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## Original Research Article

## Clinico-bacteriological study of acute and chronic dacryocystitis cases in tertiary eye care centre in Southern Assam

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## ABSTRACT

**Purpose:** To identify the microbiological spectrum of acute and chronic dacryocystitis and to determine the antibiotic sensitivity pattern of the isolates.**Materials and Methods:** A prospective analysis on 304 patients with acute and chronic dacryocystitis were conducted during the period from November 2015 to October 2019. The posterior lacrimal flap was used as the sample in operated cases and swab of the regurgitation fluid in un-operated cases. In cases where patients presented with acute form sample was collected from purulent discharge from ulcerated area or it has been collected after performing incision and drainage of lacrimal abscess. The specimens were cultured in Microbiology department of Silchar Medical College and Hospital and results were analysed. Data was recorded and analysed in MS Office 2007**Results:** Total of 304 adult patients were included in the study among them 116 were males and 188 were females. Of the 304 specimens received from the patients 116(38.16%) showed growth of organisms and 188 were sterile. The growth consisted of gram positive, gram-negative bacteria and mixed growth.**Conclusions:** Majority of chronic dacryocystitis cases in this part of the country are caused by Pseudomonas species and Staphylococcus aureus. Whereas the acute cases mostly showed infection by Staphylococcus and mixed flora in others.**Key message:** Majority of chronic dacryocystitis cases in this part of the country are caused by Pseudomonas species and Staphylococcus aureus. Whereas the acute cases mostly showed infection by Staphylococcus and mixed flora in others.This is an Open Access (OA) journal, and articles are distributed under the terms of the [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/), which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.For reprints contact: [reprint@ipinnovative.com](mailto:reprint@ipinnovative.com)

## 1. Introduction

Dacryocystitis is an inflammation of the lacrimal sac, which usually occurs because of obstruction of the nasolacrimal duct. The obstruction may be an idiopathic congenital stenosis or may be secondary to trauma, neoplasm, infection, or mechanical obstruction. Distal obstruction of the duct converts the lacrimal sac into a stagnant pool, which

easily becomes infected leading to chronic dacryocystitis with epiphora and purulent discharge. The naso lacrimal system is predisposed to infection as it is connected with conjunctiva and nasal mucosa both of which contain endogenous organisms. It can present as a variety of clinical presentations ranging from tenderness and swelling of the overlying tissues to a frank lacrimal abscess.<sup>1-4</sup> If not managed properly lacrimal abscess can progress to orbital cellulitis, there after superior ophthalmic vein thrombosis, and cavernous sinus thrombosis in some cases.<sup>5-7</sup>

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Dacryocystitis is an annoying and sometimes an eye threatening ophthalmic problem, which affects mostly middle aged and elderly women.<sup>8</sup> According to studies in the past *Staphylococcus epidermidis* and *Staphylococcus aureus* are the most frequently isolated organisms in adult lacrimal sac infections.<sup>9,10</sup>

The treatment of this disease in adults is surgery, either external or endonasal dacryocystorhinostomy (DCR), or occasionally silicone intubation<sup>11</sup>. There is a risk of soft tissue infection after open lacrimal surgery without systemic antibiotic prophylaxis and is a significant risk of failure in lacrimal surgery. Knowledge of the bacteriology helps us to select prophylactic antimicrobial agents.

This study will highlight the major causative agents in the south eastern region of Assam and will limit the misuse of antibiotics resulting in anti-microbial resistance. Our study will help the ophthalmologists to use specific antibiotics targeting the causative organisms and benefit the patient as well as to reduce the incidence of drug resistance. No such study was carried out in the past in this part of the country.

## 2. Materials and Methods

A permission was taken from Silchar medical College ethical Committee for conducting this study. A prospective study was done over a period of 4years on patients who attended the ophthalmology outpatient department of our medical college during the period from 1st November 2015 to 31st October 2019

Patients with written consent with willingness to participate in the study were taken up for the study. Clinically diagnosed cases of acute dacryocystitis and patients of chronic dacryocystitis undergoing external dacryocystorhinostomy (Ext- DCR) and dacryocystectomy of either sex, site, and age group of 15 to 65 years were included in this study.

Patients in extremes of ages, inflammatory diseases such as sarcoidosis and Wegener's granulomatosis, trauma, surgical injury, post dacryocystectomy, and foreign bodies.

Primary or secondary tumors or neoplasms of the lacrimal sac and duct or arising in the adjacent sinuses were excluded from this study. Patients who underwent any lacrimal surgery in the past were excluded.

Patients who received topical or systemic antibiotic in the past 1 week during their visit were excluded from the study.

The study was carried out in accordance to the ethical guidelines of Declaration of Helsinki and institutional ethical committee approval was taken before the commencement of the study. An informed consent was obtained from the patients. Patients were diagnosed with detailed history taking, slit lamp examination and by lacrimal syringing. Clinically diagnosed cases of chronic dacryocystitis were operated for Ext-DCR or DCT after relevant investigations. Posterior lacrimal flap was used as the sample in case of operated cases. In cases where

patients presented with acute form sample was collected from purulent discharge from ulcerated area or it has been collected after performing incision and drainage of lacrimal abscess. The materials were collected with sterile cotton swabs or the DCR posterior flap was sent to Department of the Microbiology, Silchar Medical College and Hospital. The specimens received in were inoculated immediately on MacConkey agar and Blood agar and incubated for 16-18 hours overnight at 37°C under aerobic conditions. Organisms grown were identified using gram staining and biochemical reactions and antibiotic sensitivity was done by Kirby-Bauer disc {the Clinical and Laboratory Standards Institute 2016}. Bacterial inoculums for antibiotic susceptibility testing was prepared from 4-5 well isolated colonies from a pure culture in 5ml of sterile peptone water. It was incubated at 37 degree Celsius until a slightly visible turbidity appeared (usually 2 hours) and the turbidity of the inoculum was compared with standard 0.5 McFarland. Standardized bacterial inoculum was cultured on Mueller Hinton agar using a sterile swab and evenly spreading in 3 directions of the agar plate to obtain a uniform growth. The inoculated plates were allowed to dry for 3-5 mins at 37 degree Celsius. Blood agar was used instead of MHA for testing *Streptococcus* species. Appropriate antibiotic disc was applied and incubated at 37°C for 16-18 hours. The diameter of the zone of inhibition was then measured.

## 3. Results

Total of 304 adult patients were included in the study; 116 males and 188 females. Of the 304 specimens received from the patients 116 (38.16%) showed growth of organisms and 188 were sterile (Tables 1 and 2).

The growth consisted of both gram positive and gram-negative bacteria and 8 specimen showed mixed growth. The predominant organism was gram negative *Pseudomonas* (36/116; 31.03%). Among gram positive bacteria predominant was *Staphylococcus aureus* (28/116:24.14 %). (Table 3) One specimen showed mixed growth of *Klebsiella* species and *Streptococcus pneumoniae* (4/116:3.45%) and another specimen showed mixed growth of *Klebsiella* species and *Staphylococcus aureus* (4/116:3.45%). The following table (Table 4) shows the organisms isolated in the study.

**Table 1:** Result of culture of specimen

<b>Total</b>	304
<b>Growth</b>	116
<b>No growth</b>	188
<b>% of growth</b>	38.16%

**Table 2:** The male: female ratio of the specimen showing growth of organisms

Gender	Total tested	Growth of organisms seen	
Male	116	40	
Female	188	76	
2a: acute and chronic cases in male and females			
Gender	Total	Acute	Chronic
Male	116	36	80
Female	188	60	128
Total	304	96	208
2b: Culture positive acute and chronic cases:			
Gender	Chronic	Acute	Total
Male	16	24	40
Female	28	48	76
Total	44	72	116

**Table 3:** Age wise distribution of the specimen showing growth of organisms

Age group	No. of cases
21-30	20
31-40	12
41-50	36
51-60	28
61-70	16
71-80	4

**Table 4:** Organisms on culture

	Organism	No. of cases	Percentage
Gram positive	Staphylococcus aureus	28	24.12
	Streptococcus pneumoniae	12	10.34
	Pseudomonas	36	31.03
Gram negative	Klebsiella	24	20.9
	Acinetobacter	8	6.9
	Klebsiella+Streptococcus pneumoniae	4	3.45
Mixed	Klebsiella+Staphylococcus aureus	4	3.45

#### 4. Discussion

Mucosa of the lacrimal sac is usually highly resistant to infection but can be triggered by distal obstruction of the nasolacrimal duct. Chronic dacryocystitis is more common and has several stages of presentation like epiphora, mucoid discharge, conjunctival hyperemia and chronic dacryocystitis. There appears to be geographical variation in the bacteriological profile of chronic dacryocystitis. There are relatively few studies about the bacteriological profile of lacrimal sac infection. Therefore, this study concerns about changing trends in the spectrum of dacryocystitis and with their antimicrobial susceptibility pattern. In the present study, specimens were obtained directly from the lacrimal sac under the operating microscope while making the sac flap for external-DCR which give less chance for collection contamination. In the pre-antibiotic era streptococci was very common causative agent of chronic dacryocystitis however after the discovery of effective antibiotic like Penicillin and Cephalosporins, streptococci were replaced by staphylococci-notoriously known to acquire drug

resistance.<sup>12,13</sup> This finding was concordant with our study which showed second most frequently isolated organism as Staphylococcus aureus (24.14%) Some study have also reported gram negative bacteria like Pseudomonas, Enterobacter, Citrobacter species.<sup>13</sup> This correlated with our study which showed predominant organisms as Pseudomonas (31.03%), followed by Klebsiella (20.4%) In our study, female (76 cases, 65%) preponderance which was concordant with other studies<sup>10,13</sup>. In our study, the predominant age group was 41-50 years. Similar findings were reported in other studies.

In a study conducted in the region a decade ago which concentrated only on the bacteriology the majority of the organisms were gram-positive bacteria, (75%), with a predominance of staphylococcus species and gram-negative bacteria were isolated in 25% of the specimens with predominance of Pseudomonas aeruginosa.<sup>14</sup>

Our study showed predominance in females (188) as compared to males (116).

Antibiogram of the predominant gram-negative organism *Pseudomonas*

Antibiotic	R	S	%R
Meropenem	0	36	0
Piperacillin tazobactam	0	36	0
Gentamicin	0	36	0
Ceftriaxone	16	20	44
Ceftazidime	0	36	0
Cefuroxime	28	8	77
Moxifloxacin	0	36	0
Ciprofloxacin	0	36	0
Co- trimoxazole	0	36	0
Amoxiclav	12	24	33
Cefpodoxime	20	16	56

Antibiogram of most common gram-positive organism *Staphylococcus Aureus*

Antibiotic	R	S	%R
Ampicillin	8		100
Amoxiclav	8		100
Azithromycin	4		100
Ciprofloxacin	4	24	16.6
Moxifloxacin	4	24	16.6
Gentamycin	4	24	16.6
Ceftriaxone	0	28	0
Cefpodoxime	0	28	0
Cefoxitime	0	28	0
Linezolid	0	28	0
Vancomycin	0	28	0

Out of 116 culture positive cases, there were 28 isolates of *Staphylococcus aureus*, 12 isolates of *Streptococcus pneumoniae*, 36 isolates of *Pseudomonas*, 24 isolates of *Klebsiella*, 8 isolates of *Acinetobacter* and 8 mixed isolates (*Klebsiella* sps + *Streptococcus pneumoniae* & *Staphylococcus aureus* + *Klebsiella*). In the antimicrobial susceptibility of predominant organism none of the *S. Aureus* isolates showed methicillin resistance. All isolates were sensitive to cephalosporin, linezolid, vancomycin Aminoglycosides (gentamicin), fluoroquinolones (moxifloxacin, ciprofloxacin) and macrolides (azithromycin) showed 86% sensitivity. Higher rates of resistance was seen in ampicillin and amoxycillin-clavulanic acid (71% sensitive).

In *Pseudomonas* species isolated, showed resistance towards third generation cephalosporins like ceftriaxone (56% sensitive), cefuroxime (23% sensitive), cefpodoxime (44% sensitive) as well as Amoxicillin-clavulanic acid (66% sensitive). The isolates were cent percent sensitive towards higher antibiotics like meropenem, piperacillin-tazobactam, aminoglycoside (gentamicin), fluoroquinolone (moxifloxacin, ciprofloxacin) and co-trimoxazole. It must be noted that, we did only aerobic culture of the specimens. Incorporation of anaerobic culture would have enhanced the outcome of our study and inclusion of large sample size would have given a better picture.

## 5. Conclusion

Therefore, the findings in our study suggests that majority of acute or chronic dacryocystitis cases in this part of the country are caused by *Pseudomonas* species and *Staphylococcus aureus*. Absence of methicillin resistance *Staphylococcus aureus* is a positive finding in the study but frequent use of cephalosporins have gradually expressed increase in resistance pattern in the gram negative organisms which has to be confirmed using molecular technique for a better picture of the scenario but is an indicator to exercise control over the rampant usage of antibiotics by the treating ophthalmologists.

## 6. Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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None.

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