



**ORIGINAL RESEARCH PAPER**

**Ophthalmology**

**BACTERIOLOGY AND ANTIMICROBIAL SUSCEPTIBILITY OF CASES WITH NASOLACRIMAL DUCT OBSTRUCTION**

**KEY WORDS:** Nasolacrimal duct obstruction, Staphylococcus aureus, Bacteriological profile, Antimicrobial susceptibility.

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**ABSTRACT**

A hospital based observational study was conducted in Assam Medical College and Hospital, Dibrugarh, Department of Ophthalmology, to find out the prevailing pattern of bacterial organisms in the lacrimal sac of patients with nasolacrimal duct obstruction and the effective antibiotics against them. 80 cases were selected. After taking a thorough history , clinical and slit-lamp biomicroscopic examination was done, conjunctival swabs were collected from all the cases for microbial examination. The most common isolated organism was Staphylococcus aureus (40%) amongst the Gram positive and Klebsiella and E.coli (both 10%) amongst the Gram negative. Antimicrobial susceptibility testing demonstrated that Gatifloxacin (96.55%) and Amikacin (90.90%) was the most effective drug against all Gram-positive and Gram-negative bacterias respectively.

**INTRODUCTION**

Epiphora is the most infuriating symptom of nasolacrimal duct obstruction causing constant driveling of tears down the cheeks. It is followed by discharge, swelling, pain and conjunctivitis<sup>1</sup>, leading to stasis and altered environment within the lacrimal sac. Being unaware of further deleterious complications, most of the people consider watering from eyes as minor discomfort and avoid themselves from presenting to ophthalmologist. Nasolacrimal duct obstruction is an annoying and sometimes a vision threatening ophthalmic problem which affects patients of every age. It occurs commonly at the junction of the lacrimal sac and the nasolacrimal duct. The obstruction may be a congenital one, due to an imperforate membrane, which may persist into adult life, or it may be acquired due to some specific and nonspecific obstructive causes. Specific causes of nasal origin like polyp, inferior turbinate hypertrophy, extremely deviated nasal septum etc. In addition, numerous systemic disorders, <sup>2-4</sup> including environmental allergy, <sup>5</sup> Sarcoidosis, <sup>6</sup> Wegener granulomatosis, <sup>7</sup> and lymphoma, <sup>8</sup> may be associated with nasolacrimal duct obstruction. Secondary tumours arising from adjacent sinuses, trauma, foreign bodies like retained eyelashes, etc. It converts the lacrimal sac into a stagnant pool, which easily becomes infected leading to chronic dacryocystitis with epiphora and purulent discharge.<sup>9</sup> An untreated chronic dacryocystitis never undergoes spontaneous resolution.<sup>10</sup> It tends to progress and the walls of the sac become atonic, the contents never being evacuated except by external pressure<sup>10</sup> and acute inflammation may lead to lacrimal abscess.<sup>10</sup>

Nasolacrimal duct obstruction is a constant menace to the eye since minute abrasions of the cornea are of almost daily occurrence and such an abrasion is liable to become infected and give rise to an ulcer. There is also a danger of endophthalmitis and panophthalmitis if any intraocular operation is undertaken. No matter how innocuous the trauma seems to the eye or perfect successful ocular surgeries are performed, the mere presence of a reservoir of infective material in the vicinity carries serious risk to the eye.

**MATERIALS AND METHODS:**

A Hospital – based observational study was conducted in Assam medical college, Department of Ophthalmology for one year from 1<sup>st</sup> July 2015 to 30<sup>th</sup> June 2016. Patients of more than 15 years of age with complains of epiphora with nasolacrimal duct obstruction was included in the study. Patients less than 15 years of age, patients who received either topical or systemic antibiotics for the past one week during their visit to the hospital and patients with other infectious disease like corneal ulcer, conjunctivitis and blepharitis were excluded from the study.

outpatient department of Assam Medical College and Hospital. An informed consent was taken from the patients, after that a detailed history was taken of the patients complaining of watering, discharge from the eye. Duration of the epiphora, pain in the side of the nose and any swelling in the medial canthus were enquired. Any use of systemic or topical antibiotics for the past one week was asked. Patients were questioned about any trauma, sinusitis, allergies or any type of nasal pathologies. A thorough ocular examination of the selected patients was carried out. The lid position, margin were examined for any malposition. Eyelashes were examined for any misdirection, any signs of blepharitis if found the patient was excluded from the study. The cornea, conjunctiva, anterior chamber, sclera was examined to rule out any disease related to these structures. The puncta was examined for any punctal stenosis.

Assessment of the lacrimal drainage system included inspection, palpation, digital expression of lacrimal sac contents, lacrimal syringing fluorescein dye disappearance test, Jones primary and secondary dye test, gentle probing to check for hard stop or soft stop and Dacryocystography to establish nasolacrimal duct obstruction.

Since nasal pathologies also contribute to nasolacrimal duct obstruction e.g. a fractured inferior turbinate, nasal polyps or carcinoma, all the selected patients were also subjected to nasal examination in the ENT department of Assam Medical College & Hospital, Dibrugarh.

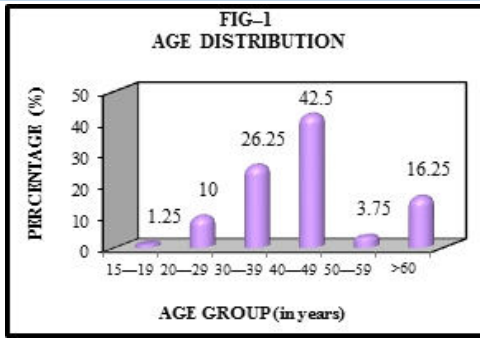
The materials for microbial examination were collected from patients under aseptic conditions. During collection of the samples it was ensured that the lid margins or the eyelashes were not touched. 2 sterile cotton swab sticks were taken for the purpose. Samples from the affected eye were taken either by applying pressure over the lacrimal sac and allowing the purulent material to reflux through the lacrimal puncta or by lacrimal syringing with normal saline. Material that was collected was properly labeled with the patient's name, age, sex, type of specimen, date of collection and taken to the laboratory for gram staining, culture on Blood agar, McConkey agar, Chocolate agar and antimicrobial susceptibility test was done by disc diffusion method. Only aerobic incubation was done in our study.

**RESULTS:**

**AGE DISTRIBUTION:**

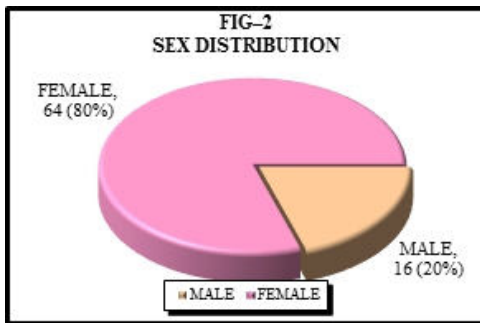
The majority of the cases in our study were in the age group of 40-49 years the (42.50%) followed by the age group of 30 -39 years (26.25%), more than 60 years (16.25%) and 20 – 29 years (10%).(Fig-1)

A study was carried out in 85 eyes of 80 patients attending the



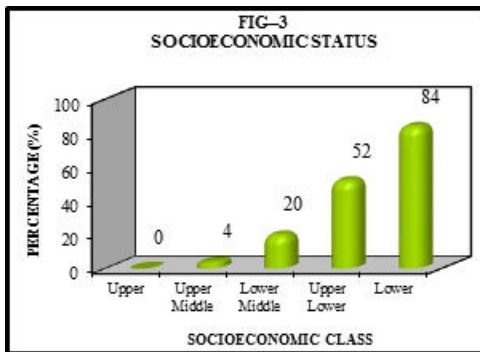
**SEX DISTRIBUTION:**

The nasolacrimal duct obstruction was more in females. Out of the 80 cases selected for our study, 64 (80%) were females and 16 (20%) were males. (Fig-2)



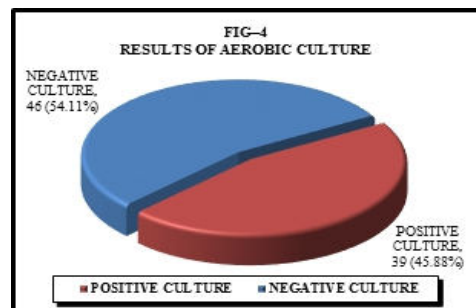
**SOCIOECONOMIC STATUS:**

The selected patients were grouped into socioeconomic categories based on their profession, education and family income, and their lifestyle etc. It was seen that majority of these patients fell into the lower category (84%) whereas only 52% patients belonged to the upper lower category (Fig-3).

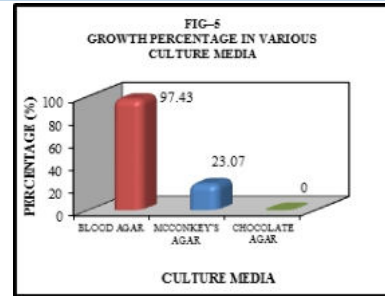


**CULTURE RESULTS:**

The samples collected from the conjunctival sacs were inoculated in Blood agar, McConkey's agar and chocolate agar and incubated under aerobic condition for 24 hours. The growth percentage obtained on culture is shown in (Fig-4).

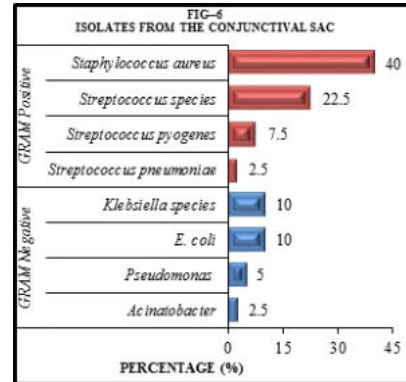


From the positive cultures, 38 (97.43%) showed growth in blood agar whereas only 9 (23.07%) showed growth in McConkey's agar (FIG-5). Growth in chocolate agar was negative in our study.



A total of 40 organisms were isolated from the positive samples. Of these, the number of Gram positive bacteria isolated was 29 (72.50%) and that of Gram negative bacteria was 11 (27.50%). Staphylococcus aureus was found to be the most common and was isolated from 16 samples (40%), followed by Streptococcus species (22.50%), Streptococcus pyogenes (7.50%) and Streptococcus pneumoniae (2.50%).

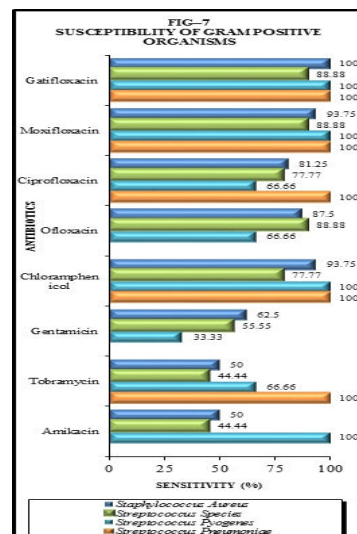
Amongst the Gram negative isolates, Escherichia coli and Klebsiella species were found in equal proportion (4 each) (10%), followed by Pseudomonas (5%) and Acinetobacter (2.50%). Klebsiella were isolated in mixed cultures along with Pseudomonas species.



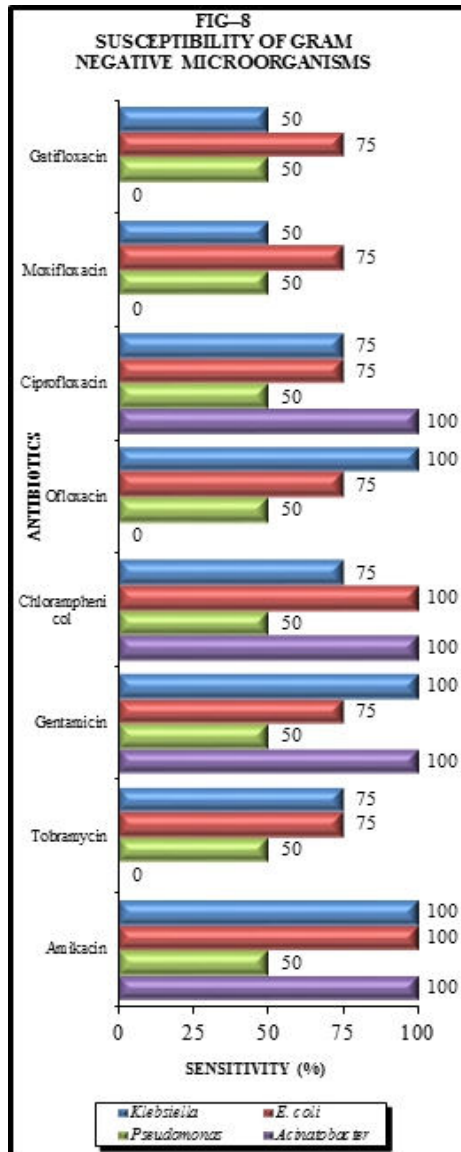
**ANTIMICROBIAL SUSCEPTIBILITY:**

The susceptibility of the isolated organisms was tested against Gatifloxacin, Moxifloxacin, Ciprofloxacin, Ofloxacin, Chloramphenicol, Gentamicin, Tobramycin and Amikacin. The disc diffusion method was used for the purpose. The results of these tests are shown below.

It is seen that the susceptibility of Gram positive bacteria to Gatifloxacin is highest (96.55%), followed by Moxifloxacin (93.10%), Chloramphenicol (89.65%), Ofloxacin (82.75%) and Ciprofloxacin (79.31%). Tobramycin and Amikacin were the least sensitive. (Fig-7).



It is seen that Amikacin has the highest sensitivity towards most of the gram negative organisms (90.90%), followed by Chloramphenicol (81.81%) and Gentamicin (81.81%). (Fig-8).



**DISCUSSION:**

The study was conducted on 85 eyes of the 80 cases, attending the Outpatient Department of Ophthalmology, Assam Medical College & Hospital, Dibrugarh.

The age and the number of patients in each category has been analyzed and in our study and the most common age group affected was 40 - 49 years (42.50%). Jacobs BH in his study found the maximum incidence of this condition between 40-55 years of age. Duke Elder is of the view that the incidence of dacryocystitis is highest in the fifth decade. MJ Bharathi in his study found 31-60 years to be the most affected age group. According to Grant G. Gilliland, this is more in adults older than 40 years.

On analyzing the sex distribution in our study it was found that the female (80%) patients were affected more than the males (20%) with a M: F ratio of (1: 4). Duke Elder, in his study found females (75- 80%) to be affected more commonly than males (25-30%). The incidence of the condition in females was stated to be 79.6% and 20.4% in males by MJ Bharathi with a M: F ratio of (1: 3.90) and 70% in females and 30% in males by Nagaraj with M: F ratio of (1: 2.33) in their studies. Jacobs HB found a male to female ratio of 1: 3 in his series of patients. Our findings were comparable with Jacobs HB.

In our study most of the cases belonged to the lower socio economic class (84%) with low levels of education and hygiene which is comparable with the studies done by Surendra P. Wadgaonkar et al (june 2014) and Duke Elder.

The bacteriology of the collected samples from the conjunctival sac was studied. It was seen that culture of the samples helped in detecting bacterial isolates from 45.88% conjunctival sac samples. In our study 39 (45.88%) showed positive growth while 46 (54.11%) showed negative growth. From the 39 positive samples, 40 organisms were isolated where gram positive bacteria were 29 (72.50%) and gram negative bacteria were 11 (27.50%). Staphylococcus aureus was the most common isolate (40%) among the gram positive cases followed by Streptococcus species (22.50%) which can be compared with the findings of Bareja & Ghosh, 1990 and Pollard, 1991. Staphylococci were frequently isolated organisms in their study. The most common Gram-negative bacteria isolated was Escherichia coli in Gilliland's study which justifies our finding where the common gram negative bacteria in our study is Escherichia coli and Klebsiella. Traquair reported one of the earliest series in which Staphylococcal species were found to have isolated from 32% of the 251 patients who underwent DCR operation. Our study can be compared with the study of Prakash et al where the most common gram-positive isolate was Staphylococcus aureus (29.76%) Thus our finding of Staphylococcal species being present in the conjunctival sac in 40% cases of nasolacrimal duct obstruction has been supported by a number of investigators.

While determining the susceptibility of the conjunctival sac isolates to some of the common topically used antibacterial we found that the Gram positive organisms were more sensitive to Gatifloxacin (96.55%), followed by Moxifloxacin (93.10%), Chloramphenicol (89.65%), Ofloxacin (82.75%) and Ciprofloxacin (79.31%). Amikacin has the highest sensitivity (90.90%), towards the gram negative organisms followed by Chloramphenicol (81.81%) and Gentamicin (81.81%) which can be compared with the study done by Indrajit Sarkar et al where they found that Gram-positive bacteria were most sensitive to vancomycin and gatifloxacin while Gram-negative organisms were most sensitive to Amikacin. Rowayda Mahmoud Amin et al 2013, in analysis of the in vitro susceptibility found that the highest percentages of bacterial isolates were most susceptible to Gatifloxacin (91.8%), Cefotaxime (91.8%), and Amikacin (91.1%), tobramycin (88.5%) and Ofloxacin (88.5%). M Jayahar Bharathi and his coworkers in their study found that the largest number of gram-positive isolates was susceptible to moxifloxacin (98.7%) and vancomycin (97.9%), and gram-negative isolates to amikacin (93.5%) and gatifloxacin (92.7%) which can be compared with our study. In case of Gram negative bacilli, most sensitive antibiotics were Amikacin (100%), Gentamycin (100%) which supports our study. Amikacin was the most sensitive antibiotic found by Xuguang et al in his study. Ali MJ et al too found gram negative organisms to be more sensitive to quinolones and aminoglycosides.

**CONCLUSION:**

Dacryocystitis, as a disease entity, is known since ancient times. It is an important cause of ocular morbidity, both in children and adults. Knowledge of bacteriology and antimicrobial sensitivity in a particular geographic area is necessary for formulation of a management protocol to reduce the cost burden and emergence of drug resistant strains.

Nasolacrimal duct obstruction is a common condition. No age is spared, though the condition is more amongst people in the age group of 40-49 years. Its higher incidence in females can partly be attributed to the anatomic disparity between male and females in the bony canal diameter through which the nasolacrimal duct passes. The condition is more prevalent in the lower socio-economic class where levels of hygiene and education are low. Both Gram positive and negative bacteria colonize the lacrimal sac in nasolacrimal duct obstruction. Amongst the gram positive organisms Staphylococcus aureus is the commonest organism seen in nasolacrimal duct obstruction followed by Streptococcus species, Steptococcus pyogenes, Streptococcus pneumoniae. Amongst the gram negative organisms Klebsiella and Escherichia

coli are the most common followed by *Pseudomonas* and *Acinetobacter*. Gram positive organisms were more susceptible to Gatifloxacin (96.55%), Moxifloxacin (93.10%), Chloramphenicol (89.65%) and Ofloxacin (82.75%), and least sensitive to Tobramycin and Amikacin. Gram negative bacteria were found to be more susceptible to Amikacin (90.90%), Gentamicin (81.81%) and Chloramphenicol (81.81%).

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