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MICROBIOLOGICAL SPECTRUM OF DACROCYSTITIS IN A TERTIARY CARE TEACHING HOSPITAL.

microbiology

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ABSTRACT

Introduction: The aim of the study is to determine microbiological spectrum of acute and chronic dacrocystitis and their antibiotic susceptibility pattern in a tertiary care teaching hospital.

Materials and methods: This prospective observational study was carried out in the department of microbiology and ophthalmology of a tertiary care teaching hospital. 205 were patients diagnosed with dacrocystitis and catagorised into acute and chronic dacrocystitis. Specimens for microbiological analysis were collected under strict aseptic precautions from dacrocystitis. All specimens were subjected to standard microbiological procedures. methicillin resistant Staphylococcus aureus(MRSA) and extended spectrum of beta lactamases(ESBL) strains were also detected as per CLSI guidelines.

Results: A total of 205 specimens were collected from cases of dacrocystitis. 55(26.83%) specimens were from acute dacrocystitis and 150 (73.17%) specimens were from chronic dacrocystitis. Culture positivity was high in the specimens collected from chronic dacrocystitis(110/150;73.33%). Overall Staphylococcus.aureus was the predominant pathogen found in both acute 9(29.03%) and chronic dacrocystitis 27(24.55%). Among Gram negative bacilli, H. influenza 4(12.90%) was found to be the predominant pathogen in specimens collected from acute dacrocystitis and preponderance Pseudomonas aeruginosa9(8.19%) was revealed in specimens collected from chronic dacrocystitis. 33.33% were found to be methicillin resistant Staphylococcus aureus(MRSA) in acute dacrocystitis. In chronic dacrocystitis 40.74% strains of S.aureus were found to be MRSA. Out of 8 Gram negative bacilli, E.coli(25%) was found to be ESBL producers from cases of acute dacrcystits. Among 39 isolates of Gram negative bacilli, E.coli(7.62%) and Klebsiella species(10.26%) were found to be ESBL producers in chronic dacrocystitis.

Conclusion: Stahylococcus aureus was the predominant organism isolated from acute and chronic dacrocystitis. Gram positive cocci from both acute and chronic dacrocystitis were highly susceptible to cefazolin and vancomycin. Efficacy of amikacin was high towards Gram positive and Gram negative bacteria.

KEYWORDS

Acute dacrocystitis, Chronic dacrocystitis, MRSA.

Introduction:

Dacryocystitis is an inflammation of the lacrimal sac, which usually occurs because of obstruction of the nasolacrimal duct.1 Dacrocystitis might present in two forms, acute and chronic dacrocystitis. Acute dacryocystitis is an acute inflammation of the lacrimal sac secondary to nasolacrimal duct obstruction and possibly bacterial overgrowth in the stagnant fluid in the lacrimal sac. There is a varied spectrum of its clinical presentations ranging from tenderness and erythema of the overlying tissues to a frank lacrimal abscess.2 Chronic dacryocystitis is more common than acute dacryocystitis and has several stages of presentation like epiphora, mucoid discharge, conjunctival hyperaemia and chronic conjunctivitis.2

It is an important cause of ocular morbidity in India. It is the most common cause of epiphora and may presentwith or without mucopurulent discharge.3 Untreated lacrimal abscess can progress to orbital cellulitis, superior ophthalmic vein thrombosis, and cavernous sinus thrombosis.4The studies have shown that microbial spectrum differs in chronic and acute dacryocystitis. Most articles in the literature have discussed the microbiologic spectrum of chronic dacryocystitis and very few dealt with acute dacryocystitis.5

There are distinct patterns of geographical variation in terms of etiology. Knowledge on microbial spectrum of dacrocystitis in a particular region is essential. In recent years, there has been an increase in the incidence and the prevalence of multi drug resistant bacteria such as methicillin resistant Staphylococcus aureus(MRSA) and extended spectrum of beta lactamases(ESBLs). Currently, there is a paucity of data on multi drug resistant bacteria involved in dacrocystitis, especially in this region.

Hence, we aimed to focus light on microbial spectrum of acute and chronic dacrocystitis along with their antibiotic susceptibility pattern.

Materials and methods:

This prospective observational study was conducted in the department of microbiology and ophthalmology, Vinayaka missions medical college, Karaikal from March 2015 to June 2017. All the patients diagnosed with dacrocystitis were catagorised into acute and chronic dacrocystitis. Acute dacryocystitis was diagnosed in patients with pain, redness, and swelling in the lacrimal sac area. Patients with persistent epiphora and regurgitation of mucopurulent material on pressure over the sac area or during irrigation of the lacrimal drainage system are diagnosed as chronic dacrocystitis.

Specimens for microbiological analysis were collected under strict aseptic precautions. In cases of acute dacryocystitis, along with conjunctival swab, pus discharge following spontaneous bursting of abscess and/or following incision and drainage was also taken. In cases of chronic dacryocystitis, those cases with mucoid or mucopurulent discharge on syringing of the lacrimal sac.6

Inclusion criteria:

Clinically diagnosed cases of acute and chronic dacrocystis were included in the study.

Exclusion criteria:

Patients who had antibiotics in past seven days were excluded.

All the specimens collected from patients were inoculated on aerobic and anerobic bacteriological media (5% sheep blood agar, chocolate agar, Mac Conkey agar and thioglycollate broth). And also inoculated on Sabouraud s dextrose agar and processed according to standard microbiological procedures.7

MRSA and ESBL strains were also detected as per CLSI guidelines, 2014 8.

MRSA detection:
The phenotypic test for the detection of MRSA was done by using a cefoxitin (30 µg) disc. A zone of inhibition which was equal to or more than 22 mm was considered as susceptible to Cefoxitin and the organism was reported as Methicillin Sensitive *Staphylococcus aureus*. Those isolates which produced a zone of inhibition less than or equal to 21 mm were considered as Methicillin Resistant *Staphylococcus aureus* (MRSA).

Quality control strains:
Methicillin sensitive *S. aureus* (MSSA) ATCC 25923
Methicillin resistant *S. aureus* (MRSA) ATCC 43300

ESBL detection:
ESBL production was confirmed by using discs of Ceftazidime (30 µg) and Ceftazidime Clavulanic acid (30/10µg) respectively. The test organism was inoculated as a lawn on a Muellar Hinton agar plate and the above mentioned discs were placed on the plate. The plates were incubated at 37^{0}C overnight and they were examined next day. An increase in the zone diameter, which was equal to or more than 5 mm for the antimicrobial agent which was tested in combination with clavulanic acid, in comparison to the antimicrobial which was tested alone, indicated that the strain was an ESBL producer.

Quality control strains:
K. pneumoniae ATCC 700603 (ESBL positive control)
E. coli ATCC 25922 (ESBL negative control)

Results:
A total of 205 specimens were collected from cases of dacrocystitis. 55 (26.83%) specimens were from acute dacrocystitis and 150 (73.17%) specimens were from chronic dacrocystitis. 121(85.82%) specimens yielded monomicrobial growth and 20(14.18%) specimens yielded polymicrobial growth. Culture positivity was high in the specimens collected from chronic dacrocystitis(110/150;73.33%) compared to acute dacrocystitis(31/55;56.36%). Out of 205, female patients were 167(81.46%) and male patients were only 38(18.54%) in both acute and chronic dacrocystitis. Majority of patients in our study were between the age group of 30-55 years (87%). Overall 31 organisms isolated from cases of acute dacrocystitis. Staphylococcus aureus 9(29.03%) was the predominant bacteria isolated. Streptococcus pneumoniae 7(22.58%) and S.epidermidis(22.58%) were the second commonest pathogens grown. H.influenzae 4 (12.90%) was the common pathogen isolated among Gram negative bacilli. Escherichia coli 2 and Pseudomonas aeruginosa 2 both together accounted for (12.90%).Table.1. In acute dacrocystitis no anerobic bacteria and no fungi were isolated.

Table 1: Organisms isolated from acute dacrocystitis

Organism	Number (%)
Stahylococcus aureus	9(29.03%)
Streptococcus pneumonia	7(22.58%)
Stahylococcus epidermidis	7(22.58%)
Haemophilus influenzae	4(12.90%)
Escherichia coli	2(6.45%)
Pseudomonas aeruginosa	2(6.45%)
TOTAL	31(100%)

Again S.aureus 27(24.55%) was the predominant pathogen isolated from chronic dacrocystitis.This was followed by Stahylococcus epidermidis 21(19.09%) and Streptococcus pneumoniae17(15.45%). In chronic dacrocystitis, among Gram negative bacilli Pseudomonas aeruginosa 9(8.19%) was frequently isolated pathogen. Three specimens collected from chronic dacrocystitis, anerobic bacteria Bacteroides(2.73%) were isolated. Fungal pathogens, Candida 2(1.82%) and Aspergillus 1(0.10%) were also isolated from chronic dacrocystitis. Table.2

Table 2: Organisms isolated from chronic dacrocystitis

Organism	Number(%)
Stahylococcus aureus	27(24.55%)
Stahylococcus epidermidis	21(19.09%)
Streptococcus pneumonia	17(15.45%)
Pseudomonas aeruginosa	9(8.19%)
Escherichia coli	7(6.36%)
Haemophilus influenza	7(6.36%)
Klebsiella species	6(5.45%)
Enterobacter	5(4.54%)
Proteus	3(2.73%)
Citrobacter	2(1.82%)
Bacteroides	3(2.73%)
Candida	2(1.82%)
Aspergillus	1(0.10%)

Table 3: Antibiotic susceptibility pattern of isolates from acute dacrocystitis

Bacterial isolate(n=31)	Cefazolin	Vancomycin	Ciprofloxacin	Moxifloxacin	Gentamycin	Amikacin	Tobramycin
S.aureus(9)	7(77.79%)	9(100%)	5(55.56%)	6(66.67%)	4(44.44%)	8(88.89%)	3(33.33%)
S.pneumoniae(7)	7(100%0	7(100%)	4(57.14%)	7(100%)	4(57.14%)	6(85.71%)	4(57.14%)
S.pidermidis(7)	7(100%)	7(100%)	4(57.14%)	44(57.14%)	1(14.28%)	5(71.43%)	2(28.57%)
H.fluenza(4)	2(50%)	NT	1(25%)	3(75%)	1(25%)	3(75%)	2(50%)
E. coli(2)	1(50%)	NT	0(0%)	1(50%)	1(50%)	2(100%)	1(100%)
P.aeruginosa(2)	1(50%)	NT	0(0%)	0(0%)	1(100%)	2(100%)	2(100%)

Table 4: Antibiotic susceptibility pattern of isolates from chronic dacrocystitis

Bacterial isolate(n=110)	Cefazolin	Vancomycin	Ciprofloxacin	Moxifloxacin	Gentamycin	Amikacin	Tobramycin
S.aureus(27)	21(77.78%)	24(88.89%)	15(55.56%)	17(62.69%)	8(29.63%)	22(81.48%)	17(62.96%)
S.epidermidis(21)	20(95.23%)	21(100%)	18(85.71%)	19(90.48%)	10(47.62%)	20(95.25%)	9(42.6%)
S.pneumoniae(17)	16(94.12%)	16(94.12%)	15(88.24%)	15(88.24%)	7(41.18%)	15(88.24%)	12(70.59%)
P.aeruginosa(9)	1(11.11%)	NT	4(44.44%)	4(44.44%)	2(22.22%)	6(66.67%)	3(33.33%)
E. coli(7)	4(57.14%)	NT	3(42.85%)	5(71.43%)	1(14.29%)	7(100%)	5(71.43%)
H.influenzae(7)	2(28.57%)	NT	7(100%)	6(85.71%)	2(28.57%)	6(85.71%)	5(71.43%)
Klebsiella(6)	3(50%)	NT	6(100%)	6(100%)	3(50%)	6(100%)	5(83.33%)
Enterobacter(5)	3(60%)	NT	5(100%)	5(100%)	3(60%)	5(100%)	4(80%)
Proteus(3)	1(33.33%)	NT	2(66.67%)	3(100%)	2(66.67%)	3(100%)	1(33.33%)
Citrobacter(2)	1(50%)	NT	1(50%)	2(100%)	1(50%)	2(100%)	1(50%)
Bacteroides(3)	1(33.33%)	2(66.67%)	3(100%)	3(100%)	2(66.67%)	3(100%)	1(33.33%)

Antibiotic susceptibility pattern of isolates were displayed in tables. (Table.3)(Table.4).

Among 9 isolates of Staphylococcus aureus, 3(33.33%) were found to be methicillin resistant Staphylococcus aureus(MRSA) in acute dacrocystitis. All MRSA strains were sensitive to vancomycin. Among 8 Gram negative bacilli from acute dacrocystitis,2(E.coli) were identified as extended spectrum of betalactamase(ESBL) producing strains. Both ESBL strains of E.coli were 100% resistant to tested quinolones except to moxifloxacin(50%).

In chronic dacrocystitis 11(40.74%) strains of S.aureus were found to be methicillin resistant Staphylococcus aureus(MRSA). Among 39 isolates of Gram negative bacilli, 3 strains of E.coli and 4 strains of Klebsiella species were found to be ESBL producers. All ESBL producing strains were susceptible to amikacin.

Discussion:
The most common inflammation of the lacrimal apparatus is

dacryocystitis. Lacrimal abscess is a very painful condition. Pathogenesis is believed to be microbial overgrowth in the stagnant fluid of the lacrimal sac in the background of nasolacrimal duct obstruction.9 Obstructed nasolacrimal duct may occur in any age group. Congenital blockage occurs in 3–6% of term infants. In majority of cases this is due to blockage of nasal end by epithelial debris or an imperforate mucosal membraneresulting from incomplete canalization of embryonic duct.10 Primary and secondary acquired nasolacrimal duct obstruction usually occurs mainly in middle-aged or older people. In our study 77% of cases were between the age group 30-60 years. According to Shakya et al , it was observed that the maximum numbers of dacryocystitis cases were found to be most common (54%) between 30 and 60 years of age.11Similar studies conducted by by Diggle, Duke-Elder , Reddy and Reddy, also showed maximum incidence in 35-65 years.12,13,14

In our study, overall females were predominantly affected in acute and chronic dacrocystitis which accounted for 81%.These results are similar to other studies conducted by Shakya et al 11 and Mallik and Chatterjee 15 in which the incidence of dacrocystitis was 81% and 71% respectively among females.Most probably cause for the preponderance of females could be due to excessive lacrimation, long stay in the kitchen with consequent greater exposure to soot, smoke, and heat. However, the anatomical factor of the narrow bony nasolacrimal canal appears to be more acceptable.11

In our study, Out of 55 specimens collected from cases of acute dacrocystitis, 31(56.36%) specimens yielded bacterial growth. No anerobic bacteria and fungi were isolated from acute dacrocystitis. Gram positive cocci was predominantly isolated and accounted for 74.19%. Among the gram-positive isolates, S. aureus was the most common organism noted, accounting for 39.13% of all the gram-positive isolates. Among Gram negative organisms H.influenzae (50%) was the predominant followed by E.coli(25%) and P.aeruginosa (25%). As per the study conducted by American Society of Ophthalmic Plastic and Reconstructive Surgery (ASOPRS)16 dacryocystitis group, it was found that 78.3% of the isolates were gram-positive and 21.7% were gram negative. S. aureus was the most common organism revealed and accounted for 50% of all the gram-positive isolates.In contrast, Briscoe et al. exclusively studied acute dacryocystitis in 39 patients and found the preponderance of gram-negative isolates (61%) with P. aeruginosa being the commonest isolate.17

In our study, out of 150 specimens collected from cases of chronic dacrocystitis, 150(73.33%) specimens yielded microbial growth.In chronic dacryocystitis, S.aureus27(24.55%) was found to be the predominant bacterial pathogen followed by S.epidermidis and S. pneumoniae, accounting for, 19.09% and 15.45% of the isolates, respectively. According to the study conducted by Sun et al 18, in chronic dacryocystitis, CoNS was found to be the predominant bacterial pathogen followed by S. aureus and S. pneumoniae, accounting for 44.2, 10.8, and 8.7% of the isolates, respectively. Among Gram negative bacilli, P.aeruginosa was the predominant bacteria isolated. In our study, 20 specimens from chronic dacrocystitis revealed more than one organism.

In our study Bacteroides was the only anaerobic bacteria isolated and accounted for 2.73%. However, anaerobic microorganisms have been isolated in as many as 15.7% of the positive cultures, in some studies, the most common genus being Bacteroides (5.7%). 18 Other commonly isolated anaerobic bacteria from dacrocystitis were Peptostreptococcus species, Propionibacterium species, Prevotella species and Fusobacterium species.19According to the study by Sun et al,18 the most frequently isolated fungi being Candida, although Aspergillus and Mucor may also be found.18 In our study, Candida and Aspergillus was isolated and accounted for 1.82% and 0.10% respectively.

Antibiotic susceptibility pattern revealed , cefazolin and vancomycin has a higher efficacy towards Gram positive cocci. Higher susceptibility rates were also found with amikacin compared to gentamycin and tobramycin towards Gram positive and Gram negative bacteria. Pathogens isolated from acute dacrocystitis are more susceptible than pathogens recovered from chronic dacrocystitis. In acute dacrocystitis, MRSA was found to be 33% whereas in chronic dacrocystitis, MRSA was 40%. All strains of MRSA from acute dacrocystitis were susceptible to vancomycin. But, 3 strains of MRSA isolated from chronic dacrocystitis showed resistance to all tested antibiotics including vancomycin. But, as per the study conducted by Mills et al, 15 methicillin-resistant Staphylococcus aureus(MRSA) have been isolated more frequently as etiologic agents in acute dacryocystitis than in chronic dacryocystitis.

Among Gram negative isolates from acute dacrocystitis, only two strains of E.coli were found to be extended spectrum of beta lactamases (ESBLs). Among 39 isolates of Gram negative bacilli, 3 strains of E.coli and 4 strains of Klebsiella species were found to be ESBL producers. All ESBL producing strains isolated from acute and chronic dacrocystitis were susceptible to amikacin.

Conclusion:

Stahylococcus aureus was the predominant organism isolated from acute and chronic dacrocystitis. Among Gram negative bacilli, H. influenza was found to be the predominant pathogen in specimens collected from acute dacrocystitis and preponderance Pseudomonas aeruginosa was revealed in specimens collected from chronic dacrocystitis. Bacterial strains isolated from chronic dacryocystitis showed higher resistance than those from acute cases. Gram positive cocci from both acute and chronic dacrocystitis were highly susceptible to cefazolin and vancomycin. Efficacy of amikacin was high towards Gram positive and Gram negative bacteria.

REFERENCES:

1. Iliff NT. Infections of the lacrimal drainage system. In: Peopse JS, Holland GN, Wilhelmus KR (eds). Ocular Infection and Immunity. Mosby: St Louis, MO, 1996, pp 1346–1355.
2. Ali MJ, Motukupally SR, Joshi SD, Naik MN.The microbiological profile of lacrimal abscess: two decades of experience from a tertiary eye care center. Journal of Ophthalmic Inflammation and Infection. 2013; 3:57.
3. Jacobs HB. Symptomatic epiphora. Br J Ophthalmol 1959;43:415-34.
4. Maheshwari R, Maheshwari S, Shah T . Acute dacryocystitis causing orbital cellulitis and abscess. Orbit.2009; 28:196–199.
5. Chaudhry IA, Shamsi FA, Al-Rashed W (2005) Bacteriology of chronic dacryocystitis in a tertiary eye care center. Ophthal Plast Reconstr Surg.2005; 21:207–210.
6. Bharathi MJ, Ramakrishnan R, Maneksha V, Shivakumar C, Nithya V, Mittal S. Comparative bacteriology of acute and chronic dacryocystitis. Eye. 2008;22:953-60.
7. Forbes BA, Sahm DF, Weissfeld AS. Chapter 13, Overview of bacterial identification methods and strategies. Bailey and Scott's diagnostic Microbiology, 12th ed. St.Louis: Mosby; 2007. p. 216-47.
8. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing; 24th informational supplement. CLSI M100-S24.2014; Clinical and Laboratory Standards Institute, Wayne, PA.
9. Cahill KV, Burns JA Management of acute dacryocystitis in adults. Ophthal Plast Reconstr Surg.1993; 9:38–42.
10. Kushner BJ. Congenital nasolacrimal system obstruction. Arch Ophthalmol 1982; 100: 697.
11. Shakya DK, Gandhi S, Adlakha N, Kujur R, Singh Chauhan HR, Ranjan KP. A clinico-bacteriological study of lacrimal regurgitate in cases of chronic dacryocystitis in a referral hospital in Madhya Pradesh. Int J Med Public Health 2015;5:270-3.
12. Diggle FH. Lacrymal obstruction: Its nasal origin and intranasal treatment. Br Med J 1927;2:933-5.
13. Duke-Elder S, MacFaul PA. Diseases of the lacrimal passages. System of Ophthalmology. St. Louis: CV Mosby; 1974. p. 674-770.
14. Reddy S, Reddy B. A clinicopathological study of chronic dacryocystitis. JAMA 1955;24:413.
15. Mallik SR, Chatterjee DL. Dacryocystography of normal and disturbed lacrimal passage. Orient Arch Ophthalmol 1970;8:5.
16. Mills DM, Bodman MG, Meyer DR, Morton AD. The microbiologic spectrum of acute dacryocystitis. A national study of acute versus chronic infection. Ophthal Plast Reconstr Surg.2007; 23:302–306.
17. Briscoe D, Rubowitz A, Assia E (2005) Changing bacterial isolates and antibiotic sensitivities of purulent dacryocystitis. Orbit 24:95–98.
18. Sun X, Liang Q, Luo S, Wang Z, Li R, Jin X. Microbiological analysis of chronic dacryocystitis. Ophthalmic Physiol Opt 2005; 25: 261–263.
19. Brook I, Frazier EH. Aerobic and anaerobic microbiology of dacryocystitis. Am J Ophthalmol. 1998;125(4):552–4.