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A Bacteriological Study of Chronic Dacryocystitis in a Tertiary Care Hospital

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ABSTRACT

Background and Objectives: Dacryocystitis is an infection and an inflammation of lacrimal sac and is an important cause of ocular morbidity in India both in adults and in children. The aim of the study is to isolate and identify the bacterial patterns associated with dacryocystitis and to determine their antibacterial sensitivity pattern. Materials and methods: A total of 50 lacrimal swab materials were subjected to bacterial analysis. Children less than 8 years were not included in the study. Results: The bacteria of six different species were isolated from (43/50) 86% culture positive samples. Staphylococcus aureus were the most common bacteria accounting for 30.33% followed by Klebsiella oxytoca (25.58%), Staphylococcus epidermidis (18.61%), Diphtheroids (11.63%), Pseudomonas (9.30%), Enterococcus spp (4.65%). Rate of infection was higher in females (93.33%) than in males (83.33%). Infection was higher among the age group >60 years (48%) followed by the age groups 40-60 years (36%), and <40 years (16%). In antibiogram, Vancomycin was effective against gram positive isolates and Gentamicin/Amikacin were effective against gram negative isolates. Conclusion: Staphylococcus aureus was the most frequently isolated bacteria sensitive to Vancomycin, followed by Klebsiella oxytoca which is sensitive to Gentamicin/Amikacin.

KEYWORDS Chronic dacryocystitis, Lacrimal sac, Nasolacrimal duct, antibacterial sensitivity pattern

Introduction:

Dacryocystitis is the most frequent disease of the efferent lacrimal system.[1] Dacryocystitis is the inflammation of the lacrimal sac which is usually because of nasolacrimal duct obstruction or may be secondary to trauma, inflammation, neoplasm. The obstruction of the canal leads to a stagnation of tears and creates a pathological environment. It builds up material within the lacrimal sac leading to an exacerbated infection and more stasis. The normal flora of the eye and nose acts as an opportunistic pathogen and causes infection of lacrimal sac. The infection in dacryocystitis can spread to the anterior orbit causing marked edema of the eyelids or can develop into a pre-septal or orbital cellulitis. A delay in management may lead not only to secondary infection in the remaining years of life but also ultimately to blindness.

Knowledge of the bacteriology of dacryocystitis contributes significantly to the proper choice of prophylactic antimicrobial agents. Though various regional studies on microbial analysis of dacryocystitis and their sensitivity pattern towards different antibiotics are available, there is still a considerable scope in these studies to document the change in the pattern, if any, of the pathogens in dacryocystitis according to the age group, gender, type of dacryocystiis; and this will help to reduce unnecessary load of antimicrobial agents. Further this will help in enhancing the understanding of the interrelationship between human and microorganisms and the virulence of specific microbial pathogens.

Hence, this study was planned to find out the bacterial etiology of dacryocystitis among a population in a tropical climate and the antibacterial sensitivity so that exclusive management protocols may be formulated.

Materials and Methods:

A cross-sectional study was carried out from April 2014 to September 2014 at Tirunelveli Medical College, Tirunelveli, Tamil Nadu. The patients of chronic dacryocystitis above 15 years of age were included in the study.

Inclusion criteria:

Clinically diagnosed cases of dacryocystitis were included in the study.

Exclusion criteria:

The patients who had received either topical or systemic antibiotics for at least 48 hours before their visit to the hospital were excluded.

Sample collection and processing:

An informed consent was obtained from all patients who were enrolled. The specimens were collected with the help of an ophthalmologist. The surrounding area was aseptically cleaned, to avoid contamination from the surface microorganisms. Duplicate sterile cotton swabs were used for collection of discharge from the lacrimal punctum of infected lacrimal sac, ensuring that the lid margin or conjunctiva was not touched. One swab was used for Gram's staining and the second one for inoculation into culture media like BHI broth, Blood agar and Chocolate agar plates. The inoculated BHI broth and Blood agar was inoculated at 37°C for 24 to 48 hours in the presence of 5-10% carbon dioxide. After 24 hours of incubation, the plates were taken out from the incubator and the colonies were examined for isolation and identification of organisms. In case of mixed growth, the Gram's stain was done separately from the morphologically-different colonies and the colonial charac-

teristics will be studied. The different colonies from which Gram' staining were further sub-cultured according to the Gram' staining nature and characteristics.

Identification of the microorganisms was done using various biochemical as well as routine tests. The antibiotic susceptibility pattern was done by Kirby-Bauer disc diffusion method.

Results:
Out of 50, 43(86%) samples showed positive growth and 43 microorganisms of six different species were isolated and seven samples were culture negative including gram positive isolates 28 (65.12%) and gram negative being 15 (34.88%). **(Table-1&2)** *Staphylococcus aureus* and *Klebsiella oxytoca* were the most frequently isolated gram positive organisms and gram negative organisms respectively.

TABLE: 1
Distribution of Dacryocystitis cases according to spectrum of Gram-Positive Organisms.

S. No	Organisms	No. of cases	Total (%)
1	Enterococci	2	4.65%
2	Diphtheroids	5	11.63%
3	Staphylococcus aureus	13	30.23%
4	Staphylococcus epidermidis	8	18.61%
Total		28	65.12%

TABLE: 2
Distribution of Dacryocystitis cases according to spectrum of Gram-Negative Organisms.

S. No	Organisms	No. of cases	Total (%)
1	Klebsiella oxytoca	4	25.8%
2	Pseudomonas	11	9.30%
Total		15	34.88%

In this study, females were affected more i.e., 28 (93.33) as compared to males 15 (83.33%) . The male to female ratio was 1.87:1 . This study showed the highest number of dacryocystitis cases among the people who were in the age group of >60 years (48%), followed by those in the age group 40-60 years (38%), those in the age group <40 years (16%). Out of 43 growth positive- samples, a higher proportion of growth was found in left eye (51.16%) than in right eye (37.21%) or bilateral i.e both eyes (11.63%).The antibiotic sensitivity test was done for all the isolates which is shown in the

TABLE:3
Antibiotic sensitivity among Gram-Positive isolates.

Sl. No	Antibiotics	Susceptibility of Microorganisms			Total
		Enterococcus (2)	Staph aureus (13)	Staph epidermidis (8)	
1	Erythromycin	2 (100%)	13 (100%)	7 (87.5%)	95.83%
2	Clindamycin	2 (100%)	12 (92.3%)	7 (87.5%)	93.27%
3	Doxycycline	1 (50%)	13 (100%)	7 (87.5%)	79.17%
4	Ciprofloxacin	2 (100%)	11 (84.61%)	8 (100%)	94.87%
5	Vancomycin	2 (100%)	12 (92.3%)	8 (100%)	97.43%

TABLE:4
Antibiotic susceptibility pattern among Gram-Negative isolates.

Sl. No	Antibiotics	Susceptibility of Microorganisms			Total
		Klebsiella oxytoca (11)	Pseudomonas (4)		
1	Gentamicin	11 (100%)	3 (75%)	87.5%	95.83%
2	Amikacin	11 (100%)	3 (75%)	87.5%	93.27%
3	Streptomycin	10 (90.97%)	3 (75%)	82.96%	79.17%
4	Cephalexin	8 (72.73%)	4 (100%)	86.37%	94.87%
5	Doxycycline	6 (54.55%)	4 (100%)	77.28%	97.43%

Discussion:
The most common infection of lacrimal apparatus is Dacryocystitis. The lacrimal excretory system is prone to infection and inflammation for various reasons. This mucous membrane-lined tract is contiguous with two surfaces (conjunctival and nasal mucosa) that are normally colonized by bacteria. The functional purpose of lacrimal excretory system is to drain tears from eye to nasal cavity. Obstruction of the nasolacrimal duct from whatever source results in stasis with accumulation of tears, desquamated cells and mucoid secretions superior to the obstruction. This creates a fertile environment for secondary bacterial infection.

Chronic dacryocystitis is significantly more common in the age above 30 years. Worldwide, chronic dacryocystitis has been reported to be much more common in females than males, having a sex ratio 3.99:1 [3]Female predominance with a 3:1 ratio (due to obliteration of lumen) was reported. [4]In this study also, female predominance was seen with the female to male ratio 1.87:1**.** This predilection is due to the smaller nasolacrimal canal diameter in females than in males and hormonal factors[5]. Females blew the nose infrequently as compared to males, which may have caused stagnation of secretions, leading to infections[6]. The process act as a potential nidus for the organisms to propagate within the sac, causing inflammation, hyperemia, edema and hypertrophy of the mucosal epithelium. Accumulation of mucoid and mucopurulent exudates causes the sac to dilate, ultimately leading to pyocele[9].

Altogether, 50 samples were collected and processed, of which 43 (86%) showed positive results and remaining 7(14%) showed negative results. In this study, the involvement of the eye was unilateral (88.37%) either the right or the left eye and there was also bilateral cases (11.63%). This correlated with the findings of Ghose et al. [7] There was a relatively high incidence on the left side (51.16%) as compared to the right side (37.21%).This correlated well with the findings of Brooki et al**.,** in which the left lacrimal sac is involved in 36 patients (58%).[8] In general the disease had predilection to the left side, especially in females, because of the narrow bony canal. The nasolacrimal duct and the lacrimal fossa formed a greater angle on the right side than on the left side[5]. The bacterial isolates have been changing from time to time and from place to place.

Of 43 isolates 28 (65.12%) were Gram positive and 15 (34.88%) were Gram negative. The gram positive or obtained in descending order are *Staphylococcus aureus, Staphylococcus epidermidis, Diphtheroids, Enterococcus spp* and the gram negative organisms are *Klebsiella oxytoca, Pseudomonas***.** The anti-microbial sensitivity pattern varies from community to community. This is because of the emergence of resistant strains as a result of irrational use of antibiotics. The gram positives were most sensitive to Vancomycin (97.43%), followed by Erythromycin (95.83%), Ciprofloxacin (94.87%),

Clindamycin (93.27%) and Doxycycline (79.17%). The gram negatives were sensitive to Gentamicin and Amikacin equally to about (87.5%) followed by Ceftriaxone (86.37%), Streptomycin (82.96%) and Doxycycline (77.28%). Overall Vancomycin and Gentamycin/Amikacin were found to be effective drug of choice for gram positive and gram negative organisms. In this study the limitations were time and the number of patients. For better outcomes a larger study population for a longer period of time should be undertaken to know the bacteriology and effective drugs of choice for chronic dacryocystitis. A comparative study of the bacteriology and anti-microbial susceptibility of both chronic and acute dacryocystitis would be very fruitful.

Conclusion:

The frequency of isolation of Gram positive organisms is higher than that of Gram negative and predominantly affect females than males involving mostly the left eye as compared to the right eye. *Staphylococcus aureus* was the most frequently isolated gram positive bacteria sensitive to Vancomycin and *Klebsiella oxytoca* was the most common among Gram negative bacteria sensitive to Gentamicin/Amikacin in chronic dacryocystitis.

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