RISK FACTOR ANALYSIS, CLINICAL AND MICROBIOLOGICAL PROFILE OF CHILDREN WITH SYMPTOMATIC OTITIS MEDIA IN A TERTIARY CARE CENTRE

Dissertation submitted to

THE TAMIL NADU DR.M.G.R. MEDICAL UNIVERSITY

In partial fulfillment of the regulations for the award of the degree of

M.D. BRANCH – VII

PAEDIATRICS

GOVT. STANLEY MEDICAL COLLEGE & HOSPITAL

THE TAMIL NADU DR.M.G.R. MEDICAL UNIVERSITY

CHENNAI, INDIA

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APRIL 2013

CERTIFICATE

This is to certify that the dissertation entitled **"RISK FACTOR ANALYSIS, CLINICAL AND MICROBIOLOGICAL PROFILE OF CHILDREN WITH SYMPTOMATIC OTITIS MEDIA IN A TERTIARY CARE CENTRE"** is the bonafide work of **DR.K.INDU PRIYA** in partial fulfillment of the requirements for **M.D. (PAEDIATRICS) Branch – VII** Examination of the Tamilnadu Dr.M.G.R. Medical University to be held in April 2013.

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DECLARATION

I, **DR.K.INDU PRIYA**, solemnly declare that the dissertation titled, **"RISK FACTOR ANALYSIS, CLINICAL AND MICROBIOLOGICAL PROFILE OF CHILDREN WITH SYMPTOMATIC OTITIS MEDIA IN A TERTIARY CARE CENTRE"** is a bonafide work done by me at Institute of Social Paediatrics, Govt. Stanley Medical College & Hospital during 2010 -2013 under the guidance and supervision of **PROF.DR.G.KARUNAKARAN, M.D., D.C.H,** Director, Institute of Social Paediatrics, Govt. Stanley Medical College & Hospital, Chennai – 600 001.

The Dissertation is submitted to **The Tamilnadu Dr.M.G.R. Medical University**, towards partial fulfillment of requirement for the award of **M.D. Degree (Branch – VII) in Paediatrics.**

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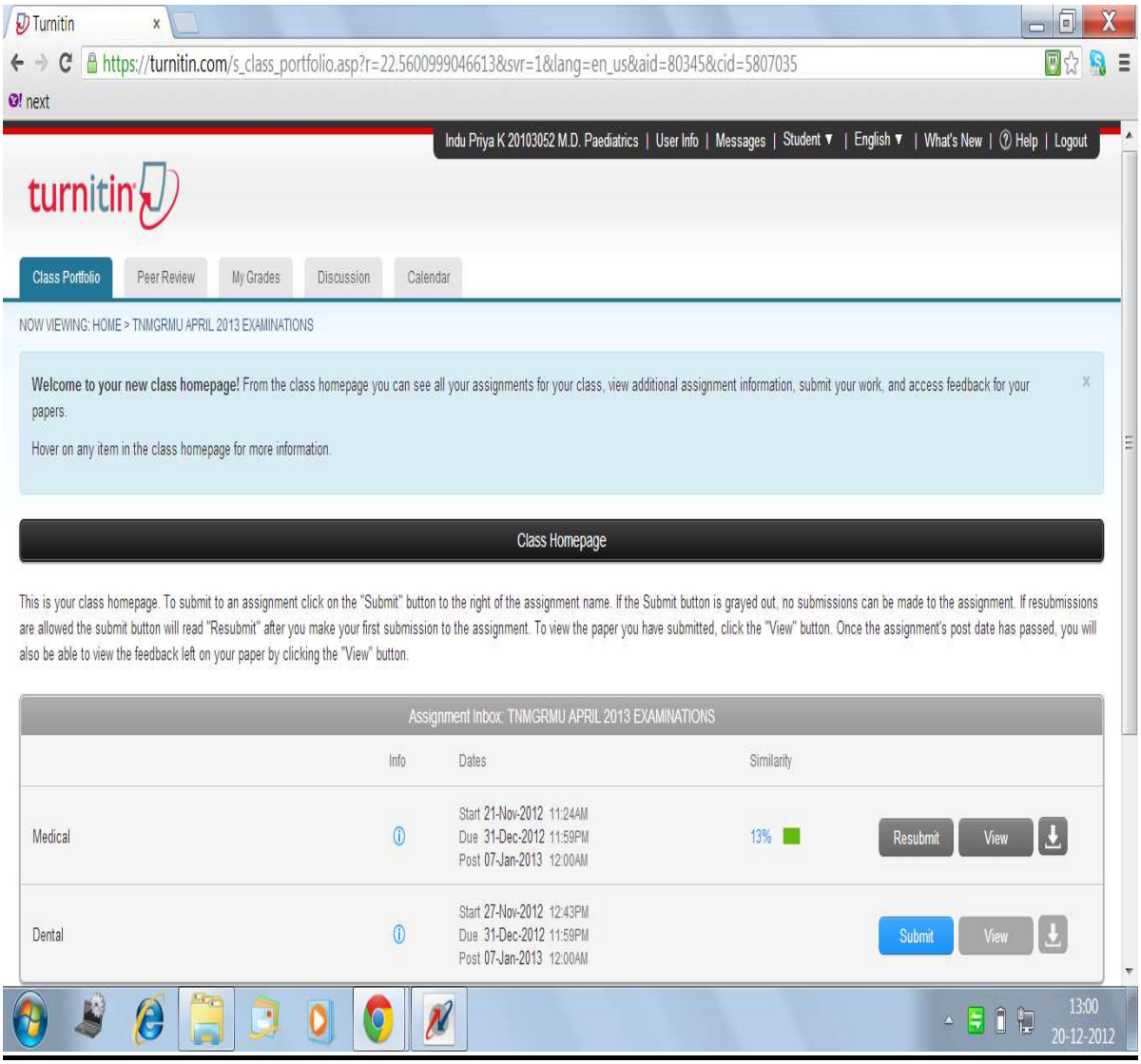
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ACKNOWLEDGEMENTS

I owe my sincere thanks to the Dean, Prof. Dr. S. Geethalakshmi M.D.,PhD., Govt. Stanley Medical College & Hospital, for granting me permission to conduct this study at Institute of Social Paediatrics, Govt. Stanley Hospital.

I thank our beloved Director, **Prof.Dr.G.Karunakaran M.D.,D.C.H.,** for guiding me throughout the study.

My sincere thanks to **Prof.Dr.Amudha Rajeshwari M.D.,D.C.H., Prof.Dr.P.Ambikapathy M.D.,D.C.H.** and **Prof.Dr.Sujatha Sridharan M.D.,D.C.H.** for their immense support for this study.

I also thank **Dr.J.Ganesh M.D.,D.C.H.** and **Dr.M.A.Aravind M.D**. for their valuable guidance and without whose help my study would not have been possible.

I also thank our Assistant Professors **Dr. Rathinavelu M.D.,D.C.H., Dr.K.Elango M.D.,D.C.H., Dr.T.S.Ekambaranath M.D., Dr.Raja M.D., Dr.Kumar D.C.H., Dr.V.Radhika M.D., Dr.Venkatesan M.D., and Dr.Ezhil Srinivasan M.D.,D.C.H.** for their critical reviews and suggestions.

I offer my special thanks to **Mr.Ravanan**, Associate professor of statistics, Presidency college for helping me in statistical analysis.

I also thank our **ENT department and Microbiology department** for their help throughout the study.

I am greatly indebted to all my friends, Post Graduate colleagues who have been the greatest source of encouragement, support, enthusiasm, friendly concern and timely help.

Last but not the least I owe my sincere thanks and gratitude to all the children and their parents without whom this study would not have been possible.

CONTENTS

INTRODUCTION

Otitis media is a common childhood infection especially in developing countries. Otitis media refers to the inflammation of the middle ear mucosa. About 80% of children experience at least one

episode of otitis media within their first 3 years of life [2,3] . It is the reason for every third hospital visit in a pediatric practice. Serious complications can occur from otitis media. It is the commonest cause of preventable and treatable hearing loss. Long term hearing loss can have serious impact on language and communication, psychosocial and cognitive development and academic performance of the child.

Identifying the predictors and avoiding them and treating the infection with appropriate antibiotics prevent complications and results in good outcome. Good knowledge and understanding of the host and the environmental factors for development of otitis media is important in identifying a child at risk of recurrent and persistent otitis media. This helps in primary and secondary prevention of otitis media and decreasing its complications and sequelae. This study is done to analyse the risk factors associated with acute and chronic otitis media and to find the spectrum of organisms causing otitis media to enable prevention and appropriate treatment respectively.

REVIEW OF LITERATURE

RISK FACTORS FOR OTITIS MEDIA

1) Age :

The incidence of otitis media is highest between 6 – 20 months of age [1,4]. 63% – 85% develop at least one episode of otitis media by 1 year and 66% - 99% by 2 years. Poor immunity, structural and functional deficiencies of the Eustachian tube results in increased occurrence of otitis media in infancy and young children. Earlier the age of onset of otitis media, greater is the risk for the occurrence of recurrent and chronic otitis media.

2) Gender :

The incidence is more in boys compared to girls. Surgeries like tympanostomy tube insertion, tympanoplasty and adenoidectomy are more in boys suggesting a greater severity in boys.

3) Socioeconomic class:

Otitis media is common among children belonging to low socioeconomic class[5]. Overcrowding, poor hygienic facilities, suboptimal nutritional status, limited access to medical care and limited resources for complying with prescribed medications makes the children in low socioeconomic class susceptible to otitis media.

4) Breast milk Vs Formula feeds[6,7,8]:

Exclusive breast feeding for 6 months provides protection against early episodes of acute otitis media. It is attributed more to the milk itself

than to the mechanics of breast feeding. Nursing in incorrect positions like supine nursing increases the risk of otitis media[9,10]. There is some controversy regarding the exact duration of breast feeding that provides protection against otitis media. One study showed after breast feeding was stopped, there was decreased risk for occurrence of otitis media for upto 4 months. After about 12 months of stopping breast feeding, the odds of occurrence of otitis media was same between the children who were breast fed and the children who were not breast fed[11].

5) Use of Pacifiers :

Pacifier usage had an influence on otitis media and affected the number of episodes of occurrence acute otitis media. A meta - analysis linked pacifier use with 24% increased risk for acute otitis media[12].

6) Passive Smoking :

Many studies were conducted to find out the association between passive smoking and occurrence of otitis media. Some studies assessed exposure to tobacco smoking using urinary cotinine and some using salivary cotinine levels. Two meta - analysis showed that passive smoking increased the risk for recurrent acute otitis media and chronic otitis media with effusion. There was not a significant increase in risk for non recurrent acute otitis media with passive smoking[12,13].

7) Exposure to other children :

There was an increase in occurrence of acute otitis media and chronic otitis media with effusion in children belonging to large families. Order of birth had an influence on otitis media[14]. Children who were first born had lower incidence of acute otitis media compared to children who had elder siblings. There is an increased nasopharyngeal colonization with repeated exposure to other children.

8) Upper airway infections :

Upper airway infection plays a significant role in the etiology of otitis media. Upper airway infection causes inflammation and damage to the mucociliary epithelial lining of the Eustachian tube predisposing the child to otitis media[15].

9) Seasonal influence :

The incidence of otitis media is more during the autumn and winter months and less in summer in both hemispheres[16]. This parallels with the occurrence of the upper airway infection. This evidence also supports the fact that upper airway infection predisposes otitis media.

10) Congenital anomalies :

Congenital anomalies like unrepaired cleft palate, submucosal cleft palate, other craniofacial anomalies and Downs syndrome have deficiency in functioning of Eustachian tube and predispose to OM.

ACUTE OTITIS MEDIA

According to Nelson Textbook of Pediatrics,19th edition,

" The diagnosis of acute otitis media requires

1) Acute onset of signs and symptoms
2) Presence of middle ear effusion
3) Signs and symptoms of middle ear inflammation

Definition of acute otitis media includes

- Recent, usually abrupt onset of signs and symptoms of middle ear inflammation and middle ear effusion
- Presence of middle ear effusion, indicated by any of the following
    - Bulging tympanic membrane
    - Limited or absent mobility of tympanic membrane
    - Air fluid level behind the tympanic membrane
    - Otorrhoea
- Signs and symptoms of middle ear inflammation indicated by either
    - Distinct erythema of tympanic membrane
    - Distinct otalgia (discomfort clearly referable to the ears that results in interference with or precludes normal activity or sleep) "

ETIOLOGY :

Bacteria are isolated in 65 – 75 % of cases from the middle ear fluid. Numerous studies show that there are 3 common organisms causing acute otitis media namely Streptococcus pneumoniae, non typable Hemophilus influenza and Moraxella catarrhalis[17,18]. Streptococcus pnuemoniae has been isolated from the middle ear fluid in 25% - 50% of the cases with acute otitis media, Hemophilus influenza in 15% - 30% and Moraxella catarrhalis in 3% - 20%. Staphylococcus aureus, group A Streptococcus gram negative organisms have also been implicated as the causative agent in about 5% of the cases.

There is a change in the microbiological flora with the increased pneumococcal vaccinations. *Block et al study shows* that "the incidence of Hemophilus influenza has increased from 39% to 52% and the incidence of Streptococcus pneumonia has decreased from 49% to 34% in the isolates in children between 7 to 24 months with acute otitis media between 1992 – 1998 and 2000-2003"[19].

Viruses like respiratory syncytial virus, rhinovirus, coronavirus, Para influenza, adenovirus and enterovirus have been isolated from respiratory secretions and middle ear effusion from about 405 to 75% cases of acute otitis media and about 5% to 22% of cases without bacteria in middle ear effusion. This might be responsible for the failure of antibiotics.It is unclear whether virus alone can cause AOM or their role

is limited to favoring bacterial invasion, amplifying inflammatory process and interfering with resolution of bacterial infection. In about 16% to 25% no bacteria or virus has been isolated [20,21].

PATHOGENESIS :

Eustachian tube, child's immune system, risk factor profile and host pathogen interaction play a role in pathogenesis [22].

Anatomical factors :

Eustachian tube is closed passively and opened by the contraction of tensor veli palatii. It has 3 main functions – ventilation, protection and clearance of middle ear. Tubal obstruction elicits a complex inflammatory response - secretory metaplasia, mucociliary transport system compromise and effusion into tympanic cavity. Eustachian tube obstruction can occur extraluminally (from hypertrophied nasopharyngeal adenoid tissue or tumor) or intraluminally (from inflammatory edema of tubal mucosa).

Progressive reduction in compliance as the child grows is the reason for the decrease in occurrence of OM as age advances. Patulous or excessively compliant eustachian tube does not provide protection to the tympanic cavity from the spread of infection from the nasopharynx. The shorter or more horizontal orientation of the Eustachian tube in infants and children increases the reflux from nasopharynx and reduces the passive gravitational drainage through the tube[22].

In children with craniofacial anomalies like cleft palate and children with Downs syndrome, there is an increased occurrence of otitis media. This is also attributed to the Eustachian tube dysfunction.

Host factors :

The level of immunity of the child plays an important role in the occurrence otitis media. As the child grows, the immune system matures and hence there is a decrease in the incidence of otitis media in older children. IgA deficiency has been noted in some children with recurrent otitis media. But its role is doubtful since IgA deficiency is also found in children without recurrent otitis media. Selective IgG subclass deficiency may be found in children with recurrent AOM in association with recurrent sinopulmonary infections.

Allergy:

Respiratory allergy as an etiology is not definite. It is possible that otitis media may be exaggerated by allergy[23]. Alteration in mucociliary clearance by repeated viral exposure or tobacco smoke slide the balance of pathogenesis in favour of pathogens.

CLINICAL FEATURES :

Acute otitis media is associated with abrupt onset of signs and symptoms. Otalgia may be manifested in younger children as irritability,

pulling of the ear, incessant crying and altered sleep habits. Otorrhoea and fever can occur. The specificity and sensitivity for pulling at the ear is low. Hearing loss may be present which may manifest as change in speech pattern. These findings except for otorrhoea are not specific and usually overlaps with that of uncomplicated upper respiratory infections[24].

Otoscopy:

Visualization of the tympanic membrane with identification of an middle ear effusion and inflammatory changes is necessary to establish the diagnosis with certainty. For pneumatic otoscopy, a speculum of proper shape and diameter must be selected to permit a seal in the external auditory canal. Appropriate restraint of the child to provide adequate examination is necessary.

The findings on otoscopy indicating the presence of middle ear effusion and inflammation associated with acute otitis media has been well defined. Fullness or bulging of the tympanic membrane is often present and has the highest predictive value for the presence of middle ear effusion. When combined with colour and mobility, bulging is also the best predictor of acute otitis media[25,26].

Reduced or absent mobility of the tympanic membrane during the performance of pneumatic otoscopy is additional evidence of fluid in the middle ear. Opacification or cloudiness, other than that caused by scarring,

is also a consistent finding and is caused by the edema of the tympanic membrane. Redness of the tympanic membrane caused by inflammation may be present and must be differentiated from the pink erythematous flushing evoked by crying or high fever, which is usually less intense and remits as the child calms down. In bullous myringitis, blisters may be seen on the tympanic membrane[27]. When the presence of middle ear fluid is difficult to determine, the use of tympanometry or acoustic reflectometry can be helpful in establishing a diagnosis.

TREATMENT

Management of otalgia

Many episodes of acute otitis media are associated with pain[28].The management of pain especially during the first 24 hours of an episode of acute otitis media, should be addressed regardless of the use of antibacterial agents.

Acetaminophen and ibuprofen are effective drugs in cases of mild to moderate pain[29]. In children with moderate to severe pain, narcotic analgesics with codeine or analogs can be used. Distraction and external application of heat or cold have also been tried for pain relief. Tympanostomy and myringotomy procedures are used in cases of severe pain and they require a lot of technical expertise.

Antimicrobial treatment :

Though previously acute otitis media was routinely treated with antibiotics, the emergence of bacterial resistance to these drugs has prompted withholding antibiotics in some cases.The three main reasons which were cited as favouring the use of antimicrobials are majority of otitis media are caused by bacteria; a faster resolution of infection in those treated with antibiotics and early treatment with antibiotics prevents suppurative complications.

The likelihood of recovery without antibacterial therapy differs depending on the severity of signs and symptoms at the initial examination. *Kaleida et al*[30] " divided patients into severe and non-severe groups based on the degree of fever , a scoring system based on duration and severity of pain and apparent discomfort and estimated parental anxiety. In the non-severe group of children, the initial failure rate on placebo plus myringotomy was 23.5% versus an initial failure rate of 9.6% on patients with amoxicillin alone". *Palva et al* cited "Routine antibacterial therapy for acute otitis media is often cited as the main reason for the decrease in the incidence of mastoiditis in the antibacterial era"[31]. By 1950s, mastoiditis has decreased dramatically.

The AHRQ evidence report on acute otitis media concluded that mastoiditis is not increased with i 11 observation, provided the children are followed closely and antibiotics are started in those who do not improve. Pooled data from 6 randomized trials and 2 cohort studies

showed comparable rates of mastoiditis in children who received initial antibacterial treatment and children who received placebo or observation. External validity may be limited because some trials excluded very young children and those with severe disease[32]. Thus current evidence does not suggest a clinically increased risk of mastoiditis in children when acute otitis media are managed only with initial symptomatic treatment without antibacterial agents, Clinicians should be aware that antibacterial treatment might mask the symptoms and signs of mastoiditis producing a subtle presentation that can delay diagnosis.

Bacterial Resistance :

Children < 2 years of age, who are constantly exposed to other children and who have received antibiotics recently are more prone for development of antibacterial resistance. The degree of resistance varies from place to place. Approximately 40% of Hemophilus influenza and all strains of Moraxella catarrhalis are resistant to aminopenicillins. The resistance is mainly due to the production of β lactamases. It can be overcome by using a β lactamase inhibitor. Some strains confer resistance not by the production of β lactamases but by the alteration of penicillin binding proteins.

About 50% of Streptococcus pneumonia are resistant to penicillins. Nearly half show intermediate resistance and the remaining half are severely resistant and difficult to treat The resistance of S.pneumoniae is

due to the alteration in penicillin binding proteins, There are about 6 penicillin binding proteins. More the number of proteins are altered, the higher the degree of resistance. This resistance can be overcome by the use of higher concentration of β lactam antibiotics for sufficient periods. Penicillin resistant Streptococcus are mostly resistant to other classes of antibiotics also.

Resistance to macrolides occurs by two mechanisms. One is mediated by mef (A) gene which is due to an efflux pump. It decreases the intracellular concentration of macrolides. It confers low level resistance. The other mechanism is due to the erm (B) gene which produces ribosomal methylases and modifies ribosomal RNA. This mechanism is also responsible for the resistance against clindamycin. Unlike β lactam antibiotics, resistance to macrolides cannot be overcome by increasing the concentration of the drug.

Guidelines for treatment :

A consensus guidelines has been published by the American Academy of Pediatrics as to who should have a period of " watchful waiting " or observation and who should be treated. It is essential to ensure the follow up of patients to assess for non - resolution or worsening of the problem. The consensus takes into consideration three factors – age of the patient, the certainty of diagnosis and the severity of the disease. Age wise children are considered as < 6 months, 6 months to

2 years and ≥ 2 years group. The presence of the three criteria i) rapid onset, ii) signs of middle ear effusion and iii) symptoms and signs of middle ear inflammation makes the diagnosis of acute otitis media certain. Patients with temperature of > 102 F (> 39 □ C), severe otalgia or toxic appearance are considered to have severe disease.

In children < 6 months of age, irrespective of the certainty of diagnosis or the severity of the disease, all should be treated with appropriate antibiotics because of the increased risk of morbidities due to complications. In children between 6 months to 2 years, antibiotics are started in cases of certain diagnosis or when there is severe disease. The child is observed for 48 to 72 hours in cases of non-severe disease. In children ≥ 2 years, all episodes are treated with a period of observation except in confirmed cases of acute otitis media with severe disease.

Table 1: Treatment based on age and certainty of diagnosis

AGE	CERTAIN DIAGNOSIS	UNCERTAIN DIAGNOSIS
< 6 months	Antibacterial treatment	Antibacterial treatment
6 moon – 2 yrs.	Antibacterial treatment	Antibacterial treatment of severe illness

		Observation if non severe illness
≥ 2 yrs.	Antibacterial treatment of severe illness Observation if non severe illness	Observation

First line drugs:

Amoxicillin is usually considered as the first choice drug due to its good efficacy and safety, low cost and palatability [33]. Both penicillin susceptible and non-susceptible Streptococcus pneumonia respond to Amoxicillin. This is achieved by increasing the traditional dose of Amoxicillin from 40 – 45 mg/kg/day to 80 – 90 mg/kg/day[34]. One limitation of use of Amoxicillin is that it is not efficient against β lactamase producing strains of non typable Hemophilus influenza and Moraxella catarrhalis. With the widespread coverage pneumococcal vaccine and decline in S.pneumoniae and rise of H.influenzae, the above factor has become important.

Allergic reactions can occur to penicillin which can be either type 1 with urticarial and angioedema or non-type 1 with rashes. For non-type 1 reactions, where there is no cross reaction with cephalosporins, cefdinir is the antibiotic of choice[35]. For patients with type 1 reaction, azithromycin is the drug of choice.

Duration of treatment :

Treatment for atleast 10 days is essential especially in children less than 2 years of age. In older children with mild episodes and who show rapid improvement, a 3 to 5 day course may be sufficient. Longer than 10 days treatment may be needed in very young children, in severe disease and in children with previous problematic episode of otitis media.

Unsatisfactory response :

Children who are prescribed antibiotics should improve within 48 to 72 hours. If there is no improvement, it is possible that the treatment was not adequate or there is a different diagnosis. Poor compliance to treatment, ineffective antibiotics, concurrent or intercurrent viral infections, poor host immunity, Eustachian tube dysfunction or reinfection from other sites are some of the causes for failure to respond to treatment.

Middle ear effusion can persist even after improvement of acute symptoms. 60 – 70 % have middle ear effusion after 2 weeks of acute otitis media, 40 % at 1 month and 10 – 25 % at 3 months[36]. It needs further follow up and observation. The presence of middle ear effusion following acute otitis media is not an indication for addition of antibiotics or changing to second line of drugs.

Second line drugs:

The second line of drugs must be effective against β lactamase producing strains of H.influenzae and M.catarrhalis and against both the

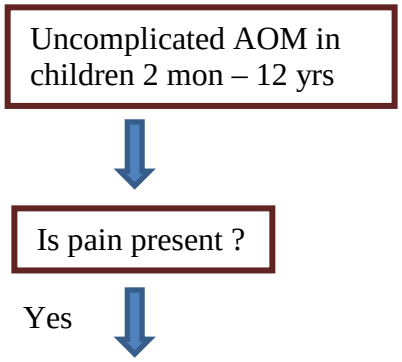
susceptible and non-susceptible strains of S.pneumoniae. Amoxicillin clavulanate, cefdinir, cefuroxime axetil and intramuscular ceftriaxone are the drugs which meet the above requirements. With the addition of clavulanate component, the spectrum of amoxicillin is extended to β lactamase producing organisms and forms an ideal second line drug. Cefdinir can be give as an once daily regimen and is well tolerated. One limitation to the use of cefuroxime is that it is not palatable. Intramuscular ceftriaxone is used when oral therapy is not possible, when there is no response to oral second line antibiotics and when highly resistant strains of Streptococcus are isolated from the aspirate from diagnostic tympanocentesis[37].

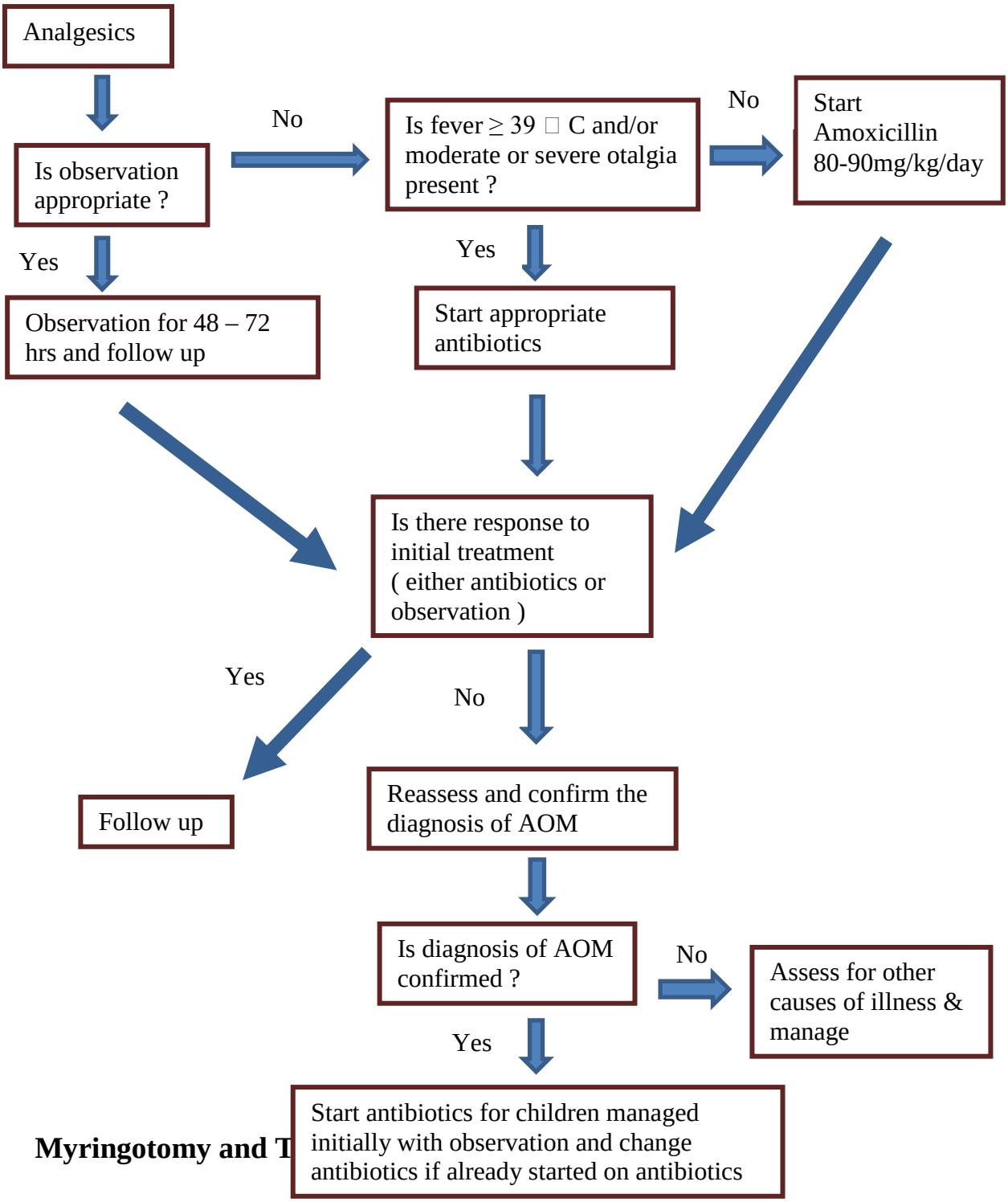
Azithromycin and clarithromycin have only limited action against β lactamase strains of H.influenzae and non-susceptible strains of S.pneumoniae . Macrolide use is more a problem of resistance than beneficial effects. Clindamycin is active against most of the strains of S.pneumoniae but they are not active against H.influenzae and M.catarrhalis.

Table 2 : Recommendations for antibacterial treatment

Temperature ≥39 C and/or severe otalgia	At diagnosis for patients started on antibiotics		Clinically treatment failure after 48-72hrs after observation		Clinically treatment failure after 48-72hrs after antibiotics	
	Recommended	Alternative for penicillin allergy	Recommended	Alternative for penicillin allergy	Recommended	Alternative for penicillin allergy
No	Amoxicillin 80-90mg/kg/day	Non type 1: Cefdinir, Cefpodoxime, Cefuroxime Type 1 : Azithromycin, Clarithromycin	Amoxicillin 80-90mg/kg/day	Non type 1: Cefdinir, Cefpodoxime,Cefuroxime Type 1 : Azithromycin, Clarithromycin	Amoxicillin – clavulanate 90mg/kg/day of amoxicillin, with 6.4mg/kg/day of clavulanate	Non type 1: Ceftriaxone3 days Type 1 : Clindamycin
Yes	Amoxicillin – clavulanate 90mg/kg/day of amoxicillin, with 6.4mg/kg/day of clavulanate	Ceftriaxone 1 or 3 days	Amoxicillin – clavulanate 90mg/kg/day of amoxicillin, with 6.4mg/kg/day of clavulanate	Ceftriaxone 1 or 3 days	Ceftriaxone 3 days	Clindamycin Tympanocentesis

Figure 1 : Algorithm for management of Acute otitis media





Myringotomy and T

Indications :

1) Severe refractory pain

2) Hyperpyrexia

3) Complications of AOM like labyrinthitis, facial palsy, mastoiditis and intracranial infection
4) Immunological compromise from any source

In patients with no response to second line drugs or in very young patients as a part of sepsis work up, diagnostic tympanocentesis or myringotomy can help in identifying the causative organism.

CHRONIC SUPPURATIVE OTITIS MEDIA

Chronic suppurative otitis media is a long standing infection of a part or whole of the middle ear cleft which manifests as ear discharge and

a permanent perforation.It usually begins in childhood as acute otitis media. When squamous epithelium lines the edges of the perforation, it does not spontaneously close and becomes permanent. Children with CSOM have ear discharge from 6 weeks to 3 months or more inspite of medications. WHO definition requires only 2 weeks of otorrhoea. but otolaryngologists usually adopt a longer period.

CAUSATIVE ORGANISMS :

Chronic suppurative otitis media is mostly caused by Pseudomonas aeruguinosa, Proteus mirabilis, Klebsiella species , Escherichia coli and anaerobes like Bacteriodes, Peptostreptococcus and Propionibacterium[38]. A chronic perforation paves way for the entry of bacteria into the middle ear. Pseudomonas is particularly very notorious resulting in progressive destruction by the proteolytic enzymes.

TYPES OF CSOM :

It is clinically divided into 2 types.

1) Tubotympanic type :

It is also called the safe ear. It involves the anteroinferior part of the middle ear cleft and causes central perforation.

2) Atticoantral type :

It is also called the unsafe ear. It involves the posterosuperior part of the middle ear cleft and causes attic or marginal perforation.

Features	Tubotympanic type	Atticoantral type
Discharge	Profuse, mucoid, odourless	Scanty, purulent , foul smelling
Perforation	Central	Attic or marginal
Granulation	Uncommon	Common
Polyp	Pale	Red or fleshy
Cholesteatoma	Absent	Present
Complications	Rare	Common
Audiogram	Mild to moderate conductive deafness	Conductive or mixed deafness

ETIOLOGY :

1) Sequelae to Acute otitis media :

Acute otitis media can result in a large central perforation. The perforation may become permanent and results in recurrent infection from the external ear. When the middle ear mucosa is exposed to the external environment, it gets sensitized to dust, pollen, etc and results in persistent otorrhoea.

2) Ascending infection via Eustachian tube :

Infection from the infected sinuses, tonsils and adenoids can spread to the middle ear cleft through the Eustachian tube and result in otitis media.

HEARING LOSS:

Tubotympanic disease usually results in conductive hearing loss. Hearing loss ranges from none to 50dB. Sometimes a paradoxical effect of better hearing in the presence of discharge than when the ear is dry. It is due to the round window shielding effect by the discharge. In a dry ear with perforation, when sound waves strike the round window and oval window at the same time, they get cancelled.

When CSOM is present for longer periods, toxins are absorbed through the round window and oval window and causes cochlear damage. This can result in mixed type of hearing loss.

Assessment of hearing :

a) Clinical tests :

i) Watch test :

It was used as a screening test in the pre audiometric era. A clicking watch is brought from a distance towards the ear. The distance when the clicking of the clock is heard is measured.

ii) Speech test :

Normally a person can hear a whispered voice at a distance of 6 metres and a conversation at a distance of 12 metres. In this test, the patient is made to stand at a distance of 6 metres with his ear to be tested facing the examiner. The patient is blind folded to avoid lip reading and the other ear is blocked by intermittent tragal pressure. The examiner recites words and starts walking towards the patient. The distance at which the patient hears a whisper and normal conversational voice is noted. The intensity and pitch of voice and the surrounding noise cannot be standardized in this test.

iii) Tuning fork tests :

Tuning fork of 512 Hz is ideal for hearing assessment. Tuning forks having lesser frequencies gives a sense of bone vibration and those with greater frequencies have a short decay time. These tests are based on the fact that in a normal ear, air conduction is better than bone conduction.

Rinne test :

Here air conduction is compared with bone conduction. A tuning fork is made to vibrate and placed on the mastoid. When the patient stops hearing, the tuning fork is placed adjacent to the external auditory meatus. If the patient is able to hear, it is implied that air conduction is better than bone conduction and Rinne test is positive. When the bone conduction is better than air conduction, it is a negative Rinne test. A negative Rinne is associated with a minimum air bone gap of 15 to 20 db.

Table 3: Assessment of hearing

RESULT		**INFERENCE**
Positive Rinne	AC > BC	Normal ear Sensorineural hearing loss
Negative Rinne	BC > AC	Conductive hearing loss
False negative Rinne	BC > AC	Unilateral severe sensorineural hearing loss

Weber test:

In this test, a tuning fork is vibrated and placed in the center of the forehead. Here there is direct stimulation of the cochlea through the bone. The patient is asked to tell in which ear he hears the sound better. In a normal ear, it is heard equally in both ears. When there is conductive hearing loss, it is lateralized to the diseased ear and in sensorineural hearing loss; the test is lateralized to the normal ear. Lateralization indicates that there is either a conductive hearing loss of 15 to 20 dB in the ipsilateral ear or a sensorineural hearing loss of 15 to 20 dB in the contralateral ear.

Absolute bone conduction test :

In this test, the bone conduction of the patient is compared with that of the examiner. The meatus of both the patient and examiner are occluded. When the patient hears the tuning fork for the same duration as the examiner, then there is conductive hearing loss. When the patient hears the tuning fork for less duration than the examiner, it implies that there is sensorineural hearing loss.

b) Audiometry

i) Pure tone audiometry;

This device produces pure tones. The intensity of the pure tone can be increased or decreased by 5 dB. The amount of intensity that has to be increased higher than the normal indicates the degree of hearing impairment at that frequency. The air bone gap is a measure of the amount of conductive hearing loss.

ii) Impedance audiometry:

This test is an objective test. It includes tympanometry and acoustic reflex measurements. It is based on the fact that when a sound wave falls on the tympanic membrane, a part of it gets absorbed and the remaining is reflected. A tympanic membrane which is stiff can reflect more sound waves when compared to a more compliant tympanic membrane. By sealing the external ear and adjusting the pressures and measuring the sound that is reflected, the compliance of the tympanic membrane can be found. The compliance of the tympano ossicular system can be plotted

against the pressures and a tympanogram with different types of graph is obtained. It helps in diagnosing some middle ear pathologies.

Types of tympanogram

Type A - Normal

Type As - Reduced compliance at ambient pressures (osteosclerosis)

Type Ad - Increased compliance at ambient pressures (ossicular discontinuity)

Type B - Flat or dome shaped (fluid in middle ear)

Type C - Maximum compliance at pressures more than 100 mmH2O (negative pressure in middle ear)

INVESTIGATIONS :

1)Audiogram

2) Pus for culture and sensitivity

3) X ray of the mastoids

TREATMENT :

Aims of treatment :

1) To control the infection and make the ear dry
2) Complete eradication of the disease
3) Restoration of hearing

i) Aural toilet :

Aural toileting can be either done by dry mopping or with the help of absorbent cotton buds. It can be done with suction clearance using a microsope or irrigation. Removal of the discharge can help by removing the infected material and also improves the efficacy of topical antibiotics [39]. A Cochrane review from studies in Solomon Islands[40] and Kenya[41] showed that there was no significant benefits with aural toilet alone compared to no treatment.

ii) Topical antiseptics:

A trial by Eaton et al [40] showed that use of topical antiseptics was more effective than aural toilet alone. Zinc peroxide, boric acid, iodine powder and dilute acetic acid are some of the topical antiseptics which are reported in literature.

iii) Antibiotics:

According to a Cochrane review, combining antibiotics with aural toilet is more efficient than aural toilet alone[42]. It is a question of debate whether to use topical antibiotics or to use systemic antibiotics. Ludman[39] and Nelson[43] preferred oral antibiotics. They cited the potential ototoxic effects due to the use of topical antibiotics as a major concern.

With the above stand by most pediatricians, most otolaryngologists prefer topical antibiotics due to the poor penetration of the systemic drugs through the devascularised middle ear mucosa[44] . A Cochrane review

found that topical drugs were better than systemic drugs in decreasing the otorrhoea and clearing the middle ear disease[45]. Some of the topical antibiotics which are used are gentamycin, tobramycin, chloramphenicol, ciprofloxacin, ofloxacin and polymyxin B. Cephalexin, amoxicillin, coamoxiclav, erythromycin, ciprofloxacin, ofloxacin and trimethoprim sulfamethoxazole are some of the systemic drugs used. There are studies to support that combined topical and systemic antibiotics did not produce better results than topical antibiotics alone[40]. But the risk of ototoxicity is still a concern. Much of what is known about the ototoxicity of topical drugs is mostly based on animal studies [46].

Administration of parenteral antibiotics had good results than aural toilet alone[47]. Parenteral antibiotics used for CSOM are[48] penicillins (ampicillin, penicillin G, piperacillin, ticarcillin), cephalosporins (cefotaxime, cefuroxime, cefoperazone, ceftazidime, cefazolin), aminoglycosides (gentamycin, amikacin) , clindamycin, vancomycin and aztreonam.

iv) Treatment of contributing conditions:

In order to eliminate the trigger and source of infection, conditions like allergies, sinusitis, adenoiditis and tonsillitis must be treated.

v) Reconstructive surgery;

a) Myringoplasty :

Closure of the perforation of the pars tensa of the tympanic membrane is called myringoplasty. It helps in restoring hearing and prevents re infection from the external auditory canal. It also prevents the aeroallergens from the external environment from reaching the middle ear mucosa.

b) Tympanoplasty:

When myringoplasty is combined with ossicular reconstruction, it is called tympanoplasty. Depending on the amount of damage to the ossicular chain, specific type of tympanoplasty is done. Sequential destruction of malleus, incus and stapes results in progressively medially placed graft.

c) Mastoidectomy:

1) Cortical Mastoidectomy:

It is also called Intact canal wall mastoidectomy. Here the posterior meatal wall which separates the middle ear and the mastoid cavity is preserved. An opening is made through the posterior canal wall for entry into the middle ear cavity, In this procedure, anatomy of the middle ear is conserved and restoration of hearing is possible through tympanoplasty. But this technique needs expertise and there is the risk of recurrent or residual disease due to limited access to middle ear .

2) Radical Mastoidectomy :

It is also called Canal wall down procedure. Here the posterior meatal wall is removed and middle ear, attic, antrum and mastoid is made into a single cavity and exteriorized. This procedure aims to eradicate the disease from the middle ear and mastoid without attempts at preserving middle ear anatomy for reconstruction of hearing.

3) Modified Radical Mastoidectomy:

Here as much of the hearing mechanism as possible is preserved. It is done when the cholesteatoma is confined to the attic and antrum and in localized chronic otitis media.

COMPLICATIONS:

They can be classified into intratemporal complications and intracranial complications.

Intratemporal Complications

1) Mastoiditis
2) Petrositis
3) Facial paralysis
4) Labyrinthitis

Intracranial Complications

1) Extradural abscess
2) Subdural abscess
3) Meningitis
4) Brain abscess

5) Lateral sinus thrombhophlebitis

6) Otitic hydrocephalus

Features indicating complications:

1) Pain – It is usually not seen in uncomplicated cases. When present, it may indicate extradural, perisinus or brain abscess. It can also be due to otitis externa.

2) Vertigo – It is because of the erosion of lateral semicircular canal. It can lead to labyrinthitis or meningitis. Fistula test should be done.

3) Persistent headache – Occurs when there is intracranial complications.

4) Facial weakness – It due to the erosion of the facial canal.

5) Fever, nausea and vomiting – It occurs when there is intracranial spread of infection.

6) Irritability and neck rigidity is a feature of meningitis.

7) Diplopia – Feature of Gradinego syndrome.

8) Ataxia – It is suggestive of labyrinthitis or cerebellar abscess.

9) Abscess around the ear – It is a feature of mastoiditis.

AIMS OF THE STUDY

1) To analyse the risk factors in children < 12 years with symptomatic otitis media in a tertiary care centre
2) To study the clinical profile of children < 12 years with symptomatic otitis media in a tertiary care centre
3) To identify the organisms causing otitis media and their sensitivity patterns in a tertiary care centre

MATERIALS AND METHODS

Type of study:

Prospective descriptive study with Case control analysis of risk factors

Place of study:

Tertiary care hospital

Period of study:

October, 2011 to September, 2012

Inclusion criteria for acute otitis media:

1) Acute onset of signs and symptoms
2) Presence of middle ear effusion

(Indicated by any of the following)

- Bulging TM
- Air fluid level behind the TM
- Otorrhoea

3) Signs and symptoms of middle ear inflammation
   - Distinct erythema of TM
   - Distinct otalgia (discomfort clearly referable to the ears that results in interference with or preclude normal activity or sleep)

Inclusion criteria for chronic otitis media:

Persistent ear discharge for > 3 weeks

Method of study:

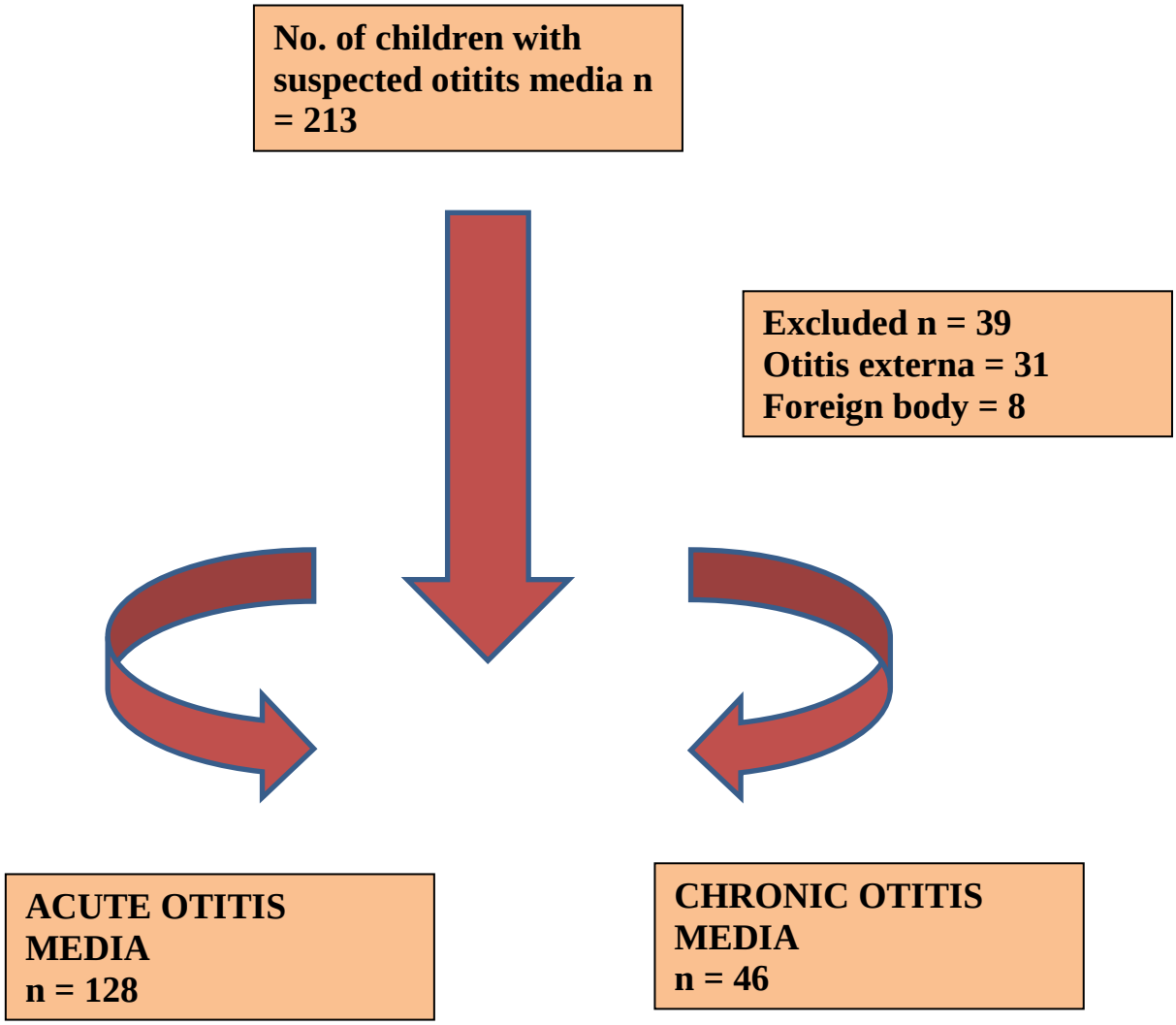
Children fulfilling the inclusion criteria are selected. Informed written consent is obtained from the parents and they are included in the study. Detailed history using the questionnaire and clinical examination was carried out. Otological examination was done using an otoscope. Hearing assessment was done using Rinnes test and Weber test. Aural swab is taken and sent for culture and sensitivity. Cultures were done for bacteria – both aerobes and anaerobes and fungus. Aerobes were cultured using blood agar, chocolate agar and Mac Conkey's agar. Anaerobes were cultured with Robertson cooked meat media. Sabourad's dextrose agar was used for isolation of fungus. X ray of the paranasal sinuses and mastoid were taken for children with CSOM with clinical suspicion of sinusitis or mastoiditis.

Age and sex matched controls for the cases were randomly chosen from the children brought for immunization and other complaints excluding respiratory symptoms. The same questionnaire pertaining to the risk factors was asked to the care givers of the controls. The data were entered and analyzed using

OBSERVATIONS & RESULTS

About 213 children were suspected to have otitis media. Of them, 39 cases were excluded – 31 cases had otitis externa and 8 cases had foreign body. A total of 128 cases of Acute suppurative otitis media and 46 cases of Chronic suppurative otitis media were included in the study.

Figure 2: Inclusion of cases for AOM and CSOM



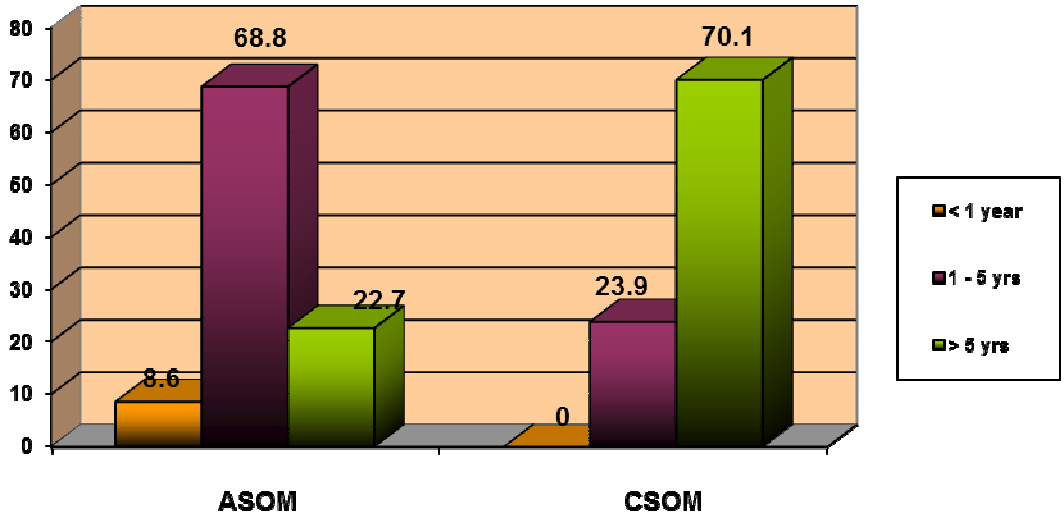
AGE DISTRIBUTION

Of the 128 cases of ASOM, 11 cases were < 1 year (8.6%), 88 were between 1 – 5 years of age (68.8%) and 29 were > 5 years (22.7%). Of the 46 cases of CSOM, 11 cases were between 1 – 5 years of age (23.9%) and 35 were > 5 years of age (76.1%)

Table 4: Age Distribution of ASOM and CSOM

AGE	ASOM		CSOM	
	NO.	%	NO.	%
< 1 year	11	8.6%	0	0
1 – 5 yrs.	88	68.8%	11	23.9%
> 5 yrs.	29	22.7%	35	76.1%

Chart 1: Age Distribution of ASOM and CSOM



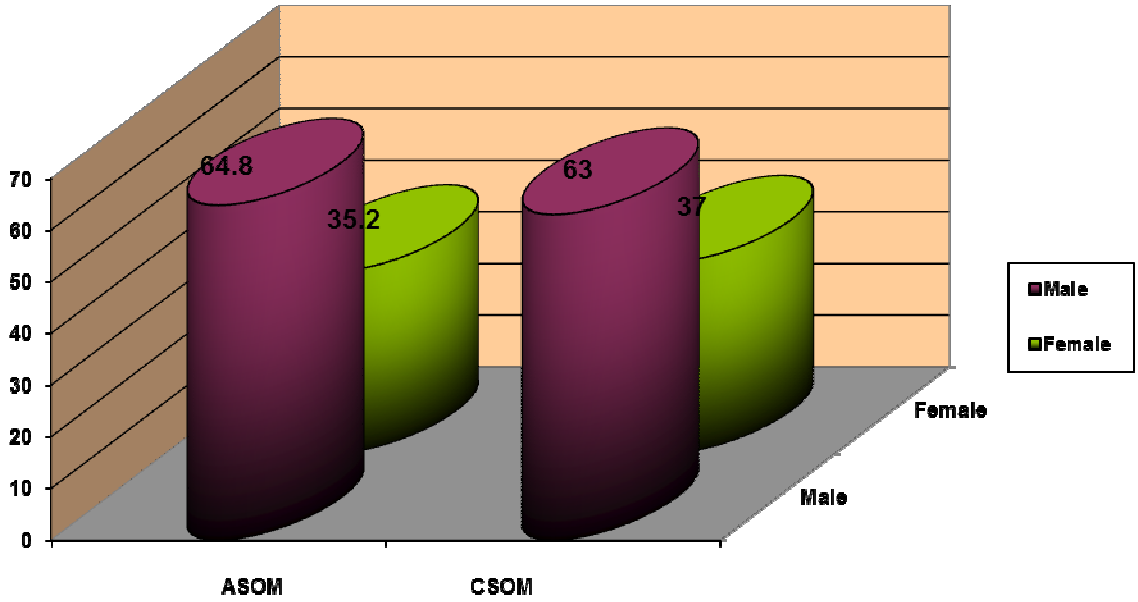
SEX DISTRIBUTION

Of the 128 cases of ASOM, 83 were male (64.8%) and 45 were female (35.2%). Of the 46 cases of CSOM, 29 cases were male (63%) and 17 were female (37%).

Table 5: Sex Distribution

SEX	ASOM		CSOM	
	NO.	%	NO.	%
Male	83	64.8%	29	63%
Female	45	35.2%	17	37%

Chart 2: Sex Distribution



ACUTE SUPPURATIVE OTITIS MEDIA

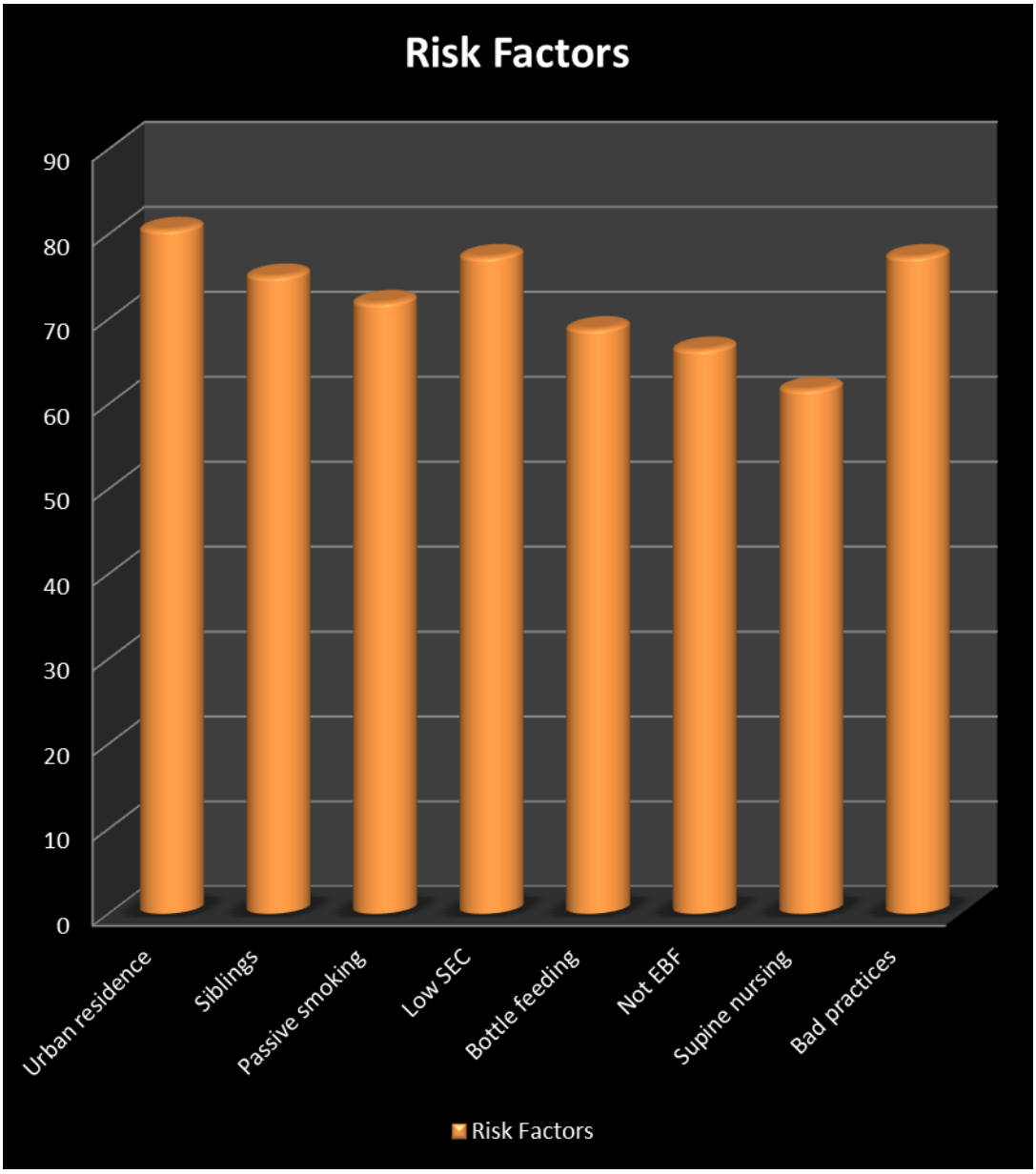
RISK FACTOR ANALYSIS

The following risk factors were analyzed – urban residence, siblings, passive smoking, low socioeconomic class, bottle feeding, not exclusively breast feeding for 6 months, supine nursing and bad practices.

Table 6: Risk factor analysis

S.NO.	RISK FACTOR	NO.	PERCENTAGE
1.	Urban Residence	103	80.5%
2.	Siblings	96	75%
3.	Passive Smoking	92	71.9%
4.	Low Socioeconomic class	99	77.3%
5.	Bottle feeding	88	68.8%
6.	Not exclusively breast fed	85	66.4%
7.	Supine nursing	79	61.7%
8.	Bad practices	99	77.3%

Chart 3: Risk factors for AOM



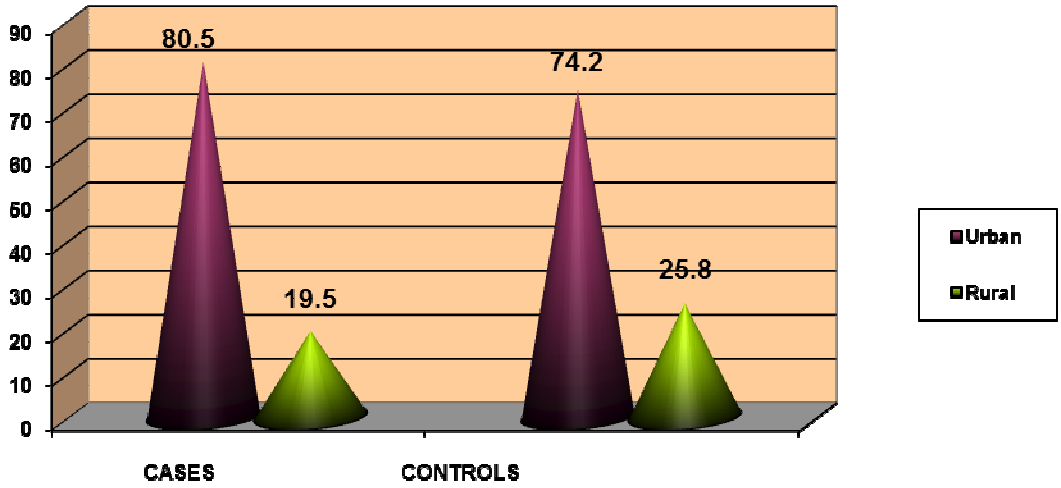
URBAN / RURAL DIVIDE:

Among the cases, 103 hailed from urban area (80.5%) and 25 hailed from rural area (19.5%). Among the controls, 95 hailed from urban area (74.2%) and 33 hailed from rural area (25.8%).

Table 7: Urban rural distribution

	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p Value
URBAN	103 (80.5%)	95 (74.2%)	1.427	0.232
RURAL	25 (19.5%)	33 (25.8%)		

Chart 4: Urban rural distribution



The difference was statistically not significant.

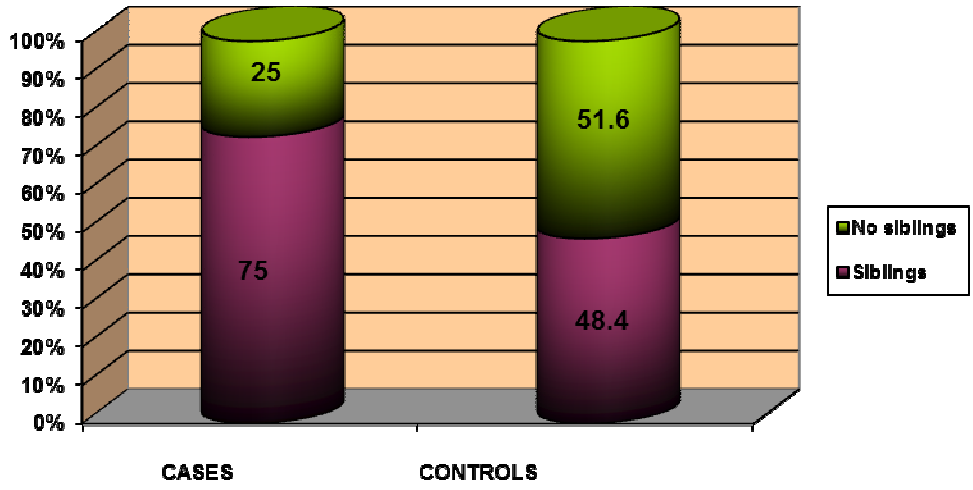
SIBLINGS:

Among the cases, 96 had siblings (75%) and 32 had no siblings (25%). Among the controls, 62 had siblings (48.4%) and 66 had no siblings (51.6%).

Table 8: Siblings

SIBLINGS	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p Value
YES	96 (75%)	62 (48.4%)	19.112	<0.001
NO	32 (25%)	66 (51.6%)		

Chart 5: Siblings



The difference was statistically significant with a p value of < 0.001.

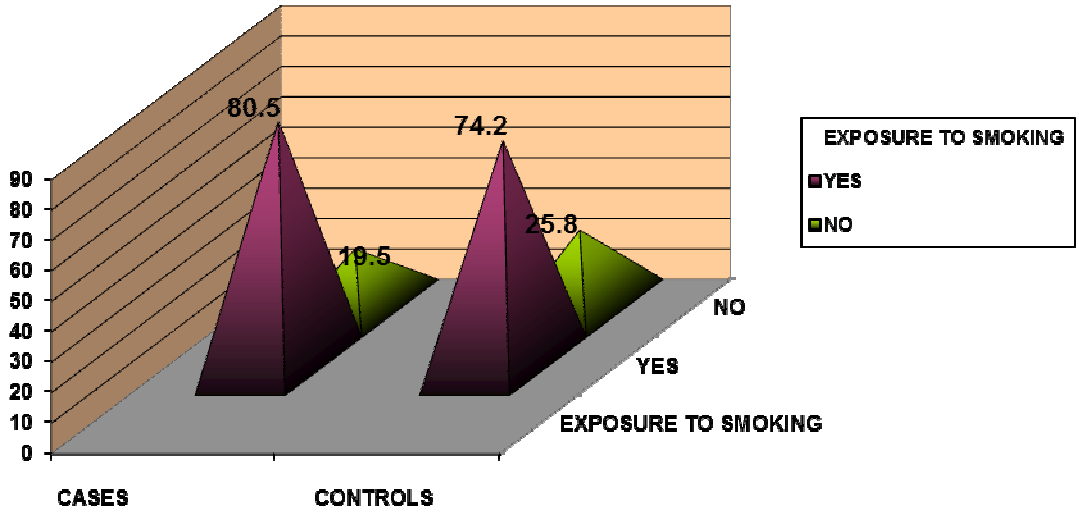
PASSIVE SMOKING:

92 cases were exposed to paternal smoking (71.9%) as against 53 of the controls (41.4%). 36 cases were not exposed paternal smoking (28.1%) as against 75 of the controls (58.6%).

Table 9: Passive smoking

SMOKING	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p value
YES	92 (71.9%)	53 (41.4%)	24.192	<0.001
NO	36 (28.1%)	75 (58.6%)		

Chart 6: Exposure to smoking



The difference was statistically significant with a p value of < 0.001.

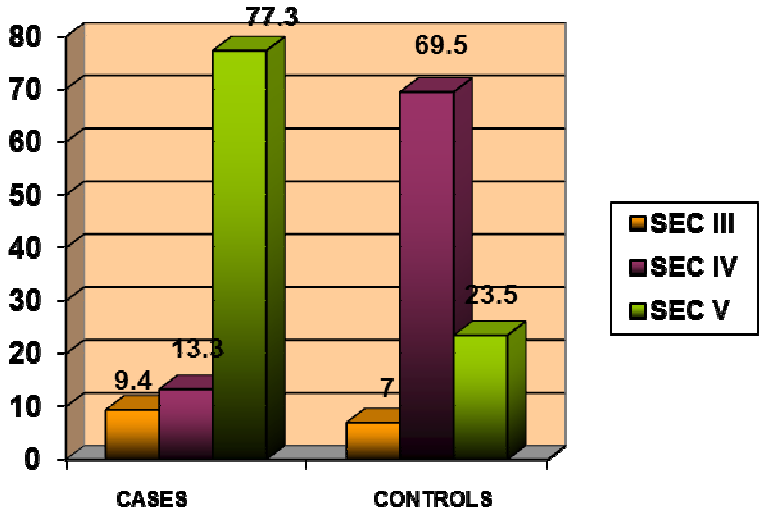
SOCIOECONOMIC CLASS

12 children (9.4%) belonged to class III socioeconomic class as per modified Kuppuswamy classification among the cases as against 9 (7%) among controls. 17 (13.3%) belonged to class IV SEC among the cases compared to 89 (69.5%) in the control group. 99 (77.3%) of the cases belonged to class V SEC as against 30 (23.5%) among the controls.

Table 10: Socioeconomic class distribution

SEC	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p value
III	12 (9.4%)	9 (7%)	86.241	<0.001
IV	17 (13.3%)	89 (69.5%)		
V	99 (77.3%)	30 (23.5%)		

Chart 7: Socioeconomic class distribution



The difference was statistically significant with a p value of < 0.001

EXCLUSIVE BREAST FEEDING

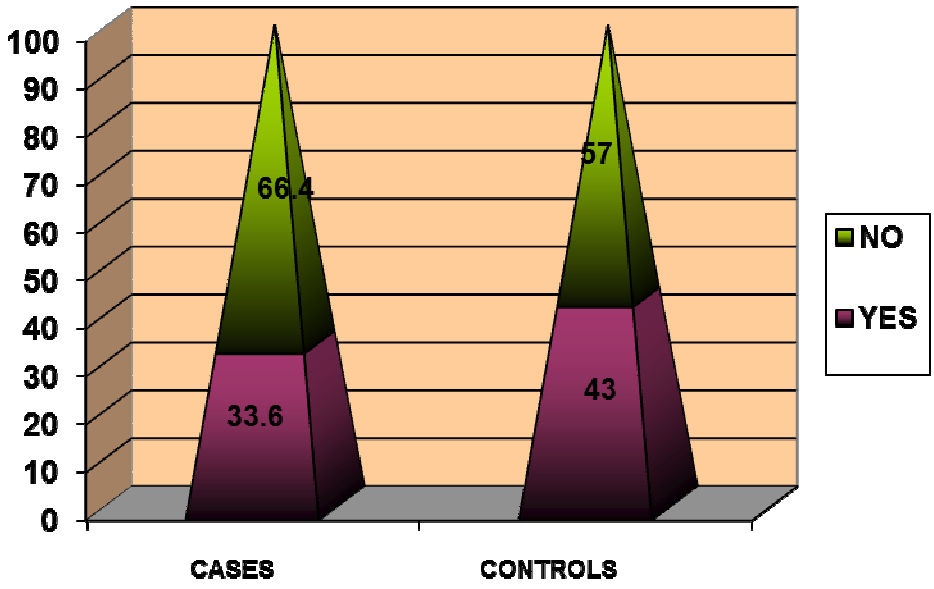
43 of the cases (33.6%) were exclusively breast fed for 6 months compared to 55 controls (43%).

The difference was not statistically significant.

Table 11: Exclusive breast feeding

EBF	CASES n = 126	CONTROLS n = 126	SIGINIFICANCE	
			χ^2	p value
YES	43 (33.6%)	55 (43%)	2.381	0.123
NO	85 (66.4%)	73 (57%)		

Chart 8: Exclusive breast feeding



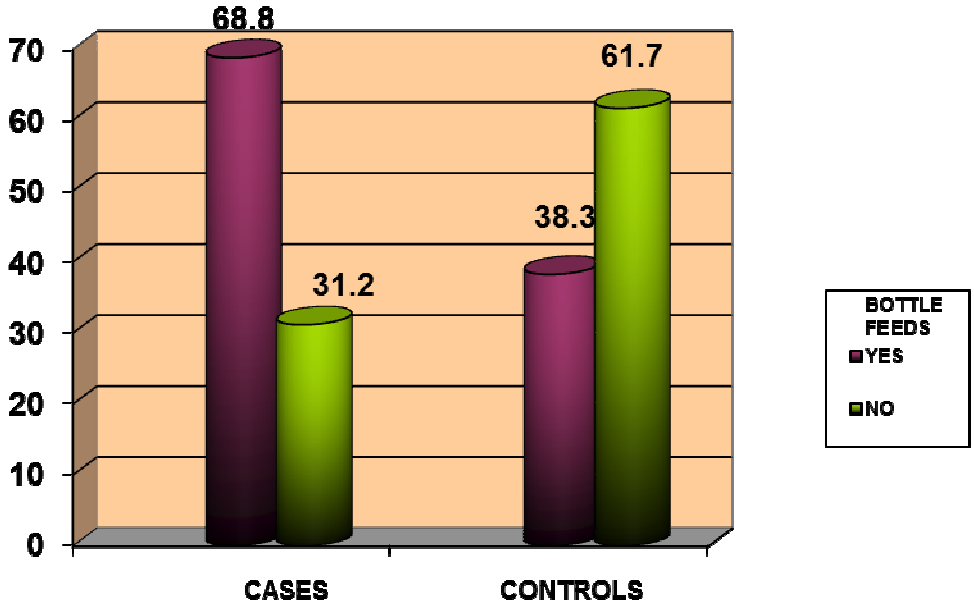
BOTTLE FEEDS

Among the cases 88 children were bottle fed (68.8%) while among the controls only 49 children were bottle fed (38.3%).

Table 12: Practice of bottle feeding

BOTTLE FEEDS	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p value
YES	88 (68.8%)	49(38.3%)	23.884	< 0.001
NO	40 (31.2%)	79(61.7%)		

Chart 9: Practice of bottle feeding



The difference was statistically significant.

SUPINE NURSING:

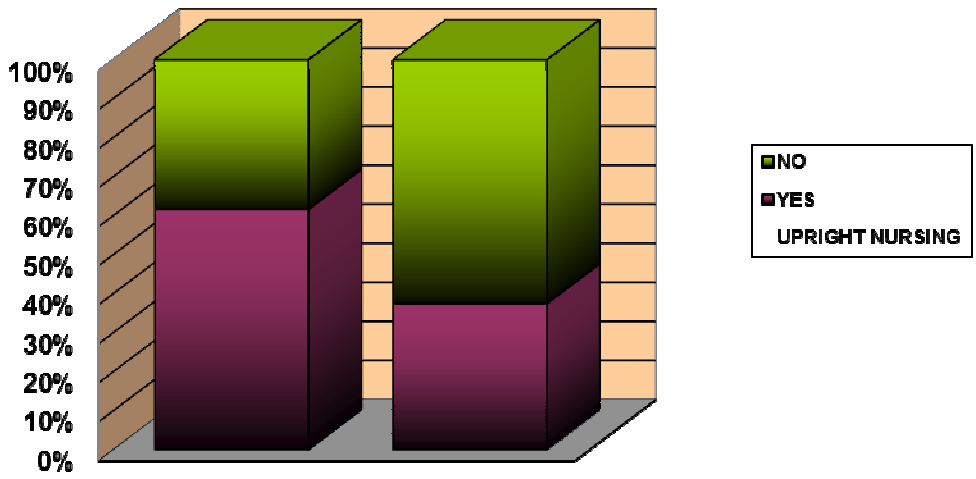
The mothers of 79 cases (61.7%) practiced upright nursing as against the mothers of 48 controls (37.5%).

The difference was statistically significant with p value of < 0.001

Table 13: Practice of upright nursing

UPRIGHT NURSING	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p value
YES	79 (61.7%)	48 (37.5%)	15.017	< 0.001
NO	49 (38.3%)	80 (62.5%)		

Chart 10: Practice of upright nursing



BAD PRACTICES

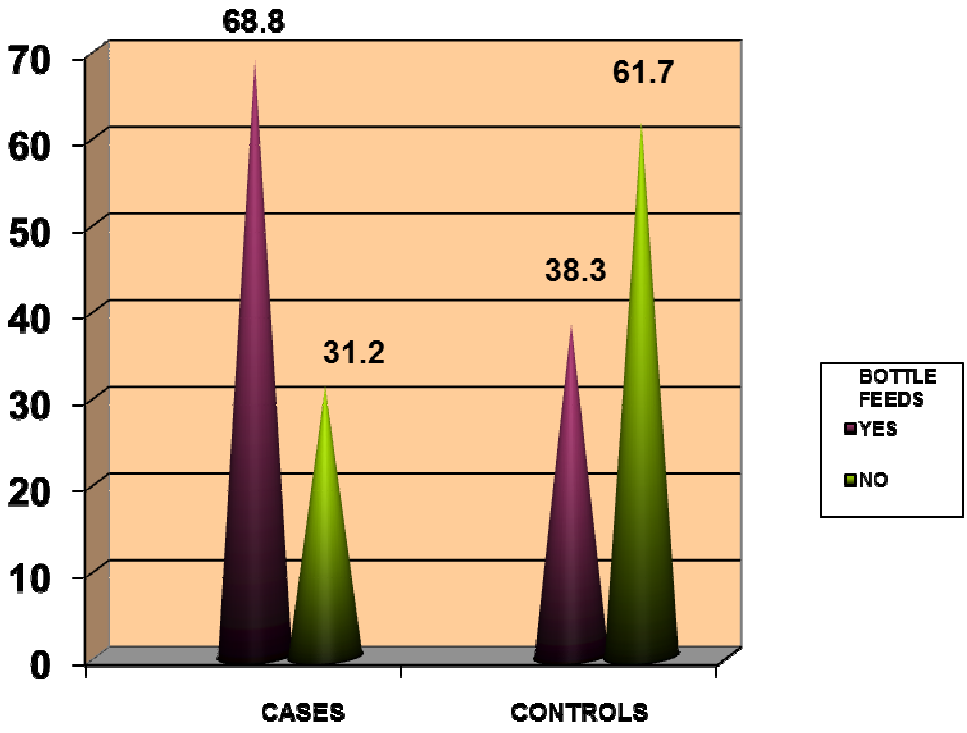
The mothers of 99 cases (77.3%) practiced nose blowing , oil instillation into the nose, use of pacifiers and other bad practices compared to the mothers of 55 controls (41.4%) .

The difference was statistically significant with p value of < 0.001

Table 14: Bad practices

BAD PRACTICES	CASES n = 126	CONTROLS n = 126	SIGNIFICANCE	
			χ^2	p value
YES	99 (77.3%)	55 (41.4%)	34.267	< 0.001
NO	29 (22.7%)	75 (58.6%)		

Chart 11: Bad practices



SYMPTOMATOLOGY

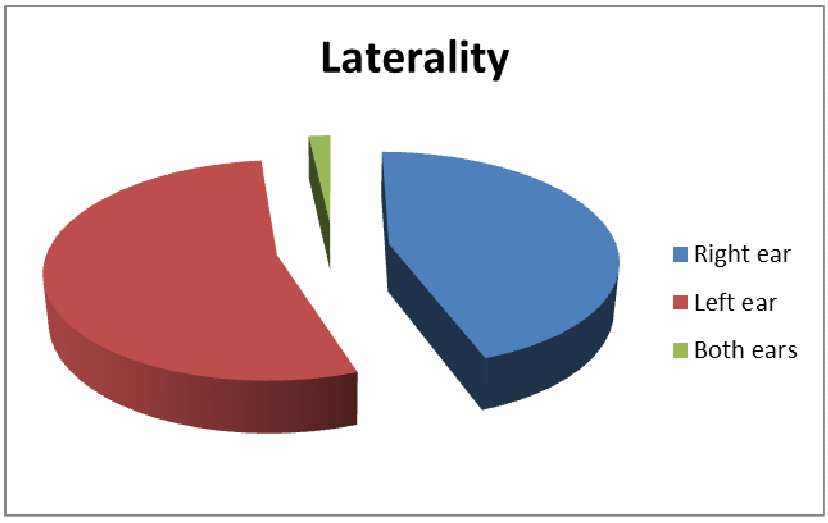
Laterality

Among the 128 cases, 29 cases (22.6%) had discharge in both ears, 45 cases (35.1%) had discharge in right ear and the remaining 54 cases (42.3%) had discharge in left ear**.**

Table 15: Laterality of ear involvement

S.NO.	INVOLVED EAR	NO.	%
1.	Right ear	45	35.1%
2.	Left ear	54	42.3%
3.	Both ears	29	22.6%

Chart 12: Laterality of ear involvement

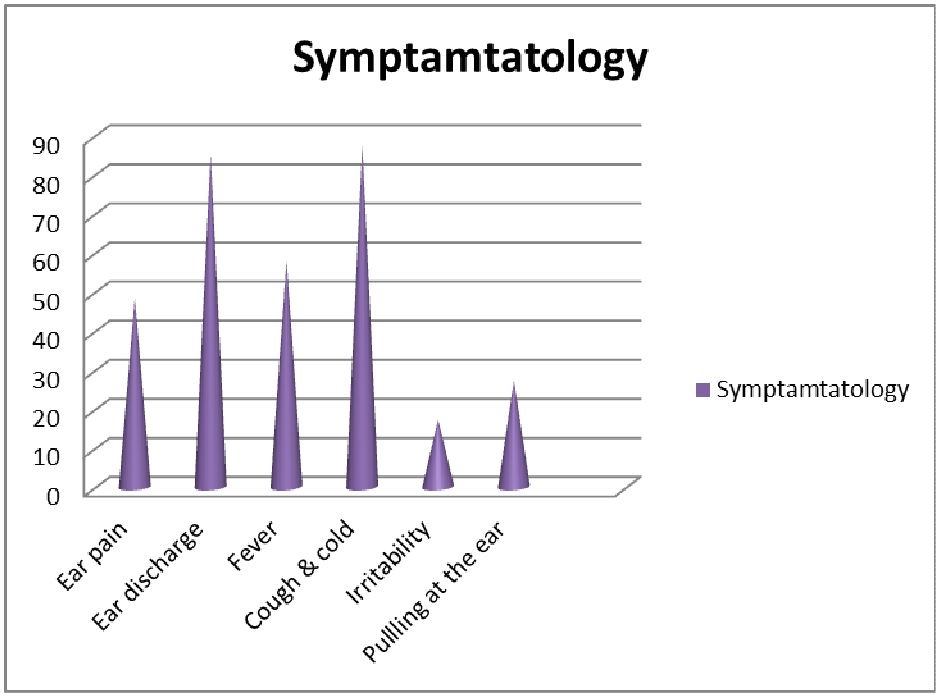


62 cases (48.4%) had complaints of ear pain and 109 cases (85.2%) had ear discharge. Fever was present in 74 cases (57.8%), cough and cold in 112 cases (87.5%), irritability in 22 cases (17.2%) and pulling at the ear in 35 cases (27.3%) .

Table 16: Profile of symptoms

S.NO.	SYMPTOMS	NO.	%
1.	Ear pain	62	48.4%
2.	Ear discharge	109	85.2%
3.	Fever	74	57.8%
4.	Cough &cold	112	87.5%
5.	Irritability	22	17.2%
6.	Pulling at the ear	35	27.3%

Chart 13: Profile of symptoms



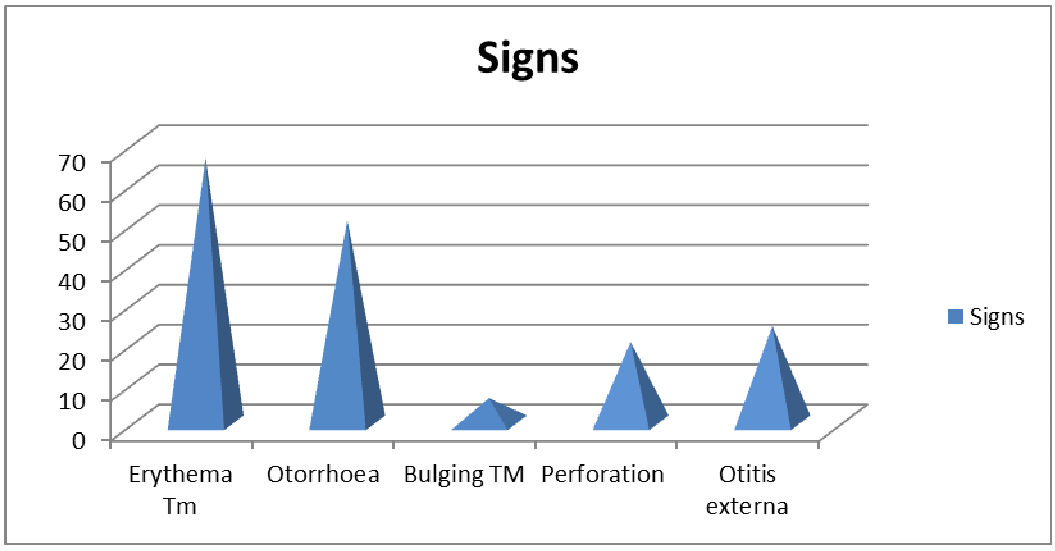
SIGNS

Erythema of the tympanic membrane was seen in 85 cases (66.4%), otorrhoea was seen in 65 children (50.8%), bulging of the tympanic membrane was seen in 8 cases (6.2%), perforation was seen in 26 cases (20.3%) and otitis extern in 31 cases (24.29%). All the children with perforation has tubotympanic type of central perforation.

Table 17 : Profile of signs

S.NO.	SIGNS	NO.	%
1.	Erythema –TM	85	66.4%
2.	Otorrhoea	65	50.8%
3.	Bulging Tm	8	6.2%
4.	Perf0ration	26	20.3%
5.	Otitis Externa	31	24.29%

Chart 14: Profile of signs



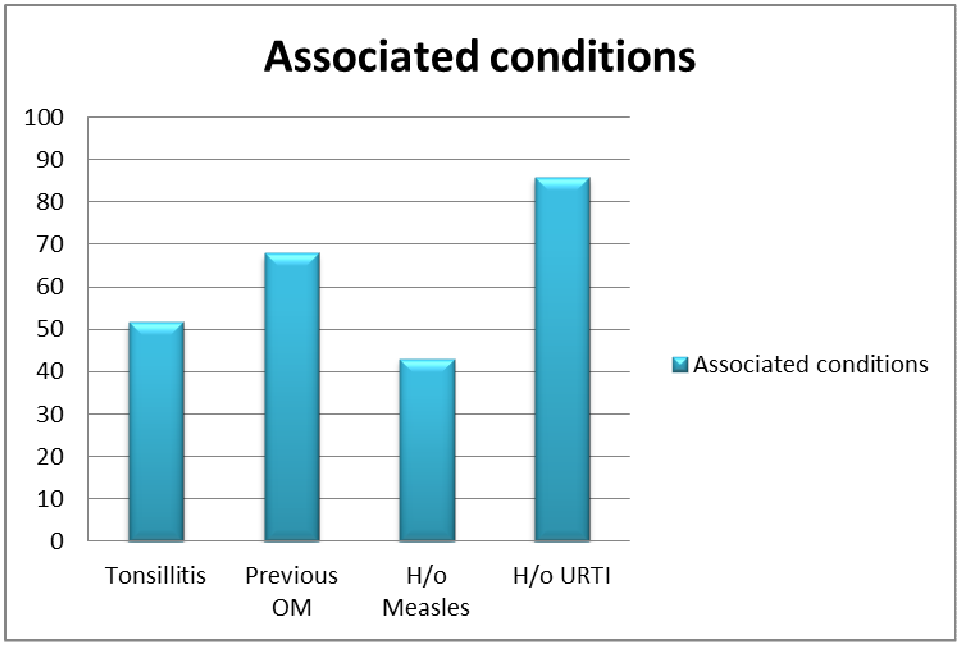
ASSOCIATED CONDITIONS

In 66 cases (51.6%) tonsillitis was present. Previous history of otitis media was seen in 87 cases (68%), history of measles was present in 55 cases (43%) and history of upper respiratory infection was seen in 110 cases (85.9%).

Table 18: Profile of associated conditions

ASSOCIATED CONDITIONS	NO.	%
Tonsillitis	66	51.6%
Previous H/O OM	87	68%
H/O Measles	55	43%
H/O URTI	110	85..9%

Chart 15: Profile of associated conditions



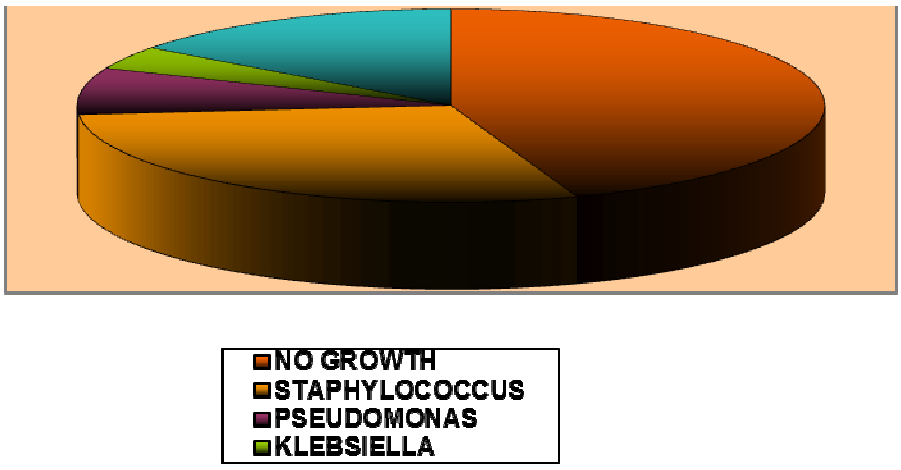
ORGANISMS

The aural swab from the children with acute otitis media showed no growth in majority of the cases – 57 children (47.5%). Staphylococcus aureus growth was seen in 37 cases (28.9%), Coagulase negative staphylococcus aureus in 19 cases (14.8%), Pseudomonas in 10 children (7.8%) and Klebsiella growth in 5 cases (3.9%).

Table 19: Organisms in aural swab

S.NO.	ORGANISMS	NO.	%
1.	No Growth	57	44.5%
2.	Staphylococcus	37	28.9%
3.	Pseudomonas	10	7.8%
4.	Klebsiella	5	3.9%
5.	CONS	19	14.8%

Chart 16: Organisms in aural swab

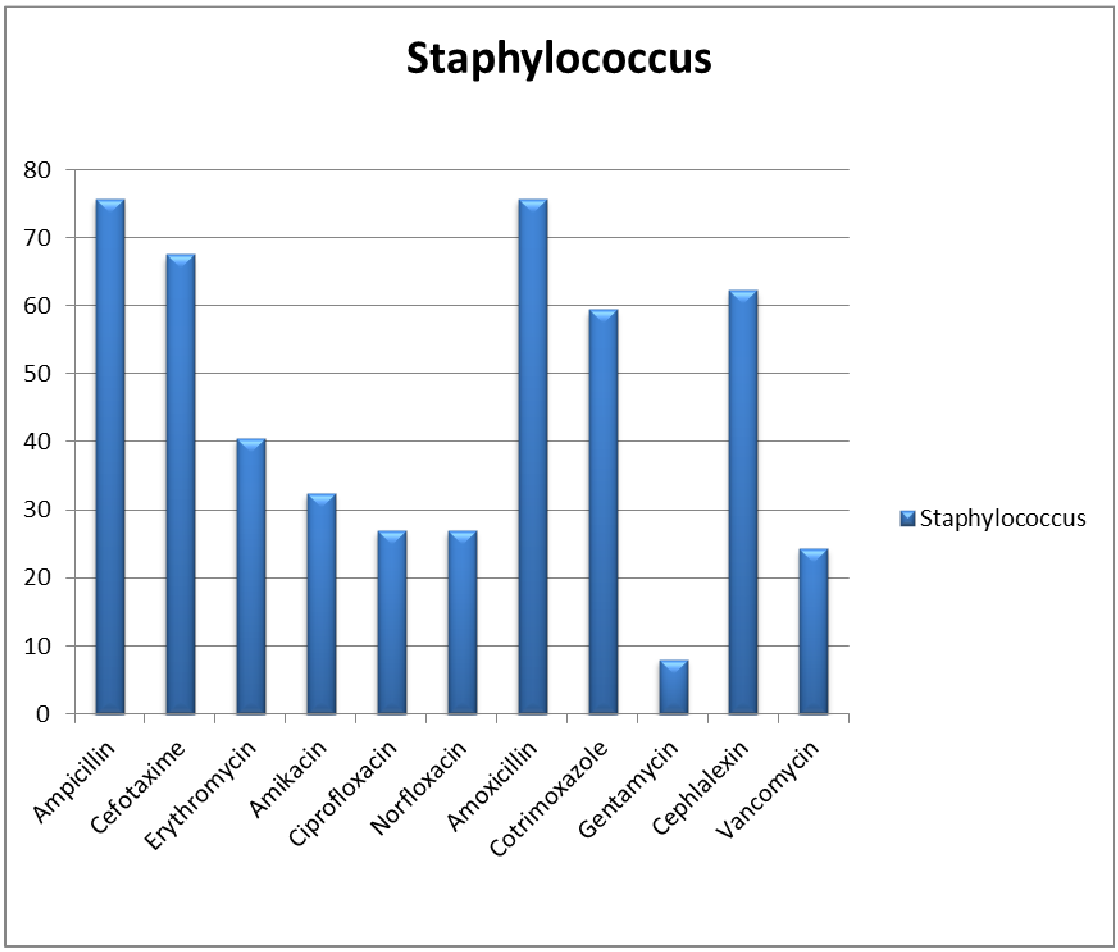


CULTURE AND SENSITIVITY PATTERNS

STAPHYLOCOCCUS AUREUS

Among the 37 isolates of Staphylococcus aureus, 75.7% were sensitive to Ampicillin and Amoxicillin, 67.5% to Cefotaxime, 40.5% to Erythromycin, 32.4% to Amikacin, 27% to Ciprofloxacin and Norfloxacin, 59.4% to Cotrimoxazole, 8% to Gentamycin, 62.2% to Cephalexin and 24.3% of the isolates were sensitive to Vancomycin.

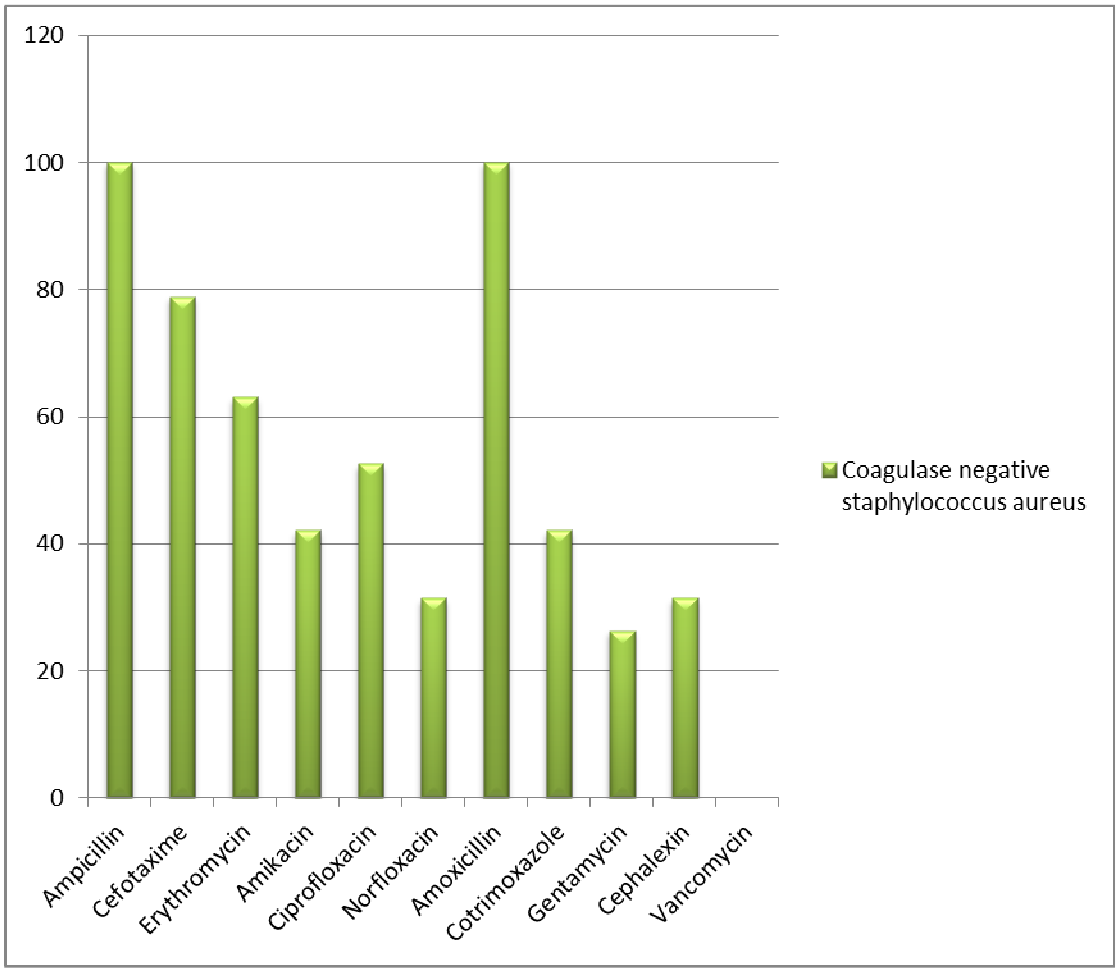
Chart 17: Sensitivity pattern of Staphylococcus aureus



COAGULASE NEGATIVE STAPHYLOCOCCUS AUREUS

Of the 19 isolates of Coagulase negative staphylococcus aureus, 100% were sensitive to Ampicillin and Amoxicillin, 78.9% to Cefotaxime, 63.1% to Erythromycin, 42.1% to Amikacin and Cotrimoxazole, 52.6% to Ciprofloxacin, 31.5% to Norfloxacin, 26.3% to Gentamycin, 31.5% to Cephalexin and 21% were sensitive to Vancomycin.

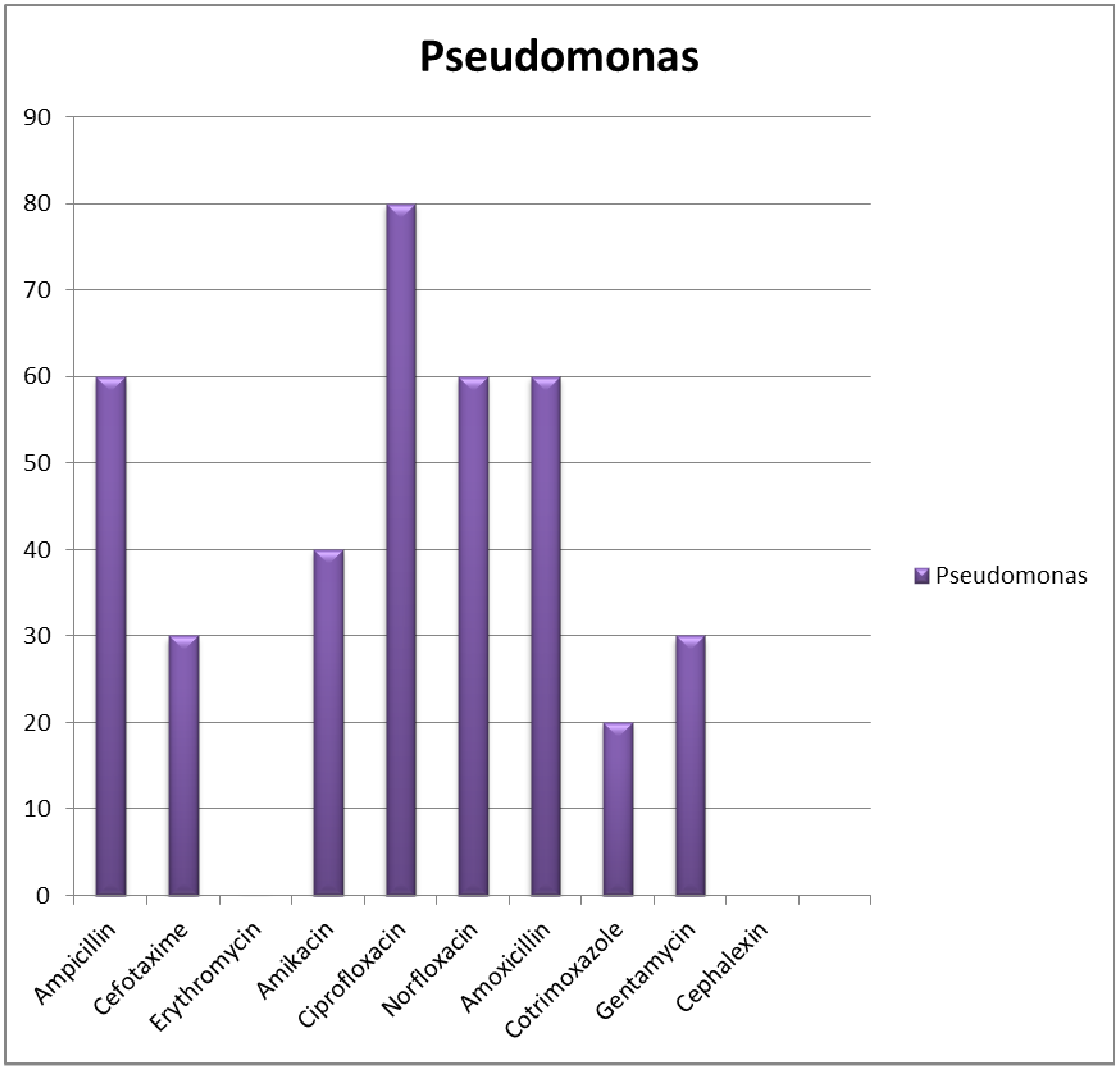
Chart 18: Sensitivity pattern of Coagulase negative staphylococcus aureus



PSEUDOMONAS

Of the 10 isolates of Pseudomonas, 60% were sensitive to Ampicillin, Norfloxacin and Amoxicillin, 30% to Cefotaxime and Gentamycin, 40% to Amikacin, 80% to Ciprofloxacin and 20% to Cotrimoxazole.

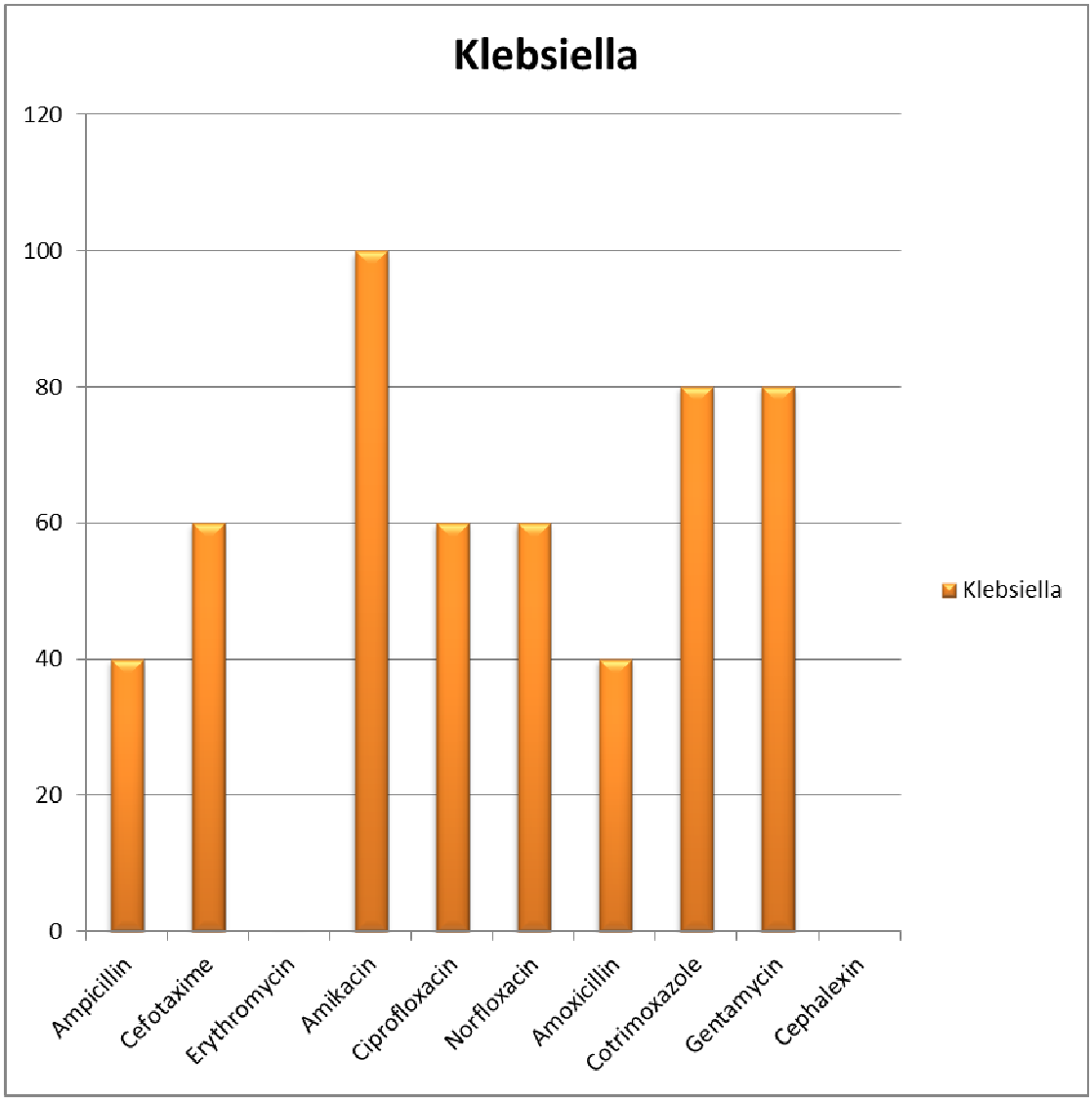
Chart 19: Sensitivity pattern of Pseudomonas



KLEBSIELLA

Among the 5 isolates of Klebsiella, 40% were sensitive to Ampicillin, Amoxicillin and Cephalexin, 60% to Cefotaxime, Ciprofloxacin and Norfloxacin, 100% to Amikacin and 80% were sensitive to Cotrimoxazole and Gentamycin.

Chart 20: Sensitivity pattern of Coagulase negative staphylococcus aureus



LOGISTIC REGRESSION ANALYSIS

By multivariate logistic regression analysis, low socioeconomic class, presence of siblings and supine nursing were found to be significant risk factors for acute otitis media.

	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
							Lower	Upper
AGE	.101	.303	.110	1	.740	1.106	.611	2.003
SEX	.354	.332	1.137	1	.286	1.424	.744	2.728
AREA	-.317	.389	.663	1	.415	.729	.340	1.561
SIBLINGS	.950	.378	6.311	1	**.012**	2.586	1.232	5.428
SMOKING	.796	.432	3.401	1	.065	2.218	.951	5.170
SEC	1.492	.261	32.728	1	**.000**	4.447	2.667	7.414
EBF	-.429	.324	1.750	1	.186	.651	.345	1.229
BOTTLE FEEDING	.710	.411	2.989	1	.084	2.034	.909	4.548
SUPINE NURSING	1.092	.327	11.155	1	**.001**	2.981	1.570	5.658
BAD PRACTICES	.567	.478	1.408	1	.235	1.764	.691	4.501
Constant	-6.100	1.282	22.624	1	.000	.002		

Table 20: Logistic regression analysis of risk factors for AOM

Table 21: Classification table

Observed		Predicted		
		Group		Percentage Correct
		Control	Cases	
Group	Control	99	29	77.3
	Cases	27	101	78.9
Overall Percentage				78.1

78.9% of the cases and 77.3% of the controls were correctly classified.

CHRONIC SUPPURATIVE OTITIS MEDIA

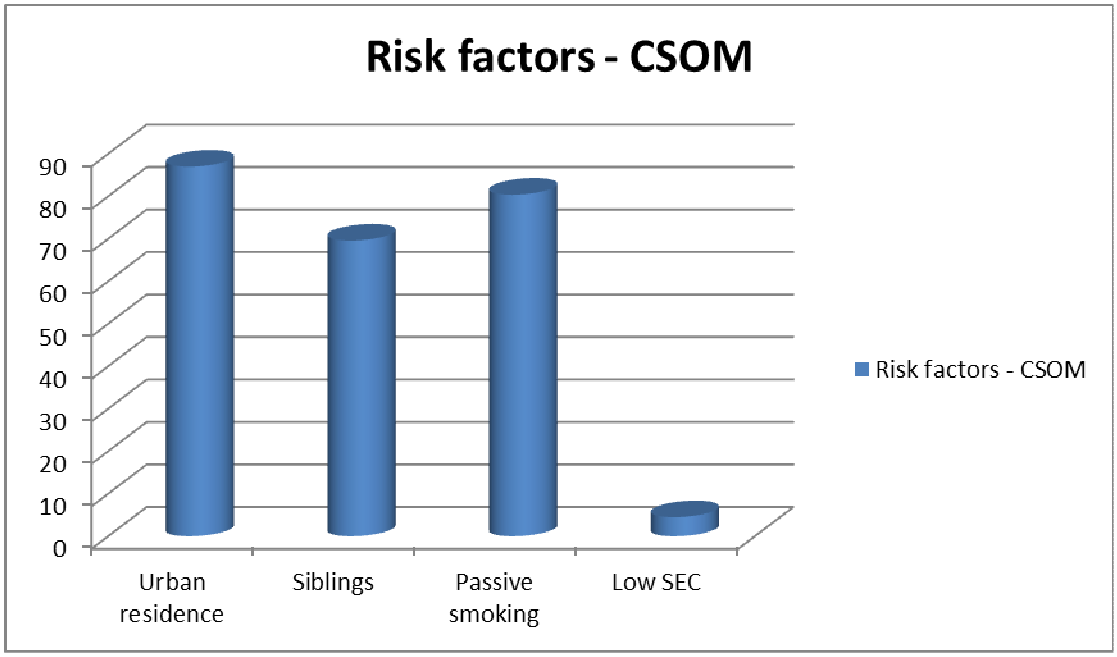
RISK FACTOR ANALYSIS

The following risk factors were analyzed for chronic suppurative otitis media – urban residence, presence of siblings, passive smoking and socioeconomic class.

Table 22: Risk factor analysis for CSOM

S.NO.	RISK FACTOR	NO.	%
1.	Urban residence	40	87%
2.	Siblings	32	69.6%
3.	Passive smoking	37	80.4%
4.	Low socioeconomic class	18	39.1%

Chart 21: Risk factor analysis for CSOM



URBAN / RURAL DIVIDE:

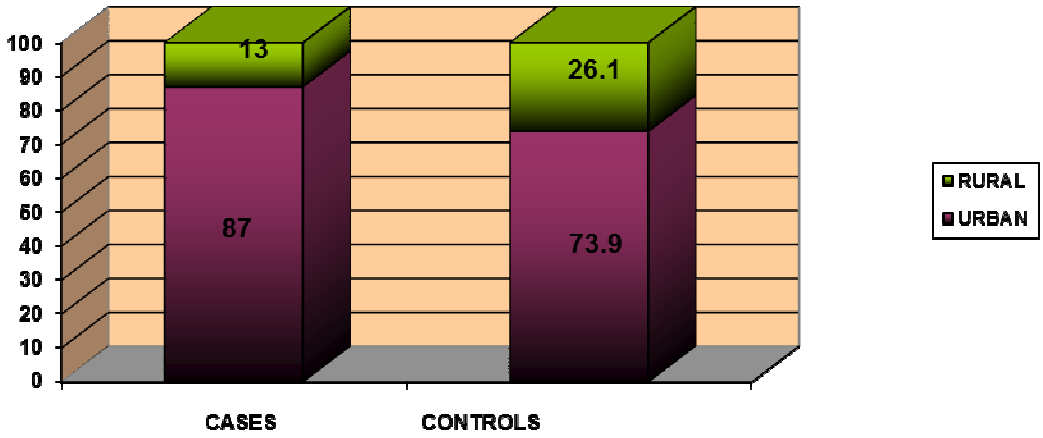
Among the cases, 40 hailed from urban area (87%) and 6 hailed from rural area (13%). Among the controls, 34 hailed from urban area (73.9%) and 12 hailed from rural area (26.1%).

The difference was not statistically significant.

Table 23: Urban rural distribution in CSOM

	CASES n = 46	CONTROLS n = 46	SIGNIFICANCE	
			χ^2	p value
URBAN	40 (87%)	34 (73.9%)	2.486	0.115
RURAL	6 (13%)	12 (26.1%)		

Chart 22: Urban rural distribution in CSOM



SIBLINGS:

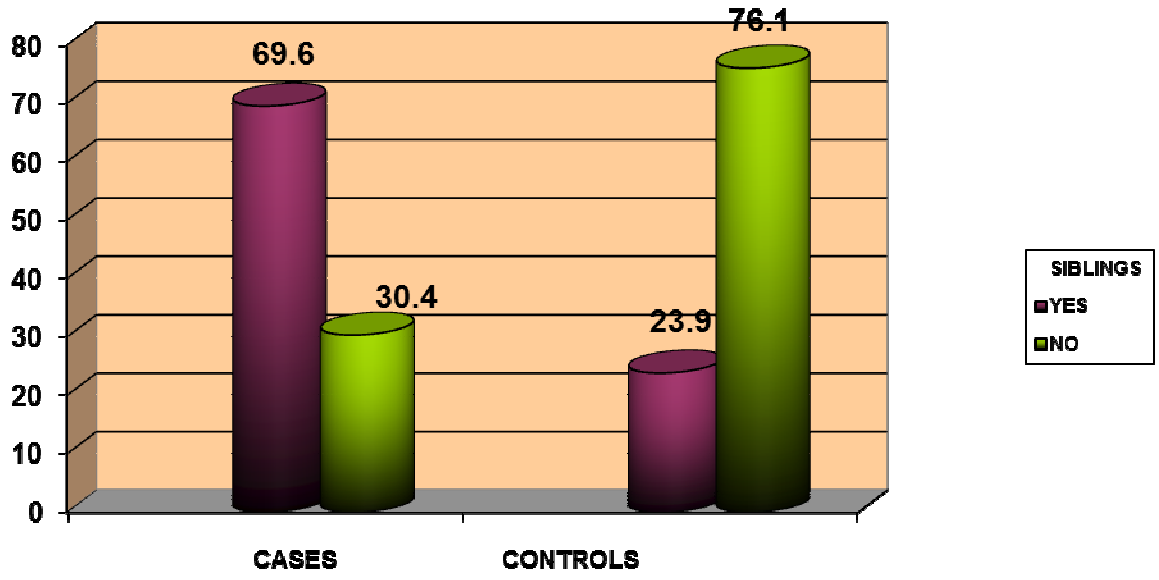
Among the cases, 32 had siblings (69.6%) and 14 had no siblings (30.4%). Among the controls, 11 had siblings (23.9%) and 35 had no siblings (76.1%).

The difference was statistically significant with a p value < 0.001

Table 24: Sibling

SIBLINGS	CASES n = 46	CONTROLS n = 46	SIGNIFICANCE	
			χ^2	p value
YES	32 (69.6%)	11 (23.9%)	19.256	< 0.001
NO	14 (30.4%)	35 (76.1%)		

Chart 23: Sibling



PASSIVE SMOKING:

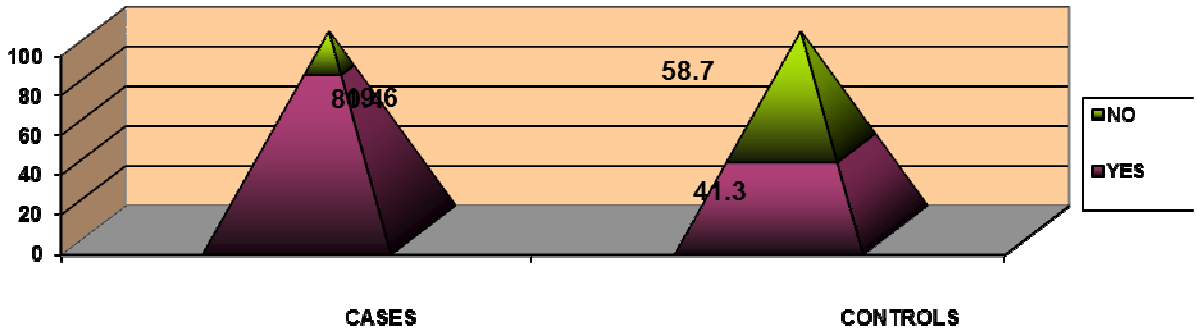
37 cases were exposed to paternal smoking (80.4%) as against 19 of the controls (41.3%). 9 cases were not exposed paternal smoking (19.6%) as against 27 of the controls (58.7%).

The difference was statistically significant with a p value < 0.001

Table 25: Exposure to smoking

SMOKING	CASES n = 46	CONTROLS n = 46	SIGNIFICANCE	
			χ^2	p value
YES	37 (80.4%)	19 (41.3%)	14.786	< 0.001
NO	9 (19.6%)	27 (58.7%)		

Chart 24: Exposure to smoking



SOCIOECONOMIC CLASS

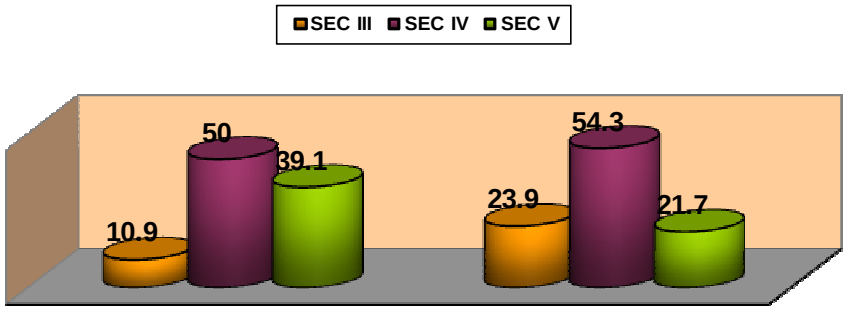
5 children (10.9%) belonged to class III socioeconomic class as per modified Kuppuswamy classification among the cases as against 11 (23.9%) among controls. 23 (50%) belonged to class IV SEC among the cases compared to 25(54.3%) in the control group. 18 (39.1%) of the cases belonged to class V SEC as against 10 (21.7%) among the controls.

The difference was statistically not significant

Table 26: Socioeconomic class distribution among CSOM

SEC	CASES n = 46	CONTROLS n = 46	SIGNIFICANCE	
			χ^2	p value
III	5(10.9%)	11 (23.9%)	4.619	0.099
IV	23 (50%)	25 (54.3%)		
V	18 (39.1%)	10 (21.7%)		

Chart 25: Socioeconomic class distribution



SYMPTAMATOLOGY

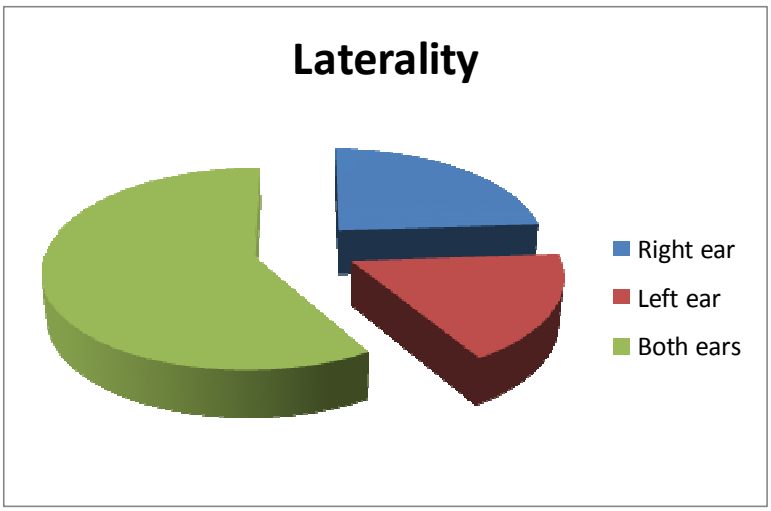
LATERALITY

There was right ear involvement in 11 cases (23.9%), left ear involvement in 8 cases (17.5%) and both ears were involved in 27 cases constituting about 58.6%.

Table 27: Laterality of involvement

S.NO.	EAR INVOLVED	NO.	%
1.	Right ear	11	23.9%
2.	Left ear	8	17.5%
3.	Both ears	27	58.6%

Chart 26: Laterality of involvement

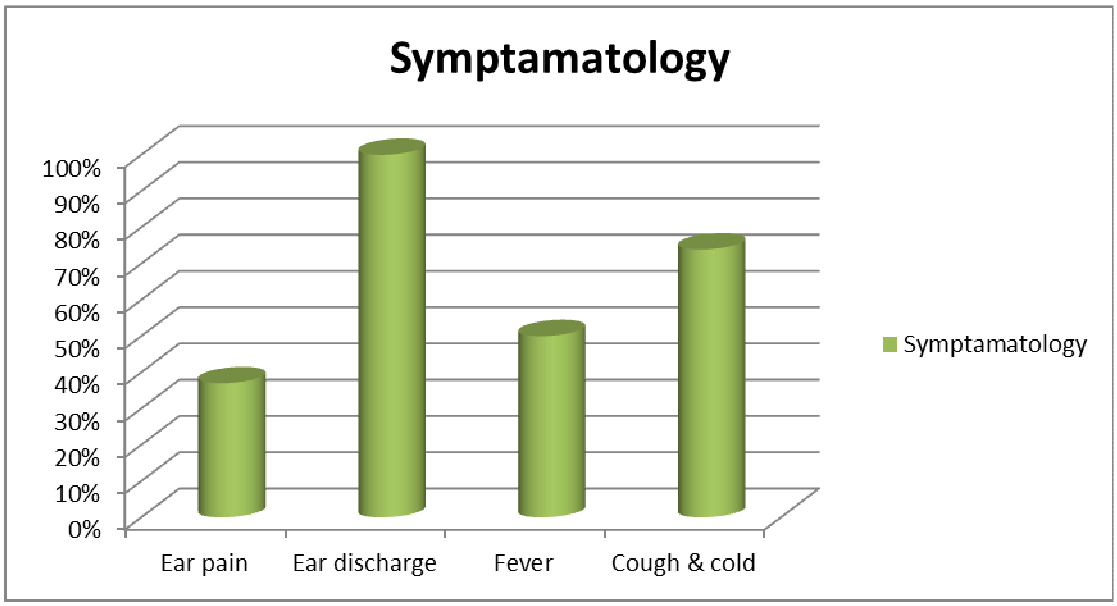


All the 46 cases (100 %) presented with otorrhoea. 17 patients (37 %) had ear pain, 23 (50%) had fever and 34 cases (73.9%) had symptoms of upper respiratory infection. 8 children (17.3 %) complained of hard of hearing. 2 patients (4.3 %) had retroauricular pain.

Table 28: Symptoms of Chronic otitis medi

S.NO.	SYMPTOMS	NO.	%
1.	Ear pain	17	37%
2.	Ear discharge	46	100%
3.	Fever	23	50%
4.	Cough & cold	34	73.9%
5.	Hard of hearing	8	17.3%
6.	Retroauricular pain	2	4.3%

Chart 27: Symptoms of Chronic otitis medi



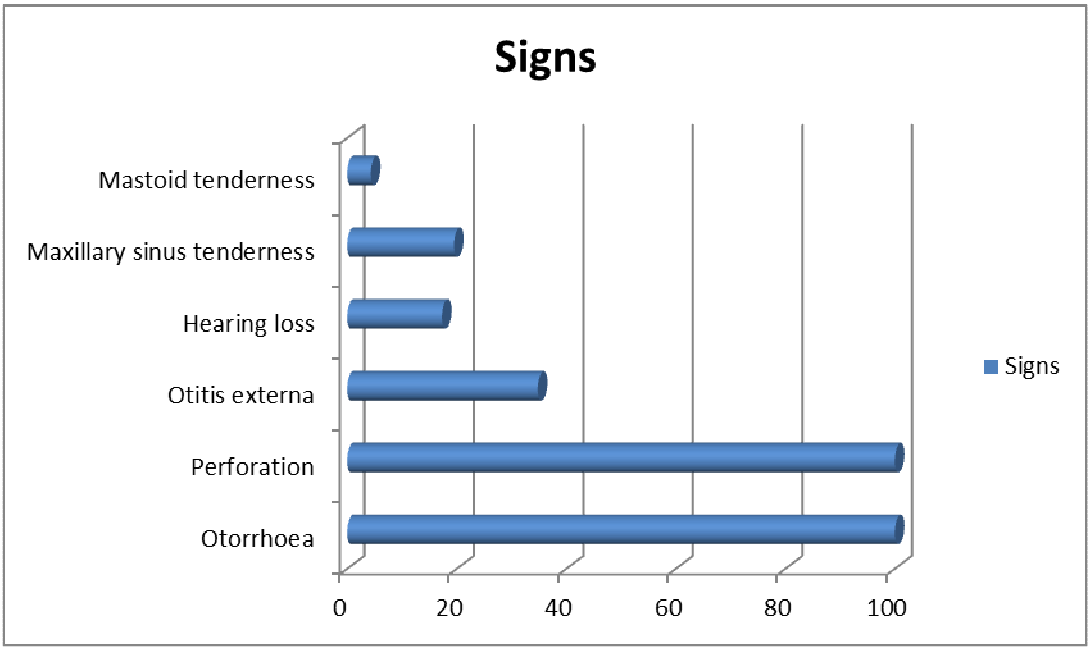
SIGNS

All the 46 cases (100 %) had perforation and otorrhoea. 16 cases (34.8%) had otitis externa, 5 cases (10.8%) conductive hearing loss, 3 (6.5%) had sensorineural hearing loss and 2 (4.3%) had mastoid tenderness.

Table 29: Distribution of signs among CSOM

S.NO.	SIGNS	NO.	%
1.	Otorrhoea	46	100%
2.	Perforation	46	100%
3.	Otitis externa	16	34.8%
4.	Hearing loss	8	17.3%
5.	Maxillary sinus tenderness	9	19.5%
6.	Mastoid tenderness	2	4.3%

Chart 28: Distribution of signs



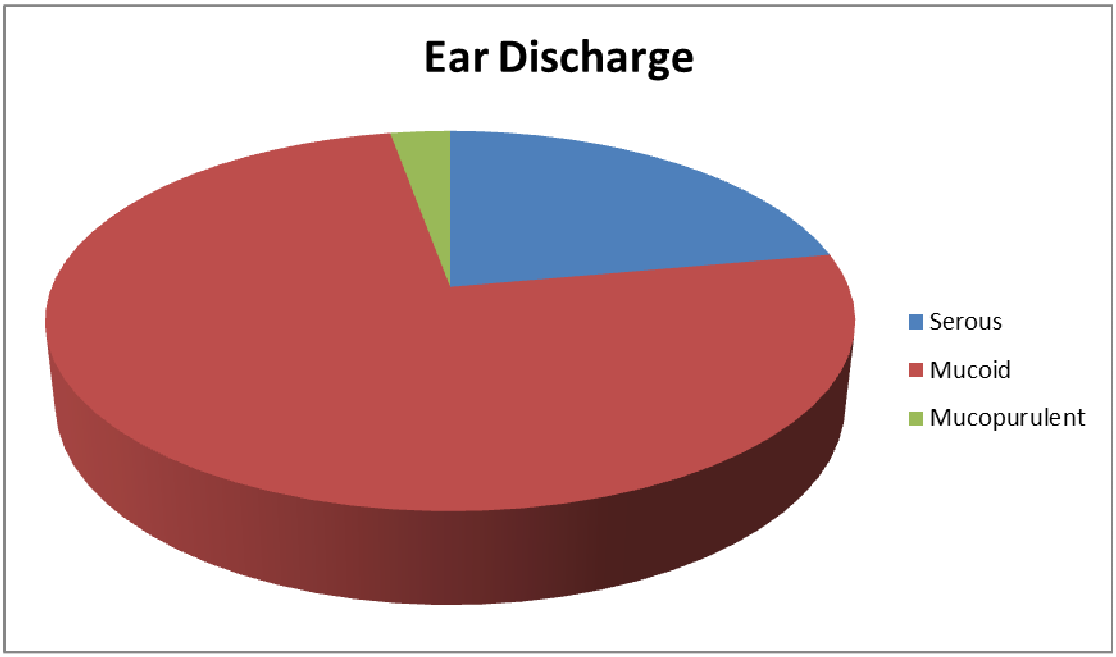
OTORRHOEA

Among the 35 children who had otorrhoea, 5 cases (10.9 %) had serous discharge, 17 children (37%) had mucoid discharge and 24 cases (52.1%) had mucopurulent discharge.

Table 30 : Types of discharge

S.NO.	DISCHARGE	NO.	%
1.	Serous	5	10.9%
2.	Mucoid	17	37%
3.	Mucopurulent	24	52.1%

Chart 29 : Types of discharge



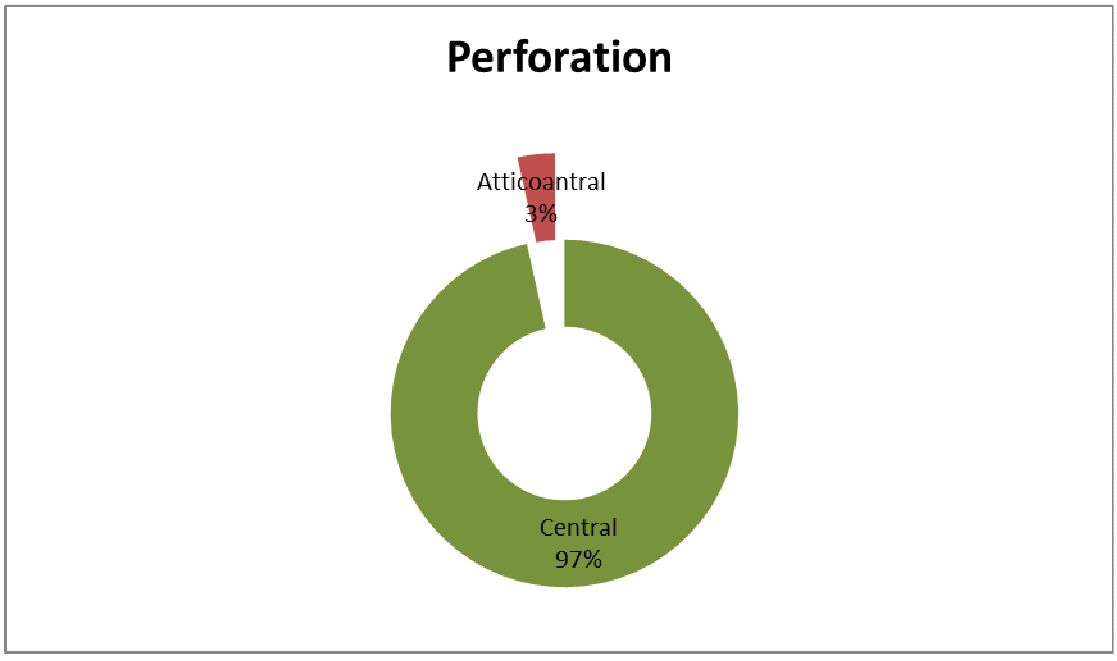
PERFORATION

41 cases with chronic suppurative otitis media had central perforation which constituted to 89% and the remaining 5 cases had atticoantral perforation constituting about 11%.

Table 31 : Types of perforation

S.NO.	PERFORATION	NO.	%
1.	Central	41	89%
2.	Atticoantral	5	11%

Chart 30 : Types of perforation



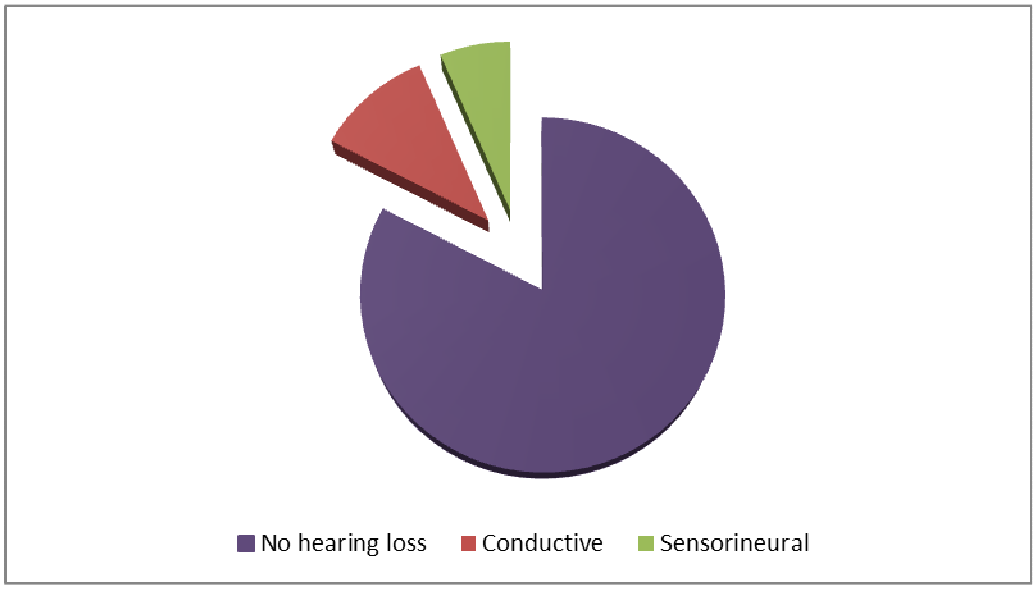
HEARING LOSS

Among the children with chronic suppurative otitis media, 8 children (17.3 %) had hearing loss. Of them 5 children (10.8%) had conductive hearing loss with negative Rinne test and lateralization in Weber's test to the diseased ear. 3 children (6.5%) had sensorineural hearing loss with positive Rinne test and lateralization of Weber test to the normal ear.

Table 32 : Distribution of hearing loss

S.NO.	RINNE TEST	WEBER TEST	INFERENCE	NO. (%)
1.	Negative	Lateralised to the diseased ear	Conductive hearing loss	5 (10.8%)
2.	Positive	Lateralised to the normal ear	Sensorineural hearing loss	3 (6.5%)

Chart 31 : Distribution of hearing loss



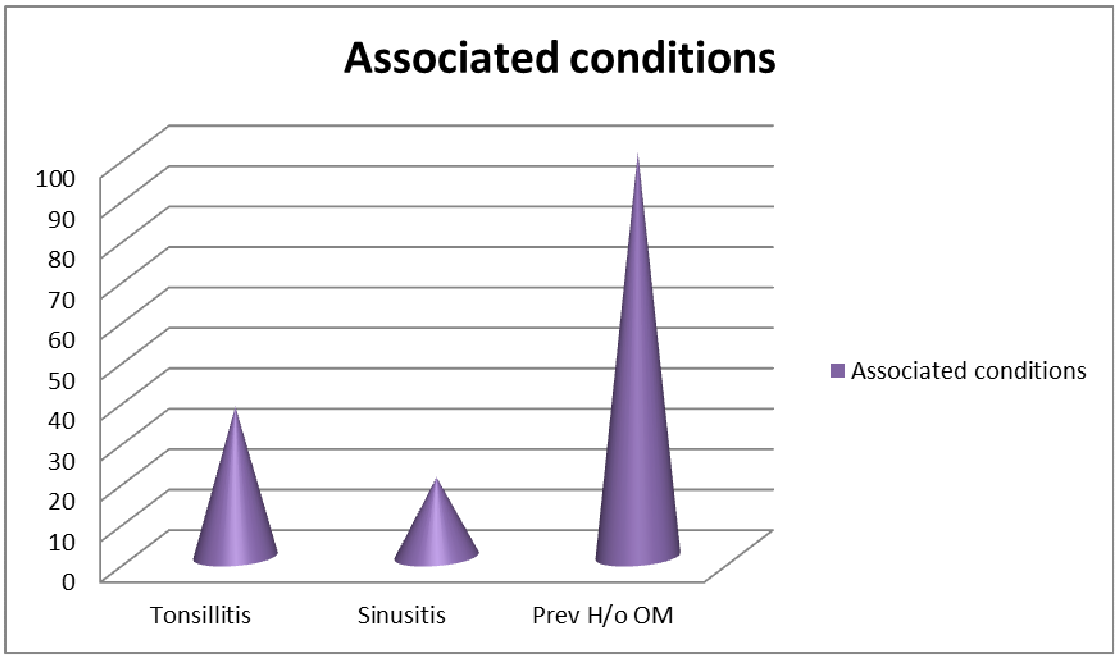
ASSOCIATED CONDITIONS

All the 46 cases were associated with previous episodes of otitis media. About 17 patients (37%) had tonsillitis.

Table 33 : Conditions associated with CSOM

S.NO.	ASSOCIATED CONDITIONS	NO.	%
1.	Tonsillitis	17	37%
2.	Sinusitis	9	19.5%
3.	Previous h/o OM	46	100%

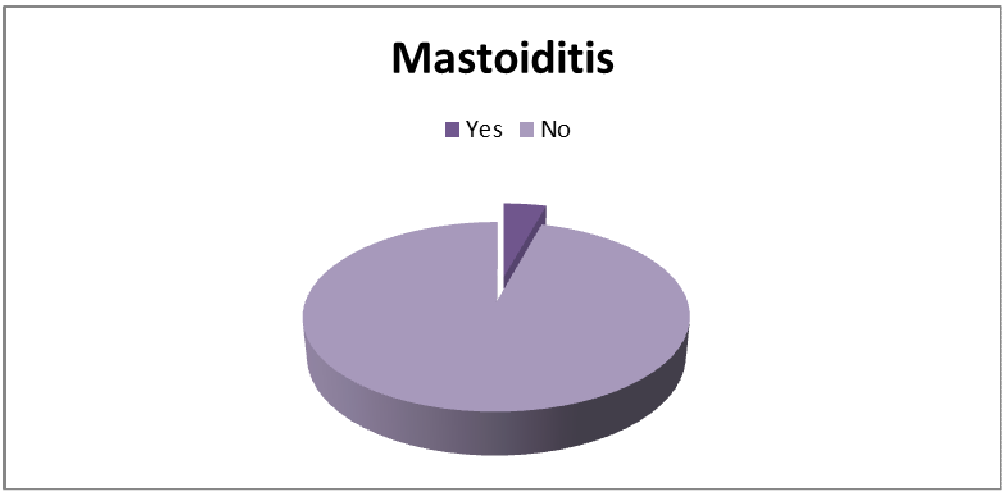
Chart 32 : Conditions associated with CSOM



COMPLICATIONS

Of the 46 cases of chronic suppurative otitis media, 2 cases (4.3%) developed mastoiditis and modified radical mastoidectomy was done.

Chart 33 : Occurrence of mastoiditis



CULTURE AND SENSITIVITY

ORGANISMS

Culture and sensitivity of the aural discharge was done for growth of aerobes, anaerobes and fungus.

Aerobes : A majority of the cases - about 23 cases (50%) showed Pseudomonas growth followed by Staphylococcus aureus growth in 13 cases (28.2%), Klebsiella and Proteus growth each in 5 cases (10.9%).

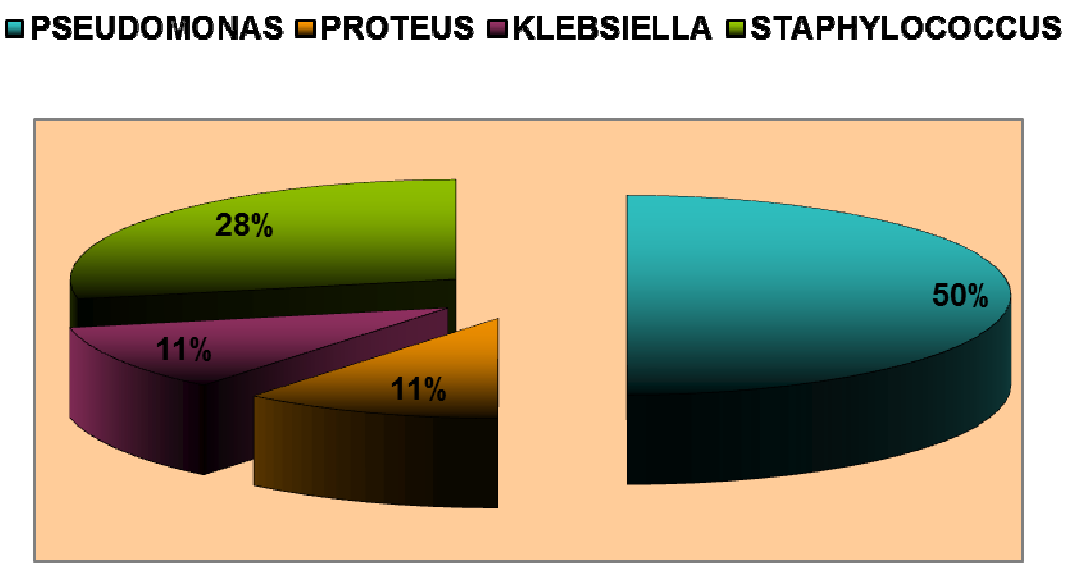
Table 34 : Organisms causing CSOM

S.NO.	ORGANISMS	NO.	%
1.	Pseudomonas	23	50%
2.	Proteus	5	10.9%
3.	Klebsiella	5	10.9%
4.	Staphylococcus	13	28.2%

Anaerobes :Anaerobic culture using Robertson cooked meat medium did not yield any growth.

Fungal cultures :There were no fungal isolates in the ear discharge from the cases of chronic suppurative otitis media.

Chart 34: Organisms causing CSOM

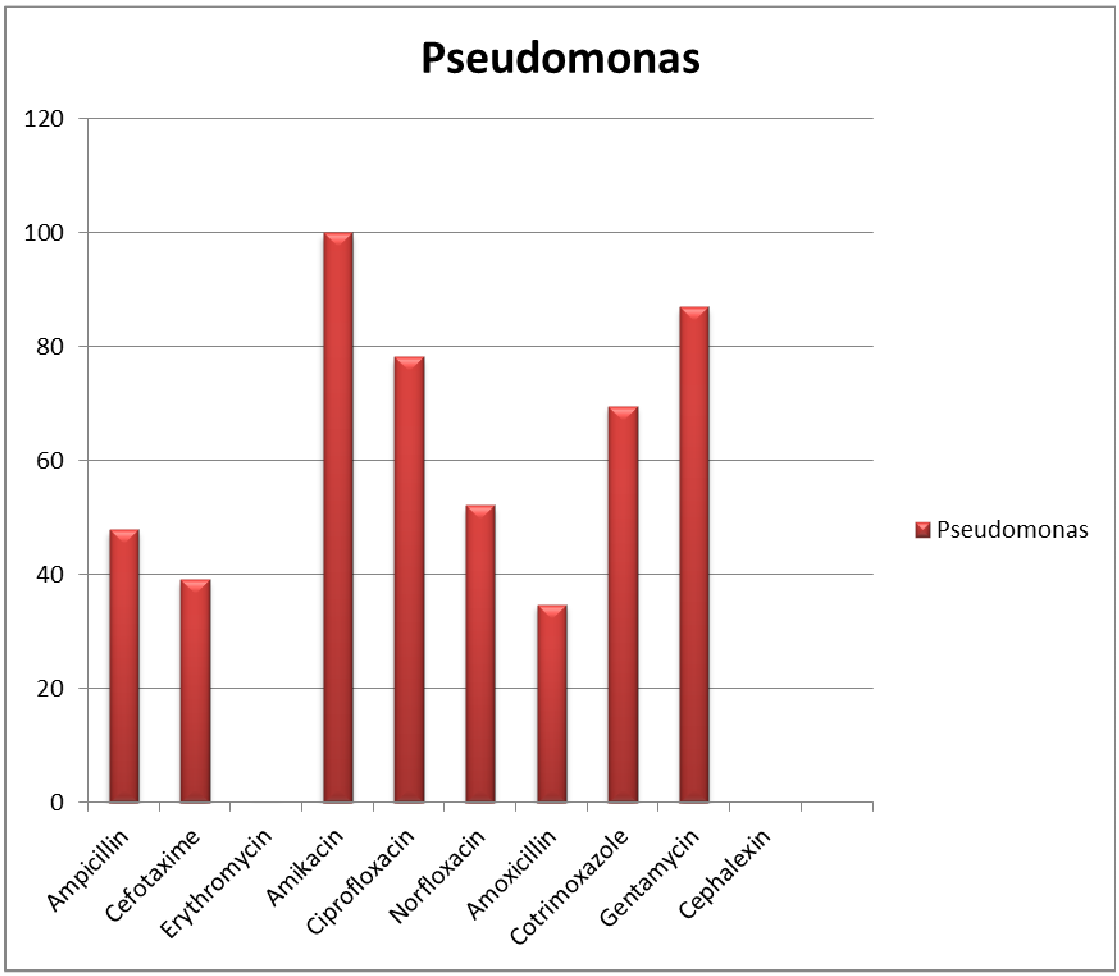


SENSITIVITY

PSEUDOMONAS

Among the 23 isolates of Pseudomonas, 47.8% were sensitive to Ampicillin, 39.1% to Cefotaxime, 100% to Amikacin, 78.2% to Ciprofloxacin, 52.1% to Norfloxacin, 34.7% to Amoxicillin, 69.5% to Cotrimoxazole, 86.9% to Gentamycin and 43.5% were sensitive to Cephalexin.

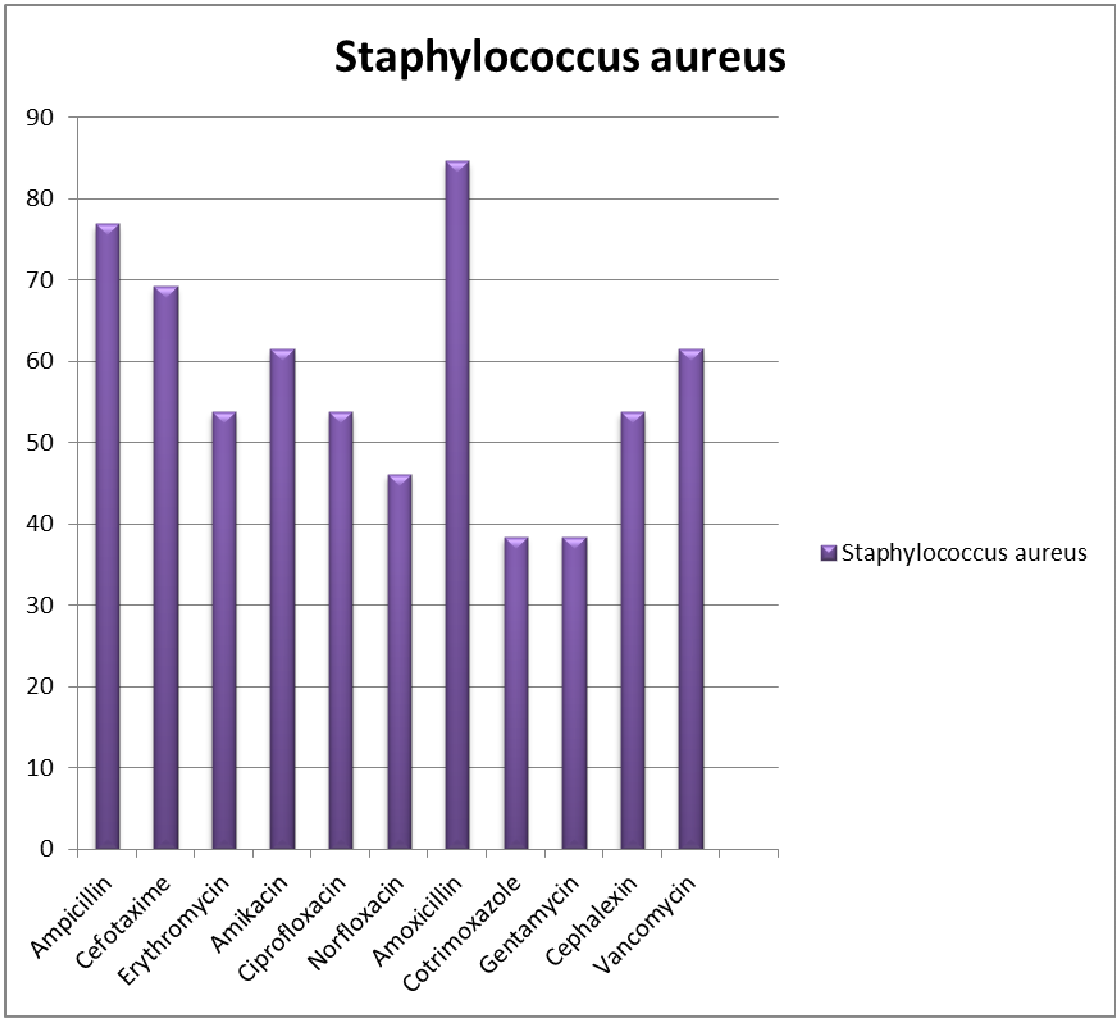
Chart 35 : Sensitivity pattern of Pseudomonas



STAPHYLOCOCCUS AUREUS

Among the 13 isolates of Staphylococcus aureus, 76.9% were sensitive to Ampicillin, 69.2% to Cefotaxime, 61.5% to Amikacin and Vancomycin, 53.8% to Erythromycin, 53.8% to Ciprofloxacin and Cephalexin, 46.1% to Norfloxacin, 84.6% to Amoxicillin and 38.4% were sensitive to Cotrimoxazole and Gentamycin.

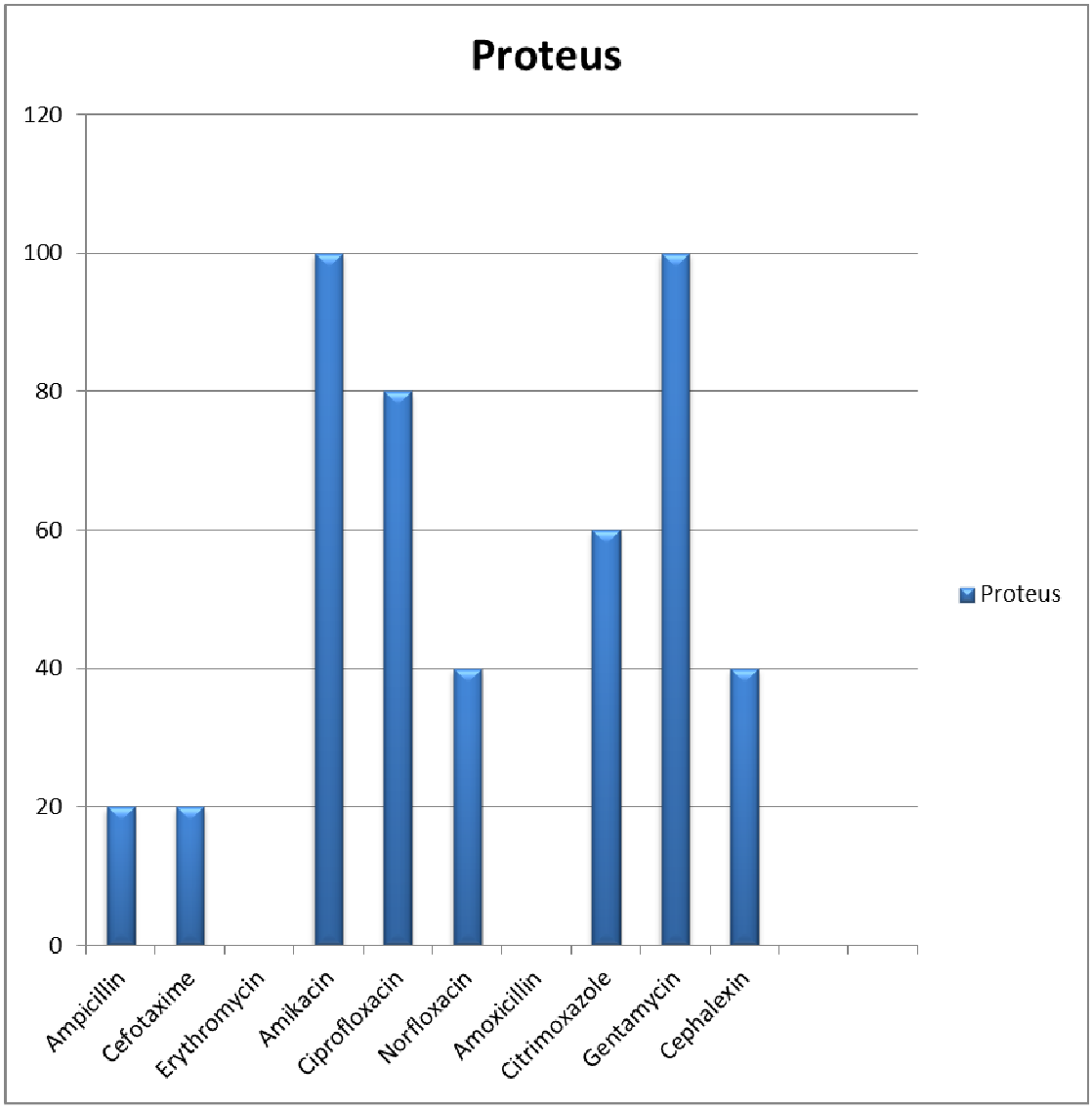
Chart 36 : Sensitivity pattern of Staphylococcus aureus



PROTEUS

Among the 5 isolates of Proteus species, 20% were sensitive to Cefotaxime, 100% were sensitive to Amikacin and Gentamycin, 80% to Ciprofloxacin, 40% to Norfloxacin and Cephalexin and 60% were sensitive to Cotrimoxazole.

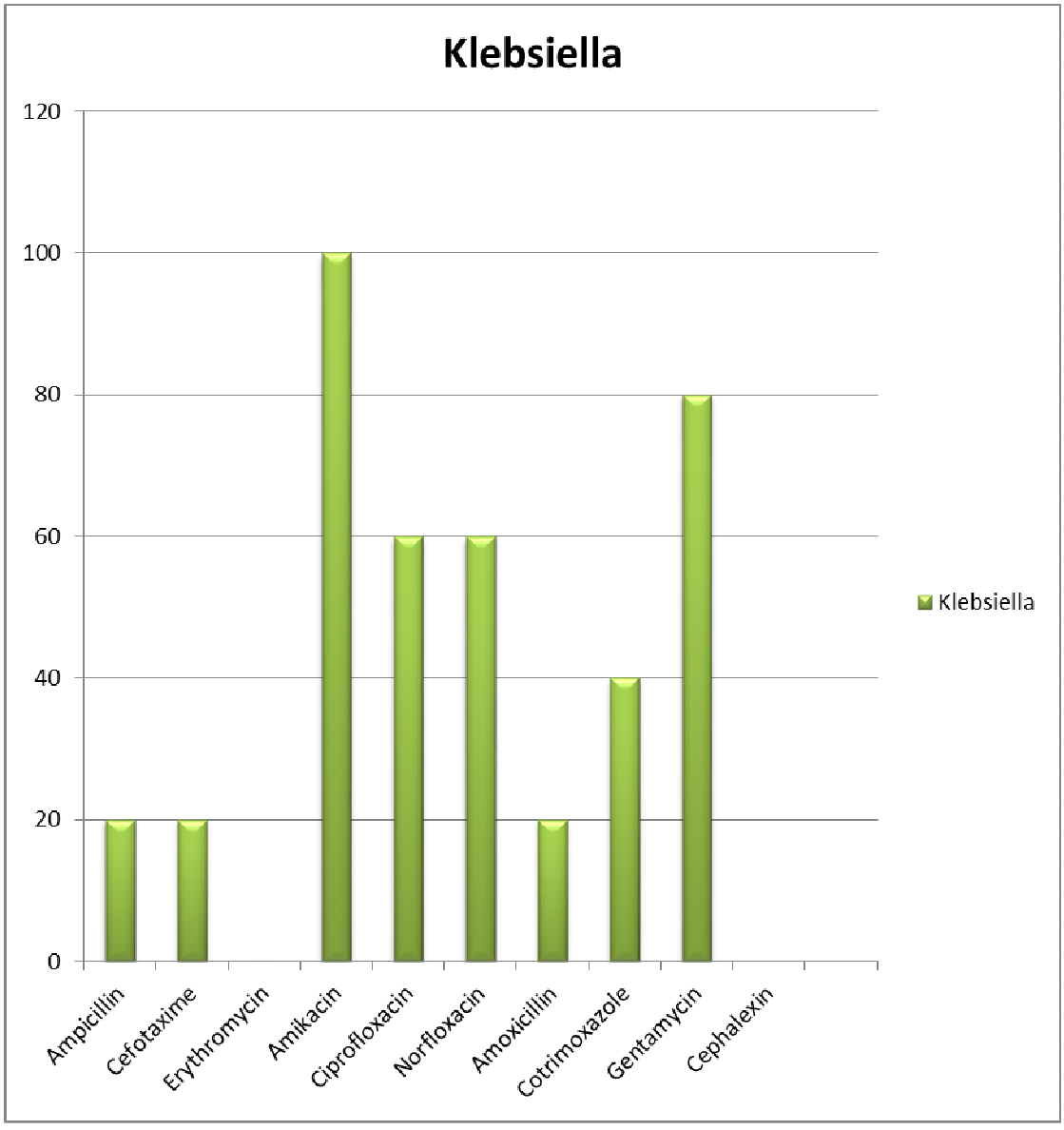
Chart 37 : Sensitivity pattern of Proteus



KLEBSIELLA

Among the 5 isolates of Klebsiella, 20% were sensitive to Ampicillin, Cefotaxime, Cephalexin and Amoxicillin, 100% to Amikacin, 60% to Ciprofloxacin and Norfloxacin, 40% to Cotrimoxazole and 80% to Gentamycin.

Chart 38 : Sensitivity pattern of Klebsiella



LOGISTIC REGRESSION ANALYSIS

By logistic regression analysis, locality of residence, presence of siblings, passive smoking and socioeconomic class were found to be significantly associated with risk for chronic suppurative otitis media.

	B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I.for EXP(B)	
							Lower	Upper
AGE	-.336	.765	.193	1	.660	.715	.160	3.198
SEX	-.247	.675	.134	1	.714	.781	.208	2.930
AREA	-1.392	.700	3.948	1	**.047**	.249	.063	.981
SIBLINGS	2.076	.576	13.008	1	**.000**	7.975	2.581	24.646
SMOKING	2.565	.662	15.028	1	**.000**	12.997	3.554	47.536
SEC	.955	.449	4.523	1	**.033**	2.599	1.078	6.268
Constant	-1.997	2.156	.858	1	.354	.136		

Table 35 : Logistic regression analysis of risk factors for CSOM

Table 36 : Classification Table

Observed		Predicted		
		Group		Percentage Correct
		Control	Cases	
Group	Control	32	14	69.6
	Cases	9	37	80.4
Overall Percentage				75.0

69.6% of the controls and 80.4% of the cases were correctly classified.

DISCUSSION & ANALYSIS

ACUTE OTITIS MEDIA

The occurrence of acute otitis media was highest between 1 to 5 years of age constituting 68.8% of the cases. There was a male preponderance constituting 64.8%. This is comparable with the Advisory committee on immunization recommendations. But since this study is a hospital based study, age and sex distribution has a selection bias.

There was a significant association between the presence of siblings and otitis media in our study constituting to 75%. *Joost et al study*[49] with 45.9% of the cases having siblings and *Uhari et al study*[50] in Finland showed also showed significant association.

In our study, 71.9% of the children with otitis media were exposed to passive smoking which was significant. This is comparable to *Uhari et al study*[50] in Finland. But *Sophia A et al study*[51] in CMC Vellore in 2010 did not find significant association.

In our study there was no significant protection found between exclusive breast feeding for 6 months and the occurrence of otitis media. But literature says there is a significant association. The lack of significant association could be attributed to the incorrect feeding positions which could lead to otitis media. *Sophia A et al study*[51] in CMC Vellore and the Nigeria study[52] also did not find a significant

association. But *Uhari et al study*[50] in Finland found a significant negative association between breast feeding and otitis media.

In our study bad practices like pacifier usage, nose blowing and oil instillation constituted about 75% and was statistically significant. Similarly, *Jose Faibes Lubianca Neto et al study*[53] attributed 25% of otitis media to pacifier usage and *Uhari et al*[50] study attributed 24% and found to have a statistical significance.

In our study, children symptoms like ear pain and fever were seen in less children compared to the *Nwawolo CC et al study*[52] in Nigeria. Clinical signs were comparable to *Nwawolo CC et al study*[52] in Nigeria.

Table 37 : Comparison of signs and symptoms of AOM in our study and Nigeria study

S.NO.	FEATURE	OUR STUDY	NIGERIA STUDY
1.	Ear pain	48.4%	92.6%
2.	Fever	57.8%	88.9%
3.	Redness of TM	66.4%	89.9%
4.	Perforation	20.3%	18.5%

In our study, majority of the cases – about 44.5% showed no growth. Staphylococcus aureus showed highest incidence constituting 28.9% compared t0 the 50% incidence in the study by *Nwawolo et al*[52] among Nigerian children.

Siblings, passive smoking, low socioeconomic class, bottle feeds, upright nursing and bad practices were risk factors for acute otitis media which had a significant association. Urban residence and exclusive breast feeding did not show a statistical significance as a risk factor for acute otitis media. On multivariate logistic regression analysis, only siblings, low socioeconomic class and supine nursing were associated with acute otitis media.

CHRONIC SUPPURATIVE OTITIS MEDIA

The clinical features both in terms of symptoms and signs were comparable to *KR Iseh et al* study[54] in Nigeria except that in our study we had 11% with atticoantral perforation while in the other study all were central perforations.

Table 37 : Comparison of signs and symptoms of CSOM in our study and Nigeria study

S.NO.	FEATURE	OUR STUDY	NIGERIA STUDY
1.	Ear pain	37%	26.47%
2.	Ear discharge	100%	100%
3.	Hearing loss	17.3%	22.46%
4.	Perforation	100%	100%
5.	Central perforation	89%	100%
6.	Atticoantral perforation	11%	0

In our study, the predominant isolate was Pseudomonas followed by Staphylococcus aureus. This is comparable to the study by *Harvinder Kumar et al*[55] in Haryana. In the Nepal study by *Shrestha et al*[56], the predominant organism was Staphylococcus aureus followed by Pseudomonas. Unlike the other two studies there was no E.coli isolates and unlike the Nepal study there was no fungal isolates.

Table 38 : Comparison of organisms in Nepal, Haryana and our study

S.NO.	ORGANISM	OUR STUDY	NEPAL STUDY	HARYANA STUDY
1.	Pseudomonas	50%	26.9%	45.5%
2.	Staphylococcus aureus	28.2%	32.2%	37.7%
3.	Klebsiella	10.9%	10.4%	9.1%
4.	Proteus	10.9%	6.9%	1.3%
5.	E.coli	0	6.9%	1.3%
6.	Fungus	0	9.5%	0

Passive smoking ($p < 0.001$) and presence of siblings ($p < 0.001$) were risk factors which were found to be significantly associated with chronic suppurative otitis media. Urban residence ($p = 0.115$) and low socioeconomic class ($p = 0.099$) did not show a significant association with chronic suppurative otitis media. Multivariate logistic regression analysis showed that passive smoking, siblings, urban residence and low socioeconomic class were significant risk factors for chronic otitis media.

Of the isolates of Pseudomonas in our study, 100% were sensitive to Amikacin and 78.2% to Ciprofloxacin compared to 88% and 92% in *Madana et al*[57] study in Pondicherry.

Table 39 : Comparison of sensitivity pattern of Pseudomonas

ANTIOBIOTIC	OUR STUDY	PONDICHERRY STUDY
Amikacin	100%	88%
Ciprofloxacin	78.2%	92%

Among the isolates of Staphylococcus aureus, 60 – 70% of the isolates were sensitive to Ampicillin, Cefotaxime and Amikacin in our study compared to 87 – 97% sensitivity in *Madana et al study*[57] in Pondicherry. 53.8% isolates were sensitive to Ciprofloxacin and Erythromycin compared to 84% in Pondicherry study.

Table 40 : Comparison of sensitivity pattern of Staphylococcus

ANTIOBIOTIC	OUR STUDY	PONDICHERRY STUDY
Ampicillin, Cefotaxime, Amikacin	60 – 70%	87 – 97%
Ciprofloxacin, Erythromycin	53.8%	84%

LIMITATIONS

1) Since our study is not a community based study, incidence and prevalence cannot be calculated
2) There is a selection bias since the cases are chosen from hospital. So the age and sex distribution cannot be ascertained.
3) As follow up of patients was not done, invitro and invivo sensitivity differences and the response to treatment was not assessed.
4) Only limited antibiogram was used.

CONCLUSION

Our study showed that siblings, low socioeconomic class and supine nursing were significant risk factors for acute otitis media and urban locality, passive smoking, low socioeconomic class and presence of siblings were significant risk factors for chronic otitis media. Most organisms causing acute otitis media were sensitive to Ampicillin and Amoxicillin while most organisms causing chronic otitis media were sensitive to Amikacin and Gentamycin in our study.

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PROFOMA

Name Age Sex Code

Address : OP/IP No.

Date

Residence	:	O Urban	Ō Rural
No. of family members	:		
No. of siblings	:		
No. of rooms	:		
No. of windows	:		
No.of persons/room	:		
Education	:	Father	Mother
Occupation	:	Father	Mother
Income	:	Father	Mother
Passive smoking	:	Ō Yes	Ō No
Exclusive breast feeding	:	Ō Yes	Ō No
Bottle feeds	:	Ō Yes	Ō No
Supine nursing	:		
Pacifiers	:	Ō Yes	Ō No

Thumb sucking	:	Ō Yes	Ō No
Nose blowing	:	Ō Yes	Ō No
Oil instillation	:	Ō Yes	Ō No

COMPLAINTS

Ear involved	:	Ō Right	Ō Left
Ear pain	:	Ō Yes	Ō No
Ear discharge	:	Ō Yes	Ō No

Ō Serous Ō Mucoid () Mucopurulent

Cough and cold	:	Ō Yes	Ō No
Fever	:	Ō Yes	Ō No
Irritability	:	Ō Yes	Ō No
Pulling at the ear	:	Ō Yes	Ō No
Hearing loss	:	Ō Yes	Ō No
Bleeding	:	Ō Yes	Ō No
Vomiting	:	Ō Yes	Ō No
Headache	:	Ō Yes	Ō No
Seizures	:	Ō Yes	Ō No
Biplopia	:	Ō Yes	Ō No
Vertigo	:	Ō Yes	Ō No

Facial weakness	:	Ō Yes	Ō No
Pain around the ear	:	Ō Yes	Ō No
Previous H/O URTI	:	Ō Yes	Ō No
Previous H/O OM	:	Ō Yes	Ō No
H/O Measles	:	Ō Yes	Ō No

EXAMINATION

Ear Canal	:		Wt :
Tympanic membrane	:		Ht :
Perforation	:	Ō Yes	Ō No
	:	Ō Central	Ō Attic
Cholesteatoma	:	Ō Yes	Ō No
Polyp	:	Ō Yes	Ō No
Bleeding	:	Ō Yes	Ō No
Mastoiditis	:	Ō Yes	Ō No
Tonsillitis	:	Ō Yes	Ō No
Rinnes test	:		
Webers test	:		

INVESTIGATIONS

Aual swab :

ABBREVIATIONS

ASOM	–	Acute suppurative otitis media
CSOM	–	Chronic suppurative otitis media
OM	–	Otitis media
TM	–	Tympanic membrane
SEC	_	Socioeconomic class

MASTER CHART FOR CONTROLS OF AOM

A	B	C	D	E	F	G	H	I	J	K
1	3	1	1	2	1	3	1	2	1	1
2	1	1	1	1	2	3	2	2	2	2
3	2	2	1	2	2	2	2	2	2	2
4	2	1	2	1	1	1	1	1	2	1
5	3	1	1	1	2	2	2	2	1	2
6	3	2	1	1	1	2	1	1	2	1
7	2	1	2	2	2	3	2	2	2	2
8	1	1	1	2	1	2	1	1	2	1
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123	2	2	1	2	1	2	1	1	2	1
124	2	1	1	1	2	2	2	2	2	2
125	2	2	1	1	2	3	2	2	2	2
126	2	1	1	1	2	3	2	2	1	2
127	3	1	1	2	2	2	1	2	2	2
128	2	2	1	1	2	2	1	2	1	2

KEY FOR CSOM MASTER CHART – ASOM

		1	2	3	4	5	0
A	Code						
B	Age	<1year	1-5 yrs	>5yrs			
C	Sex	Male	Female				
D	Locality	Urban	Rural				
E	Siblings	Yes	No				
F	Passive smoking	Yes	No				
G	SEC	Yes	No				
H	EBF	Yes	No				
I	Bottle feeds	Yes	No				
J	Upright nursing	Yes	No				
K	Bad practices	Yes	No				
L	Laterality	Right	Left	Both			
M	Ear pain	Yes	No				
N	Ear discharge	Yes	No				
O	Discharge	Serous	Mucoid	Muco purulent			
P	Fever	Yes	No				
Q	Cough & cold	Yes	No				
R	Irritability	Yes	No				
S	Pulling at ear	Yes	No				
T	Erythema TM	Yes	No				
U	Otorrhoea	Yes	No				
V	Bulging TM	Yes	No				
W	Perforation	Yes	No				
X	Otitis externa	Yes	No				
Y	Tonsillitis	Yes	No				
Z	Prev OM	Yes	No				
AA	Measles	Yes	No				
AB	Prev URI	Yes	No				
AC	Organisms	No growth	Staph	Pseudomonas	Klebsiella	CONS	
AD	Ampicillin	Sensitive	Not sensitive				
AE	Cefotaxime	Sensitive	Not sensitive				
AF	Erythromycin	Sensitive	Not sensitive				
AG	Amikacin	Sensitive	Not sensitive				
AH	Ciprofloxacin	Sensitive	Not sensitive				
AI	Norfloxacin	Sensitive	Not sensitive				
AJ	Amoxicillin	Sensitive	Not sensitive				
AK	Cotrimoxazole	Sensitive	Not sensitive				
AL	Gentamycin	Sensitive	Not sensitive				
AM	Cephalexin	Sensitive	Not sensitive				
AN	Vancomycin	Sensitive	Not sensitive				NA

MASTER CHART FOR CONTROLS OF CSOM

A	B	C	D	E	F	G
1	2	1	1	2	2	3
2	1	2	1	2	1	2
3	2	2	1	2	2	2
4	2	1	1	2	2	3
5	2	1	2	2	1	2
6	1	2	1	2	2	1
7	2	1	1	2	2	2
8	2	1	1	2	1	2
9	2	2	1	1	2	3
10	1	2	1	2	2	2
11	2	2	2	2	1	2
12	2	1	1	2	2	2
13	2	1	1	2	1	2
14	2	1	1	1	2	3
15	2	2	1	2	2	3
16	1	2	1	2	1	3
17	1	1	1	2	2	2
18	2	1	2	1	2	2
19	2	1	1	2	2	2
20	2	1	1	1	1	1
21	1	2	1	1	2	2
22	2	2	1	1	1	1
23	2	1	2	2	1	3
24	2	1	2	2	1	1
25	2	1	1	2	2	2
26	1	2	2	1	1	2
27	2	1	1	2	1	2
28	2	1	2	2	1	1
29	2	2	1	2	2	2
30	2	1	2	2	1	2
31	2	1	1	1	1	1
32	2	2	1	2	2	3
33	2	1	1	2	2	1
34	2	1	2	1	1	2
35	2	2	1	2	2	1
36	1	1	1	2	2	2
37	2	1	2	1	1	3
38	2	1	1	2	2	2
39	2	2	1	2	2	2
40	2	1	2	2	2	3
41	1	2	2	2	2	1
42	1	1	1	2	1	1
43	1	2	1	2	2	1
44	2	1	1	1	2	2
45	2	1	1	2	2	2
46	2	1	1	2	1	2

KEY FOR CSOM MASTER CHART - CSOM

		1	2	3	4	0
A	Code					
B	Age	1-5 yrs	>5yrs			
C	Sex	Male	Female			
D	Locality	Urban	Rural			
E	Siblings	Yes	No			
F	Passive smoking	Yes	No			
G	SEC	Yes	No			
H	Laterality	Right	Left	Both		
I	Ear pain	Yes	No			
J	Ear discharge	Yes	No			
K	Fever	Yes	No			
L	Cough & cold	Yes	No			
M	Hard of hearing	Yes	No			
N	Retroauricular pain	Yes	No			
O	Discharge	Serous	Mucoid	Muco purulent		
P	Otorrhoea	Yes	No			
Q	Perforation	Yes	No			
R	Otitis externa	Yes	No			
S	Hearing loss	Conductive	SNHL			
T	Mastoid tenderness	Yes	No			
U	Type of perforation	Central	Attic			
V	Sinusitis	Yes	No			
W	Tonsillitis	Yes	No			
X	Prev OM	Yes	No			
Y	Organisms	Pseudomonas	Proteus	Klebsiella	Staph	
Z	Ampicillin	Sensitive	Not sensitive			
AA	Cefotaxime	Sensitive	Not sensitive			
AB	Erythromycin	Sensitive	Not sensitive			
AC	Amikacin	Sensitive	Not sensitive			
AD	Ciprofloxacin	Sensitive	Not sensitive			
AE	Norfloxacin	Sensitive	Not sensitive			
AF	Amoxicillin	Sensitive	Not sensitive			
AG	Cotrimoxazole	Sensitive	Not sensitive			
AH	Gentamycin	Sensitive	Not sensitive			
AI	Cephalexin	Sensitive	Not sensitive			
AJ	Vancomycin	Sensitive	Not sensitive			Not done

தகவல் படிவம்

தங்க□□ குழந்தையின் காதில் இருந்து சீழ் வருவதால் சில பரிசோதனைகளை செய்து ஆய்வு மேற்கொள்ளப்பட உள்ளது. உங்க□□ குழந்தையின் நோய் குறித்த விவரங்களையும் மற்றும் பரிசோதனை முடிவுகளையும் தங்கள் சம்மதத்துடன் இவ்வாய்வில் பயன்படுத்த விரும்புகிறேன்.

தாங்கள் விரும்பினால் மருத்துவ ஆய்விலிருந்து எப்போதும் வேண்டுமானாலும் எந்த சட்ட சிக்கலும் உட்படாமல் விலகிக் கொள்ளலாம்.

இந்த ஆய்வின் மூலம் கிடைக்கும் பரிசோதனை முடிவுகளை தங்கள் ஒப்புதலின் மூலம் மட்டும் மருத்துவ ஆய்வில் பயன்படுத்தபடும்.

பங்கேற்பவரின் கையொப்பம் :

பங்கேற்பவரின் பெயர் :

இடம் :

நாள் :

MASTER CHART FOR CASES OF AOM

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN
1	3	1	1	2	2	3	1	1	2	1	2	2	1	2	1	1	2	2	1	1	2	1	2	2	1	2	1	3	2	2	2	2	1	1	1	2	1	2	2
2	1	1	2	1	1	3	2	1	2	1	1	1	1	2	2	1	2	2	1	1	2	2	2	1	1	1	1	2	1	1	1	2	1	2	1	1	2	2	2
3	2	2	1	1	1	2	1	1	1	1	2	2	1	3	1	1	2	1	2	2	2	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
4	2	1	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	1	1	1	2	2	2	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0
5	3	1	2	1	2	3	2	1	1	1	1	1	2	4	2	2	1	2	1	2	2	2	2	1	1	1	1	5	1	1	1	1	2	2	1	2	2	2	2
6	3	2	1	1	1	3	2	2	2	1	3	2	1	3	2	1	2	2	2	1	2	2	1	1	1	1	1	2	1	2	1	1	2	1	2	1	2	1	1
7	2	1	1	2	1	1	2	1	1	2	2	1	1	3	2	1	2	1	1	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
8	1	1	2	1	1	3	1	1	1	1	1	2	1	2	1	1	2	2	1	1	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
9	2	2	1	2	1	3	1	2	2	2	3	1	2	4	1	1	2	1	2	2	2	2	2	1	2	2	2	2	2	1	2	2	1	2	1	2	2	2	2
10	2	1	1	1	1	3	2	1	1	1	2	2	1	1	2	1	2	2	1	1	2	2	2	2	1	1	1	5	1	1	2	2	1	2	1	2	2	1	2
11	3	1	2	1	2	3	1	1	1	1	1	1	1	3	1	1	2	2	1	2	2	1	2	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
12	2	1	1	2	2	3	1	1	1	2	2	2	1	1	1	1	2	2	1	2	2	2	2	1	1	2	1	2	1	2	2	1	2	2	2	1	1	2	2
13	2	2	1	2	1	2	2	1	2	2	3	1	1	1	2	2	2	1	1	1	1	2	1	2	1	1	1	2	1	2	1	1	1	2	2	2	2	1	1
14	1	1	1	1	1	3	2	2	2	1	1	1	2	4	1	1	1	2	2	2	2	1	2	1	2	2	1	3	1	2	2	1	1	2	2	1	2	2	2
15	3	1	2	1	1	3	2	1	1	1	1	1	1	1	2	1	1	2	1	1	2	2	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
16	3	1	2	2	2	3	1	2	2	2	1	2	2	4	1	1	2	2	2	2	2	2	2	2	1	2	2	2	1	1	1	2	2	1	1	1	1	2	2
17	2	2	1	1	1	1	2	1	1	1	1	1	1	2	2	1	2	2	1	1	2	1	2	2	2	1	1	5	1	2	1	1	1	1	1	1	1	2	1
18	1	1	1	2	1	3	2	2	2	2	3	1	1	1	1	1	2	1	2	2	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
19	1	1	1	1	1	3	2	1	1	1	2	2	1	2	1	1	2	2	1	2	2	1	1	2	2	1	1	2	1	2	2	2	2	2	1	2	2	2	2
20	2	2	2	1	2	3	1	1	2	1	1	2	1	3	2	2	2	2	1	1	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
21	3	1	2	1	1	3	2	1	2	1	2	1	1	1	2	1	1	2	1	2	2	2	1	2	2	2	1	4	1	2	2	1	2	1	2	2	1	12	2

22	2	2	2	1	1	3	2	1	2	1	1	2	1	2	1	1	2	2	1	2	2	1	2	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0
23	2	2	1	2	2	3	2	2	1	2	3	1	1	1	1	1	2	2	2	1	2	2	2	2	1	1	1	2	2	1	2	1	2	1	1	1	2	1	2
24	3	2	1	1	2	1	1	2	1	1	2	2	2	4	2	1	2	1	2	2	1	2	1	2	1	2	1	5	1	2	2	2	2	1	1	1	2	1	2
25	2	1	1	1	1	3	2	2	2	1	2	1	1	1	2	1	1	2	2	1	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
26	1	1	1	2	1	3	1	1	1	1	3	2	1	2	1	2	2	2	1	2	2	2	2	1	2	1	1	2	1	1	1	1	2	2	2	1	2	1	2
27	2	1	1	1	2	2	2	1	1	1	2	1	1	3	2	1	2	2	1	1	2	1	2	1	1	2	1	3	2	1	2	1	2	2	1	2	1	2	2
28	2	1	2	1	1	3	1	1	2	1	2	1	2	4	2	1	2	2	1	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
29	2	2	1	2	1	3	2	1	1	2	3	2	1	1	1	1	2	1	1	1	2	2	1	1	2	2	1	2	1	2	2	1	2	1	1	2	2	2	2
30	1	2	1	1	1	3	1	2	2	1	1	2	1	2	2	1	1	2	2	2	2	2	2	2	1	2	1	5	1	1	2	1	1	2	1	1	2	2	1
31	2	2	1	1	2	2	2	1	2	1	3	1	1	3	1	1	1	2	1	1	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
32	2	1	1	1	1	3	1	1	1	1	3	2	1	1	1	1	2	2	1	1	2	1	1	2	2	2	1	2	2	2	1	1	1	1	1	2	2	2	2
33	3	1	1	2	2	1	2	2	1	2	3	2	2	4	2	2	2	2	2	2	2	2	2	2	1	2	1	2	2	1	1	1	2	2	2	1	1	1	2
34	1	1	2	2	1	3	2	1	2	2	1	1	1	1	1	1	1	1	1	1	2	2	2	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
35	2	2	1	1	2	3	1	1	1	1	2	2	1	1	1	1	2	2	1	2	2	2	2	2	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0
36	2	1	1	1	1	3	1	2	1	1	1	1	1	1	1	1	1	2	2	1	2	2	1	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
37	2	1	1	1	2	3	1	1	2	1	3	2	2	4	1	1	2	2	1	2	1	2	2	2	2	2	1	5	1	1	1	2	2	2	1	2	1	1	2
38	3	2	2	2	2	2	2	2	1	2	2	1	1	1	1	1	2	2	2	2	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
39	2	1	1	1	1	3	2	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1	1	2	2	1	1	2	1	1	2	2	2	2	1	2	2	2	1
40	2	2	1	2	1	3	1	1	2	2	3	1	1	3	1	1	2	2	1	1	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
41	2	2	2	1	1	3	2	2	1	1	2	2	1	1	2	1	2	2	2	1	2	2	2	2	1	1	1	2	1	2	2	2	2	2	2	2	1	2
42	2	1	1	1	1	2	2	2	1	1	1	1	2	4	1	1	2	2	2	2	2	2	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
43	2	1	2	1	1	3	2	1	1	1	1	2	1	2	1	1	1	2	1	1	2	2	1	2	1	2	1	3	1	2	2	1	1	1	1	2	2	2
44	1	2	1	2	1	3	2	2	2	2	2	2	1	1	2	1	2	1	2	1	2	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
45	2	1	2	1	1	3	1	1	1	1	3	2	2	4	1	1	2	1	1	2	2	2	2	1	1	1	1	3	2	2	2	2	1	1	2	2	1	2	2
46	3	2	1	1	1	3	2	1	2	1	2	1	1	2	2	1	2	2	2	2	2	2	2	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
47	2	1	2	2	1	3	2	1	2	2	1	2	1	2	2	2	2	2	1	2	2	2	1	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
48	2	2	1	1	2	3	1	2	1	1	2	2	1	3	1	1	2	1	2	1	2	2	2	2	2	1	1	4	2	1	2	1	1	2	1	1	1	2	2

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50	2	1	1	1	1	3	2	1	1	1	1	2	1	2	2	1	2	2	1	1	2	2	2	1	1	1	1	2	1	1	2	1	2	2	1	1	2	2	2
51	3	1	1	2	1	3	1	1	1	2	3	1	1	2	2	1	2	1	1	2	1	2	2	1	1	2	1	2	1	2	1	1	1	2	2	2	2	1	2
52	2	2	2	1	1	1	2	2	1	1	1	2	1	2	2	1	2	2	2	2	2	2	2	2	2	1	1	5	1	2	1	2	1	2	1	2	2	1	1
53	2	1	1	1	2	3	2	1	2	1	3	2	2	4	1	1	2	1	1	2	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
54	2	1	1	2	1	2	2	1	1	1	1	1	1	3	2	2	1	2	1	1	2	2	2	1	1	2	1	3	1	1	2	2	1	1	1	2	2	2	2
55	2	1	1	1	1	3	2	2	2	1	3	2	2	4	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
56	2	2	1	2	2	3	1	2	1	2	2	1	1	3	2	1	2	2	2	1	2	2	1	2	2	1	1	2	1	1	2	2	2	1	1	1	2	1	1
57	3	1	1	1	1	3	2	1	1	1	2	2	1	1	2	1	2	2	1	1	2	2	1	2	1	2	1	2	1	1	1	2	2	2	1	2	2	1	1
58	2	1	1	1	1	3	2	2	2	1	3	1	1	1	2	1	1	1	2	2	2	2	2	2	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
59	1	1	1	1	1	3	1	2	1	1	1	2	1	3	1	1	2	2	2	1	1	2	1	2	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0
60	2	2	1	1	1	2	2	1	1	1	1	2	1	2	1	1	2	2	1	2	2	1	2	1	1	2	2	5	1	1	1	1	1	1	1	1	1	2	2
61	3	1	1	1	2	3	1	1	1	1	2	1	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
62	2	1	1	1	1	3	1	1	2	1	3	1	2	4	2	2	2	2	1	2	2	2	2	1	1	2	1	2	2	2	1	2	2	1	1	1	2	2	1
63	3	1	2	2	1	3	1	2	1	2	1	1	1	2	1	1	1	2	2	2	2	2	2	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
64	2	1	1	1	1	3	2	1	2	1	3	2	2	4	1	1	2	1	1	2	2	2	2	2	1	1	1	5	1	1	2	2	2	1	1	2	2	1	2
65	2	1	1	1	2	1	2	1	1	1	2	1	1	1	2	1	2	2	1	1	2	2	1	1	2	2	1	3	2	1	2	2	2	1	1	2	2	2	2
66	3	2	1	1	1	2	1	1	2	1	1	2	1	3	1	1	2	2	1	2	2	2	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
67	2	1	2	2	1	3	1	1	1	2	3	2	1	1	1	2	2	2	1	2	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
68	1	1	1	1	1	3	1	2	2	1	1	1	1	2	1	1	2	2	2	2	1	2	1	1	2	1	2	2	1	1	2	2	2	2	2	2	2	1	2
69	2	1	1	1	2	3	2	1	1	1	2	2	1	3	2	1	1	2	1	1	2	2	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
70	2	1	1	1	1	2	2	1	1	1	3	2	1	1	1	1	2	2	1	1	2	2	2	1	1	2	1	2	1	1	2	2	2	2	1	1	2	1	1
71	3	1	2	1	2	3	1	1	1	1	2	1	1	1	1	1	2	2	1	1	2	2	2	1	1	1	2	3	1	2	2	2	1	1	2	2	2	2	2
72	2	1	1	1	2	3	2	2	2	1	1	1	2	4	1	1	2	2	2	2	2	2	2	2	1	2	1	2	2	1	1	2	2	1	1	2	2	1	2
73	2	2	1	2	2	2	2	1	1	2	1	2	1	1	2	1	2	1	1	1	2	2	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
74	3	1	2	1	1	1	2	1	1	1	2	2	1	2	1	1	2	2	1	2	2	2	2	1	2	1	1	5	1	1	1	2	2	2	1	1	1	1	2
75	2	1	1	1	1	3	2	1	2	1	1	1	1	1	1	1	2	2	1	1	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0

76	2	2	1	1	1	3	1	2	2	1	3	1	2	4	1	2	2	2	2	2	2	1	2	2	1	1	1	2	1	2	2	2	1	2	1	2	2	2	2
77	3	1	1	1	2	3	2	1	2	1	1	2	1	2	2	1	1	2	1	1	2	1	1	1	1	2	1	2	1	2	1	2	2	2	1	2	2	1	1
78	2	2	2	1	1	2	2	1	2	1	1	1	1	3	1	1	2	2	1	1	2	2	2	2	1	2	1	4	1	2	2	1	2	1	2	1	1	2	2
79	2	1	1	1	1	3	2	1	1	1	3	2	1	1	2	2	2	1	1	2	2	2	2	1	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
80	2	2	1	1	1	3	1	2	1	1	3	2	1	2	2	1	2	2	2	1	2	2	2	1	1	2	2	2	1	1	2	2	2	2	1	1	2	1	2
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82	3	1	2	1	1	3	1	1	1	1	2	1	2	4	2	1	2	2	1	2	2	2	2	2	1	1	1	2	2	1	1	2	2	2	1	2	2	1	1
83	2	2	2	1	1	3	1	1	2	1	1	2	1	1	1	1	2	2	2	1	2	2	2	1	2	2	1	5	1	1	2	2	2	2	1	2	1	2	1
84	2	1	1	1	1	2	2	1	1	1	1	2	1	2	1	1	2	1	1	2	2	2	2	1	1	2	2	5	1	2	1	1	1	1	1	1	2	2	2
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87	2	2	1	1	1	3	2	2	1	1	2	2	1	3	1	1	2	2	2	2	2	1	2	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
88	2	1	1	1	1	3	2	1	1	1	2	2	1	2	2	1	2	2	1	1	2	2	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
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90	2	1	1	1	2	3	2	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
91	2	2	1	1	1	3	2	2	1	1	1	2	1	2	1	1	2	2	2	1	2	2	1	1	1	2	1	3	1	2	2	2	1	2	1	2	2	2	2
92	3	1	1	1	2	3	1	1	1	1	2	1	1	1	1	1	2	2	1	2	2	2	1	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
93	2	1	1	1	1	1	2	2	1	1	3	1	1	2	1	1	2	2	2	1	2	2	2	1	2	2	1	5	1	1	2	2	2	2	1	1	2	2	2
94	2	1	1	2	1	3	2	1	2	2	2	2	2	4	1	1	2	1	1	2	2	1	2	2	1	1	2	2	1	1	1	1	1	2	1	1	2	1	2
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96	2	2	1	2	1	3	1	1	2	2	2	1	1	2	1	1	2	2	1	1	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
97	2	1	1	1	1	3	2	2	1	1	2	1	1	1	2	1	2	2	2	1	2	1	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
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100	2	2	1	1	1	1	1	1	2	1	2	1	1	1	1	1	2	2	1	2	2	2	2	1	1	2	1	2	1	1	2	2	2	2	1	1	2	1	2
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103	2	1	1	1	2	3	2	1	1	1	2	1	1	1	2	1	2	2	1	2	2	2	2	1	1	2	1	2	2	1	2	2	1	2	1	1	2	1	2
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106	2	1	1	2	1	3	2	1	1	2	2	1	1	3	2	1	1	1	1	2	2	2	2	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
107	3	2	1	1	1	3	2	1	2	1	3	2	1	2	1	1	2	2	1	1	2	2	2	2	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0
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109	2	2	1	2	1	3	2	1	1	2	1	1	1	2	2	1	2	2	1	1	2	1	1	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
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111	2	2	1	1	1	3	2	1	2	1	1	1	1	3	1	1	2	2	1	1	2	2	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
112	2	2	1	2	2	3	1	2	1	2	2	2	1	4	2	1	2	2	2	2	2	2	1	2	2	1	2	1	0	0	0	0	0	0	0	0	0	0	0
113	2	1	1	1	1	3	2	1	1	1	1	1	1	3	1	1	2	1	1	2	2	1	2	2	1	1	1	5	1	1	1	1	1	2	1	2	2	2	2
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116	2	2	1	1	2	3	2	2	2	1	2	2	1	3	1	1	2	1	2	1	2	2	2	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0
117	2	1	1	1	1	2	1	2	1	1	2	1	1	2	1	1	2	2	2	2	2	1	2	2	2	2	1	5	1	1	1	2	2	2	1	2	2	2	2

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119	2	2	1	1	1	3	2	1	2	1	2	2	1	2	2	1	2	2	1	1	2	1	1	2	1	1	1	2	1	1	2	2	1	2	1	1	2	1	2
120	2	1	1	1	1	3	2	1	1	1	2	2	1	3	2	1	2	1	1	2	2	2	2	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
121	3	1	1	1	2	3	2	2	1	1	1	1	1	1	2	1	2	2	2	1	2	2	2	2	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
122	2	1	1	1	1	3	2	1	1	1	2	1	1	1	1	1	2	2	1	1	2	2	2	1	2	2	1	2	1	1	2	2	2	2	1	1	2	2	2
123	2	2	1	2	1	3	1	2	1	2	2	1	1	2	1	1	2	1	2	2	2	1	2	2	1	1	1	4	2	1	2	1	1	2	2	1	1	2	2
124	2	1	1	1	1	3	2	1	2	1	1	2	1	1	1	1	2	1	1	2	2	1	2	1	1	2	1	1	0	0	0	0	0	0	0	0	0	0	0
125	2	2	1	1	2	3	2	1	1	1	1	2	1	3	2	1	2	1	1	2	2	2	2	1	1	2	2	1	0	0	0	0	0	0	0	0	0	0	0
126	2	1	1	1	1	2	2	1	1	1	1	1	1	3	1	1	2	2	1	2	2	2	2	1	1	2	1	2	1	1	2	2	2	2	1	1	2	1	2
127	3	1	1	1	1	3	2	2	2	1	2	2	1	3	1	1	2	2	2	1	2	2	2	2	2	1	1	1	0	0	0	0	0	0	0	0	0	0	0
128	2	2	1	2	1	3	2	1	2	2	2	2	1	1	2	1	2	1	1	2	2	2	2	1	2	1	1	5	1	1	1	1	1	2	1	2	2	2	2

MASTER CHART FOR CASES OF CSOM

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ
1	2	1	1	1	2	3	3	2	1	1	2	2	2	3	1	1	2	0	2	2	2	2	1	4	1	1	2	2	1	2	1	2	1	1	1
2	1	2	1	1	1	3	3	2	1	1	1	2	2	2	1	1	2	0	2	1	2	1	1	1	2	2	2	1	1	1	2	2	1	2	0
3	2	2	1	1	1	2	1	1	1	2	1	2	2	3	2	1	2	0	2	1	2	2	1	1	1	1	2	1	1	2	1	2	1	2	0
4	2	1	1	2	1	2	1	1	1	2	1	2	2	2	1	1	1	0	2	2	2	2	1	2	2	2	2	1	2	1	2	2	1	1	0
5	2	1	1	1	1	1	3	2	1	1	1	1	2	2	1	1	2	1	2	2	1	1	1	4	1	1	1	1	2	2	1	1	2	2	2
6	1	2	1	1	1	2	2	1	1	2	1	2	2	2	1	1	2	0	2	1	2	2	1	3	2	1	2	1	1	1	1	1	1	2	0
7	2	1	2	2	1	3	3	2	1	1	2	2	2	3	1	1	1	0	2	1	2	2	1	1	2	2	2	1	2	2	1	1	1	1	0
8	2	1	1	1	2	2	1	2	1	1	1	2	2	1	1	1	2	0	2	1	2	1	1	1	1	1	2	1	1	1	2	1	1	2	0
9	2	2	1	1	1	3	1	2	1	2	1	1	2	3	2	1	2	1	2	1	2	2	1	2	2	2	2	1	1	2	2	2	1	2	0
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11	2	2	2	1	1	2	2	2	1	1	2	2	2	2	1	1	2	0	2	1	2	1	1	4	1	1	1	1	2	1	1	2	2	1	1
12	2	1	1	1	1	3	3	2	1	2	1	2	2	2	1	1	2	0	2	2	2	2	1	1	1	1	2	1	1	2	1	1	1	1	0
13	2	1	1	1	2	2	1	2	1	2	1	2	2	3	2	1	1	0	2	1	2	2	1	1	1	1	2	1	1	2	1	2	2	2	0
14	2	1	1	1	1	1	3	2	1	1	1	2	2	3	2	1	2	0	2	1	2	1	1	1	1	2	2	1	1	1	1	2	1	2	0
15	2	2	1	1	1	3	2	1	1	1	1	2	2	2	1	1	2	0	2	1	1	2	1	4	1	1	1	2	2	2	1	1	2	2	2
16	1	2	1	1	1	2	3	2	1	2	1	1	2	3	2	1	2	2	2	2	2	2	1	2	2	1	2	1	1	1	2	1	1	2	0
17	1	1	1	1	1	2	3	2	1	2	2	1	2	1	2	1	1	1	2	1	2	1	1	1	2	2	2	1	1	1	2	1	1	1	0
18	2	1	1	2	1	3	3	1	1	1	1	2	2	3	1	1	1	0	2	1	2	1	1	1	2	2	2	1	1	2	2	2	1	2	0
19	2	1	1	1	2	3	2	1	1	2	1	2	2	2	1	1	1	0	2	2	1	2	1	4	2	2	2	1	1	1	2	2	1	1	1
20	2	1	1	1	1	3	3	2	1	2	1	2	2	3	1	1	2	0	2	1	2	2	1	1	1	1	2	1	1	1	2	1	1	2	0
21	1	2	2	2	1	2	3	1	1	1	1	2	2	3	1	1	2	0	2	1	2	1	1	4	1	1	2	2	1	2	2	1	1	1	2
22	2	2	1	1	1	2	1	2	1	1	1	1	1	2	2	1	2	1	1	1	2	2	1	3	1	2	2	1	1	2	2	2	1	1	0

Contd……

23	2	1	1	2	1	1	3	2	1	2	2	2	2	3	1	1	2	0	2	2	2	2	1	1	2	2	2	1	1	1	1	2	2	1	0
24	2	1	1	2	1	3	1	1	1	2	1	2	2	3	1	1	2	0	2	1	1	1	1	1	2	2	2	1	1	2	1	1	1	1	0
25	2	1	1	1	1	2	2	2	1	1	1	2	2	2	2	1	1	0	2	1	2	2	1	1	2	2	2	1	2	1	2	1	1	2	0
26	1	2	1	1	1	2	3	2	1	2	1	2	2	3	1	1	1	0	2	1	2	2	1	4	1	2	1	2	2	2	1	2	2	2	1
27	2	1	1	1	2	3	1	1	1	1	1	2	2	3	1	1	2	0	2	2	2	1	1	1	2	2	2	1	1	1	2	1	1	2	0
28	2	1	1	1	1	2	3	2	1	2	2	2	2	2	1	1	2	0	2	1	2	2	1	4	1	1	1	1	1	1	1	2	2	1	1
29	2	2	2	2	1	2	3	1	1	1	2	2	2	2	1	1	2	0	2	1	2	2	1	3	2	2	2	1	1	2	2	1	2	2	0
30	2	1	1	1	1	3	2	1	1	1	1	2	2	3	2	1	1	0	2	1	2	2	1	1	1	1	2	1	1	2	2	1	1	2	0
31	2	1	1	2	1	2	3	2	1	2	1	2	2	3	1	1	2	0	2	1	1	1	1	2	2	2	2	1	1	2	2	1	1	1	0
32	2	2	1	1	1	2	1	2	1	1	1	1	2	3	1	1	2	2	2	1	2	1	1	1	2	2	2	1	2	2	1	1	2	1	0
33	2	1	1	1	2	1	3	2	1	2	2	2	2	2	2	1	1	0	2	1	2	2	1	4	2	1	2	1	2	2	1	1	1	1	1
34	2	1	2	1	1	1	2	1	1	2	1	2	1	3	1	1	2	0	1	1	2	2	1	1	2	2	2	1	1	1	2	1	1	2	0
35	2	2	1	2	1	3	3	2	1	1	1	2	2	2	1	1	2	0	2	1	2	1	1	3	2	2	2	1	2	1	2	2	1	2	0
36	1	1	1	1	2	2	1	2	1	2	2	2	2	3	1	1	2	0	2	2	1	2	1	1	2	2	2	1	1	1	2	1	1	2	0
37	2	1	1	1	1	3	3	2	1	1	1	1	2	1	1	1	1	2	2	2	2	1	1	4	1	2	2	1	1	1	1	1	2	2	2
38	2	1	1	2	1	2	3	1	1	2	1	2	2	1	2	1	2	0	2	1	2	1	1	1	1	1	2	1	2	2	2	1	1	1	0
39	2	2	1	1	1	2	1	2	1	1	2	2	2	2	1	1	2	0	2	1	2	2	1	1	1	1	2	1	1	1	2	1	1	1	0
40	2	1	1	1	2	3	3	2	1	2	1	1	2	3	1	1	1	1	2	1	1	2	1	4	1	1	1	2	2	1	1	2	2	2	2
41	1	2	2	2	1	2	3	2	1	2	1	2	2	2	1	1	2	0	2	1	2	1	1	1	2	2	2	1	2	2	2	1	1	2	0
42	1	1	1	1	1	3	3	1	1	1	1	2	2	3	1	1	2	0	2	1	2	2	1	3	2	2	2	1	2	1	2	2	1	2	0
43	1	2	1	2	1	2	2	2	1	1	1	2	2	3	1	1	1	0	2	1	2	1	1	1	1	1	2	1	1	2	2	2	1	1	0
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45	2	1	1	1	2	3	3	1	1	2	1	2	2	2	1	1	1	0	2	1	2	2	1	4	1	1	1	1	1	1	1	2	1	2	1
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