promote the emergence of resistant pathogens. The frequent inappropriate exposure to antibiotics which is common may possibly explain this observation. In this study majority of patients were exposed to amoxyclav and amoxicillin.

CHAPTER FIVE

5.0CONCLUSION AND RECOMMENDATION

5.1CONCLUSSION

- This study showed tonsillitis is prevalent among patient attending ORL services at MNH. Young age being the most common affected age group with male preponderance.
- Nearly quarter of the patient had family history of tonsillitis commonly found in siblings.
- In this study majority of patients had recurrent tonsillitis, acute tonsillitis was few due to the fact that most of the patients had been attended at primary health care centers.
- The present study also found that a pathogenic bacterium isolated was streptococcus pyogenes which was susceptible to most of the drugs available at our setting and resistant to penicillin G

5.2 RECCOMENDATATIONS

1. Health education to the community to avoid self-medication so as to reduce rate of resistance.
2. Identification of bacteria isolates and their antibiotic sensitivity from the current study should be used by policy makers to establish guidelines for management of tonsillitis since it is not feasible to do culture and sensitivity to every patient with tonsillitis.
3. Penicillin G should be used with caution since present study has shown increasing resistance.
4. Large study which will include other peripheral centers should be done that will consider characterization of isolates, including surface and core swab and determining their susceptibility pattern and association between tonsillitis and family history.

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APPENDIX

Appendix I: Informed Consent Form

Consent to participate in the study titled prevalence and bacteriology of tonsillitis among patients attending ORL services at MNH- 2016

Greetings: I am Dr Bazilio Jane a postgraduate student doing a research on prevalence and bacteriological pattern of tonsillitis among patients attending ORL services at MNH.

Purpose of the Study: To determine the prevalence and bacteriology of tonsillitis among patients attending ORL services at MNH-2016.

What participation involves: If you agree to participate in this study, you will be asked questions and examined

Confidentiality: All information collected will be entered into computer with only an identification number; no name included.

Risk: We expect no harm to happen to you during the course of this study.

Rights to withdraw: Taking part in this study is completely voluntary and refusal to participate or withdrawal will not involve penalty or loss of any benefits to which you are entitled. You will be treated and followed up as per the usual treatment protocol regarding tonsillitis.

Benefits: If you agree to participate in this study, you will be followed-up closely and be assessed on the progress of your condition by the investigating doctor. We hope that the obtained information from this study will benefit others.

Who to contact: If you have any other questions regarding this study, feel free to contact me, the investigator, Dr.Bazilio Jane. Muhimbili National Hospital, P.O. Box 65000, Tel no.0712204188 Dar es Salaam.

If you have any questions concerning your rights as a participant, you may contact Prof. Said Abood, Director of Research and Publication MUHAS, P.O. Box 65001, Dar es Salaam. Telephone: 2152489.

Signature

Do you agree to participate? .....

Participant does not agree…….

I, ……..have read the consent form and my questions have been answered and I agree to participate in this study.

Signature of Participant……..

Signature of Investigator…….

Date of signed consent…….

Appendix II: Informed Consent form – Kiswahili Version

Ruhusa ya Kushiriki Utafiti Kuhusu ushamiri na vimelea vya mafindo findo Muhimbili-2016

Salaam!

Mimi naitwa Dr.Bazilio Jane ni mwanafunzi wa udhamili chuo kikuu cha tiba Muhimbili. Nachunguza ushamiri na vimelea vya ugonjwa wa mafindofindo katika hospital ya taifa Muhimbili-2016

Dhumuni la utafiti huu: Kuchunguza ushamiri wa ugonjwa wa mafindo findo katika hospital ya taifa Muhimbili-2016

Ushiriki: Kama unakubali kushiriki kwenye utafiti huu, utaulizwa maswali na utachunguzwa kwa kina katika kliniki yetu.

Usiri: Taarifa zote za uchunguzi zitaingizwa kwenye kompyuta na nambari ya utambulisho; jina halitanukuliwa.

Madhara: Tunategemea kwamba hakuna madhara yoyote yatokanayo na utafiti huu

Haki ya kujitoa kwenye utafiti: Kushiriki kati kutafiti huu ni hiari, na kuto kubali kushiriki au kujitoa hautaadhibiwa au kupoteza haki yako ya matibabu. Utatibiwa na kuendelea kufuatiliwa kama taratibu za hospitali zinavyoelekeza kwa mtu mwenye mafindofindo.

Faida ya kusiriki kwenye utafiti: Kama utakubali kushiriki kwenye utafiti huu, Faida utakazopata nipamoja na kuonwa na kufuatiliwa kwa ukaribu na daktari anaye fanya utafiti. Tuna tumaini kwamba taarifa zitakazo patikana zitawanufaisha wengine pia.

Kwa mawasiliano zaidi : Kama una maswali au maelezo kuhusu utafiti huu, uwetayari kuwasiliana na mtafiti, Dr.Bazilio Jane, Hospitali yaTaifa Muhimbili, P.O. Box 65000, simu: 0712204188 DSM. Kama una maswali kuhusu haki yako kama mshiriki wasiliana na Prof. Said Abood Mkurugenzi wa Idara ya utafiti, P.O. Box 65001, DSM. Simu 2152489.

Saini:

Je, umekubali kushiriki? .....

Mshiriki haja kubali kushiriki……

Mimi……. Nimesoma maelezo na kuyaelewa vizuri, na nimekubali kushiriki kwenye utafiti huu.

Sahihi ya Mshiriki……...

SahihiyaMtafiti……Tarehe……

APPENDIX III QUESTIONNAIRE-ENGLISH VERSION

The questionnaire for searching information on prevalence and bacteriology of tonsillitis in patients receiving ORL services at MNH.

I.Sociodemographic data

1. Serial No..... 2. Date...../...../..... 3. Hosp Reg. No.....

4. Adress ..... Tel No.....or.....

5. Age..... 6. Gender .Tick

1. Male 2. Female

Tick the following

7. Symptoms of tonsillitis

Are you presenting with any of the following symptoms? If is the child ask the parent/s or guardian.

Main symptoms	**associated symptoms**
1. Fever	7. Head ache
2. Sore throat	8. Nausea
3. Foul breath	9. Vomiting
4. Foreign body sensation in the throat	10. Abdominal pain
5. Painful swallowing	11. Bad taste in mouth
6. Snoring	12. Change in voice
	13. Difficulty swallowing
	14. Sleep apnoea
	15. Breathing per mouth

8. How often are you presenting with any of the symptoms of tonsil above. Tick

    1. Acute infection lasting less than two weeks

    2. From four to seven episodes of acute tonsillitis in 1 year, five episodes for 2 consecutive years, or three episodes per year for 3 consecutive years.

    3. Persistent infection for more than eight weeks.

9. Is there any family member had tonsillitis or history of tonsillectomy.

    1. Yes

    2. No

10. If yes what is the relationship with the patient.

    1. Mother
    2. Father
    3. Sibling
    4. Biological child

11. Have you been attended to health care facility due to tonsillitis (1) Yes (2) No

12. If yes which one

    1. Dispensary

    2. Health center

    3. Hospital

13. Have you been admitted to the hospital due to tonsillitis (1) Yes (2) No

14. Previous history of antibiotics use within one month (1) Yes (2) No

15. If YES mention……..

APPENDIX IV QUESTIONNAIRE-SWAHILI VERSION

Dodoso ya maswali ya kuangalia ushamiri na vimelea vya ugonjwa wa mafindofindo katika idara ya pua koo na masikio kwenye hospitali ya taifa Muhimbili.

Demografia

1. Namba..... 2. Tarehe...../...../..... 3. Nambaya Hosp.....

4. Anuani ……..... Namba ya simu.....au.....

5. Umri.....

6. Jinsia 1. Mme 2.Mke

Kwa maswali yanayofuata weka vema

7. Dalili za mafindofindo

Je umewahi kuwa na dalilizi fuatazo?

Dalili muhimu za mafindofindo

1. Homa
2. Madonda ya koo
3. Harufumba ya mdomoni
4. Kuhisi kuna kitu kooni
5. Kusikia mauvivu wakati wakula
6. Kukoroma

Dalili zinazo ambatana ni kama;

1. Kichwa kuuma
2. Kusikia kichefuchefu
3. Kutapika
4. Tumbo kuuma
5. Sauti kubadilika
6. Kumeza kwa shida
7. Kushituka wakati umelala
8. Kupumlia mdomo

8. Dalili tajwa hapo juu huwa zinakupata kwa muda gani?

1. Mara moja ,chini ya wiki mbili
2. Mara nne hadi saba kwa mwaka mmoja, mara tano kwa miaka miwili mfululizo, mara tatu kwa miaka mitatu mfululizo
3. Zina dumu muda mrefu zaidi ya wiki nane

9. Kuna mwanafamilia ana mafindofindo

1. Ndio
2. Hapana

10. Kama ndio ni nani

1 mama

2. Baba

3. Ndugu wa kuzaliwa pamoja

4. Mtoto

11. Je umewahi kuhudhuria kituo cha kutolea huduma za afya kwa sababu ya mafindofindo. 1. Ndio 2. Hapana.

12. Kama ndio ni kipi?

1. Zahanati. ……..

2. Kituo cha afya ……

3. Hospitali……..

13. Umewahi kulazwa hospitali kwa sababu ya mafindofindo 1.Ndio 2. Hapana

14. Umewahi kutumia dawa antibiotic1.Ndio 2. Hapana

15. Kama ndio zitaje……