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Clinico-Bacteriological Profile and Antibiogram of Chronic Dacryocystitis at a Tertiary Care Hospital in Belagavi, Karnataka.

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ABSTRACT

Background: Chronic dacryocystitis is an infection of the nasolacrimal sac caused due to obstruction of the nasolacrimal duct. Cases of chronic dacryocystitis if not treated on time, will lead to complications like conjunctivitis, corneal ulcer, lacrimal abscess, fistula or orbital cellulitis, endopthalmitis and hypopyon.

Aim: To study the current pattern of antibiogram of aerobic bacterial isolates from cases of chronic dacryocystitis.

Material and methods: This is a cross sectional study conducted over a period of one year by the Department of Microbiology and Ophthalmology at Jawaharlal Nehru Medical College, KAHER, Dr Prabhakar Kore Hospital, Belagavi. A total of 80 cases of chronic dacryocystitis which were clinically diagnosed at the ophthalmology OPD were included in this study. Discharge was collected using sterile cotton swab, ensuring not to touch the conjunctiva nor the eyelid margin. Specimens were then immediately sent to the Department of Microbiology for further process. Gram staining and inoculation on Blood agar and Macconkey agar was done followed by incubation of the plates at 37°C for 24 to 48 hours. Organisms were identified and antibiotic sensitivity testing by Kirby Bauer disc diffusion method was done according to the standard CLSI guidelines.

Results: Of the total 80 clinically diagnosed cases of chronic dacryocystitis, predominetly females 72.5% were affected than men. Majority of the patients were in the age group 41 to 50 years (32.5%) with mean age being 48.3±14.2. Majority, 56.25% were farmer by occupation, the right eye was seen to be more affected i.e 56.25%. 96.25% showed bacterial growth. Monobacterial growth was seen in 81.25% of the samples and 12% showed polybacterial. Gram positive cocci ie 68.75% was the predominant isolate compared to gram negative bacteria ie 31.25% Staphylococcus aureus (47.27%) was found to be the predominant isolate followed by Streptococcus pneumoniae (34.54%), Pseudomonas aeruginosa (20%) and Klebseilla pneumoniae (32%), CONS (9,09%) etc followed by remaining isolates. Staphylococcus aureus is found to be sensitive to vancomycin 92.3% and gentamycin 80.7%. 30.8%were found to be MRSA. Pseudomonas aeruginosa is sensitive to Ceftazidime/Clavulanic acid 100% followed by imipenem 90.9%.

Conclusion: Detection of causative organism of Chronicdacryocystitis and periodic study of their antibiogram will help the clinicians in effective patient management. All the hospitals mandatorily should incorporate antibiotic policy which should be updated timely based on local antibiotic susceptibility profile studies done in that hospital settings, which will not only help in empirical treatment but also will help to prevent antibiotic misuse and thus antibiotic resistance and treatment failure.

Introduction

Epiphora/ watering of eye is one of the most common clinical presentation in Opthalmology OPD. The Obstruction of Nasolacrimal ducts (NLD) dacryostenosis is the most common disorder seen in lacrimal system.[1] Inflammation of lacrimal sac resulting in NLD obstruction is called Dacryocystitis. Obstruction to NLD leads to bacterial colonization of nasolacrimal sac by converting it into a reservoir of infection. Dacryocystitis is classified into congenital and acquired Dacryocystitis. Further acquired into acute and chronic.[1] Patients with acute Dacryocystitis present with acute onset of redness, watering of eye, sudden severe eye pain and swelling over medial part of eye with or without oedema of lower lid & corresponding check.

Patients with chronic dacryocystitis is complain of continuous watering of the ice with mucoid mucopurulent discharge which regurgitate on pressure over the lacrimal sack area. It is associated with partial total obstruction of NLD. Staphylococcus aureus, streptococcus pneumoniae, pseudomonas and pneumococcus are the most common isolates seen to be associated with chronic dacryocystitis. With Staphylococcus epidermidis being the common commensal of lacrimal excretory system. And these cases of chronic dacryocystitis if not treated on time, will cause complications like conjunctivitis, corneal ulcer, lacrimal abscess, fistula or orbital cellulitis, endopthalmitis and hypopyon. Variation in causative agents of dacryocystitis based on geographical variation has been documented by many studies over the years.[2,3,4,5] Hence knowing the antibiogram of organism, causing chronic dacryocystitis in a particular area will help in choosing appropriate antibiotics for empirical treatment, preventing the occurrence of further complications. With this background, the present study was taken up to know the antibiogram of aerobic bacterial agents causing chronic dacryocystitis in the study setting.

Material and methods.

This is a cross sectional study conducted over a period of one year by the Department of Microbiology and Ophthalmology at Jawaharlal Nehru Medical College, KAHER, Dr Prabhakar Kore Hospital, Belagavi. Institutional ethical committee approval was taken prior to the study and informed concern was obtained from all the patients before the commencement of the study.

Inclusion criteria All the clinically diagnosed cases of NLD obstruction who were positive for regurgitation on pressure over the lacrimal sac test (ROPLAS), and those who had discharge on the lacrimal sac syringing were included in the study

Exclusion criteria Patients with congenital dacryocystitis and acute dacryocystitis. Patients who had received topical/systemic antibiotics in the past one week. Patients with nasal pathology like nasal polp, deviated nasal septum, rhinitis and angiofibroma were excluded from the study.

Sample collection

A total of 80 cases of chronic dacryocystitis which were clinically diagnosed at the ophthalmology OPD were included in this study. Demographic details like age, gender,

occupation, social status and residence area (Urban/rural) were also noted down on each patient proforma. The social status of the patient was then classified according to the modified Kuppuswamy scale as upper, upper middle,lower middle,upper lower, lower income group.[6]

Complete ocular examination of all the patients was done which included Snell's visual acuity chart to measure uncorrected visual acuity (DCVA) and best corrected visual acuity (BCVA), slitlamp evaluation was also done to roll out any other ocular pathology. Clinical examination of each patient including evaluation of nature of discharge, lacrimal sac patency, fullness in the lacrimal sac and nature of regurgitation material on pressure over the lacrimal sac and during the lacrimal sac syringing procedure was also noted. Lacrimal sac syringing was done after topically anaesthetising the conjunctival sac, lacrimal cannula is passed through the lower punctum and normal saline is injected. Patency of NLD was concluded when patient sensed saline in their nasal cavity with no reverse flow of saline through the punctum. Cases with regurgitation through punctum, the type of discharge was noted and collected using sterile cotton swab, ensuring not to touch the conjunctiva nor the eyelid margin.

Specimens were then immediately sent to the Department of Microbiology for further process. First swab was used for Gram staining and the second one for inoculation on Blood agar and Macconkey agar. These plates werethen incubated at 37°C for 24 to 48 hours and examined for colony morphology. Organisms were identified and antibiotic sensitivity testing by Kirby Bauer disc diffusion method was done according to the standard CLSI guidelines.[7,8]

Statistical analysis:

SPSS (statistical package for social sciences) version 22.0 was used for analysing the data and where presented in percentages

Results.

This is cross-sectional study which included 80 clinically diagnosed cases of chronic dacryocystitis. Table 1, depicts the social demographic profile of all cases of chronic dacryocystitisincluded in the study. Predominantly females 72.5% were affected than men. Majority of the patients were in the age group 41 to 50 years (32.5%) with mean age being 48.3±14.2. Majority, 56.25% were farmerby occupation and 75% with no comorbid condition, the right eye was seen to be more affected i.e 56.25% than the left eye.

Table 1: Distribution of chronic dacryocystitis cases according to socio-demographic profile.

Variables	Classification	Number of cases(n)	Percentage(%)
Age (years)	<30	18	22.5
	31-40	11	13.75
	41-50	26	32.5
	51-60	9	11.25
	>61	16	20
Gender	Male	22	27.5
	Female	58	72.5
Occupation	Stay at home	10	12.5
	Farmers	45	56.25
	Students	3	3.75

	Labourer	15	18.75
	Factory worker	7	8.75
Residency	Rural	58	72.5
	Urban	22	27.5
Socioeconomic status	Lower	45	56.25
	Upper lower	23	28.75
	Lower middle	7	8.75
	Upper middle	4	5
	Upper	1	1.25
Comorbid condition	Nil (Healthy)	60	75
	Sinusitis	8	10
	Diabetes mellitus	7	8.75
	Hypertension	5	6.25
Eye affected(lacterality)	Right (oculus dexter-OD)	45	56.25
	Left (oculus sinister-OS)	24	30
	Bilateral	11	13.75
Gram staining (n=80)	Positive	57	71.25
	Negative	23	28.75

Table 2: Distribution of various type of isolates (monobacterial growth or polybacterial or no growth)

	Type of growth	**Number of samples/cases**	**Percentage (%)**
Growth seen 77(96.25%)	Monobacterial growth	65	81.25
	Polybacterial growth	12	15
No growth 3(3.75%)	No growth	3	3.75

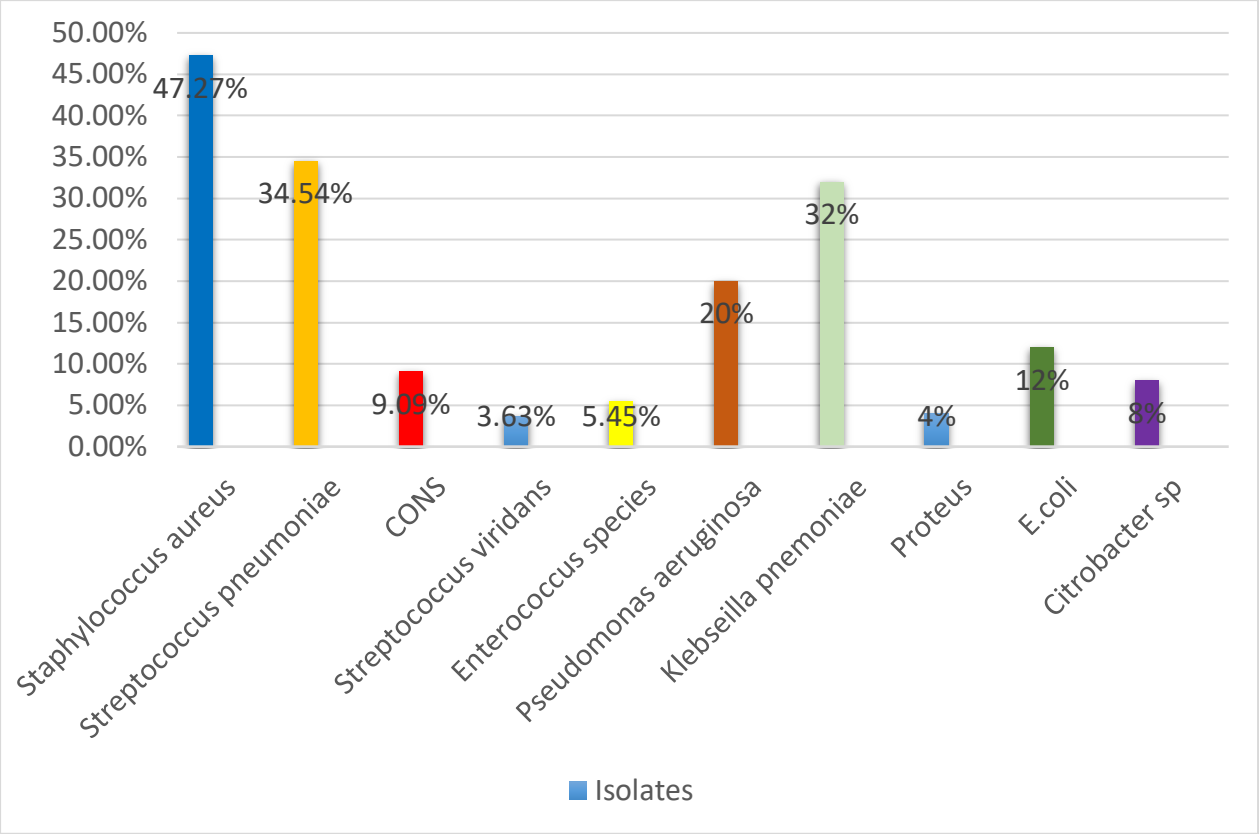
Of the samples processed majorityie 96.25%showed bacterial growth. Single type of bacteria, monobacterial growth was seen in 81.25% of the samples and 12% showed polybacterialie more than two types of bacterial growth and 3.75% did not show any growth.

Table 3 : Percentage of various organisms isolated from chronic dacryocystitis cases.

	Bacterial isolates	**Number (n=80)**	**Percentage (%)**
Gram positive cocci **n=55(68.75%)**	*Staphylococcus aureus*	26	47.27
	Streptococcus pneumoniae	19	34.54
	CONS	5	9.09
	Streptococcus viridans	2	3.63
	Enterococcus species	3	5.45
Gram negative bacilli **n=25(31.25%)**	*Pseudomonas aeruginosa*	11	20
	Klebseillapnemoniae	8	32
	Proteus	1	4

	E.coli	3	12
	Citrobacter sp	2	8

Graph 1 : Distribution of various organisms isolated from chronic dacryocystitis cases.



As seen from the table 3 and graph 1, predominant isolates were gram positive cocciie 68.75% compared to gram negative bacteriaie 31.25%

Staphylococcus aureus (47.27%) was found to be the predominant isolate followed by Streptococcuspneumoniae (34.54%), Pseudomonas aeruginosa (20%) and Klebseillapneumoniae (32%), CONS (9,09%) etcfollowed by remaining isolates.

Table 4: Distribution of chronic dacryocystitis patients based on clinical signs and symptoms

Clinical signs and symptoms	Number of patients (n=80)	Percentage (%)
Watering of eyes	80	100
Localised redness	75	93.75
Swelling over the nasolacrimal sac	37	46.25
Eye pain	66	82.5
Fever	17	21.25
Headache	21	26.25

Lacrimal abscess	4	5
Conjunctivitis	3	3.75
Discharge from the affected eye	6	7.5

As observed in table 4 which shows the distribution ofdacryocystitis patients based on clinical signs and symptoms who came to the OPD, all the patients had watering of the eye followed by localised redness (93.75%) and eye pain (82.5%). Other symptoms like fever, headache, swelling over the nasal lacrimal sac were less frequently seen.

Table 5: Distribution of discharge collected from chronic dacryocystitis cases according to their quantity, colour, consistency and gram stain

Clinical findings		**Number of cases (n=80)**	**Percentage (%)**
Colour	Colourless (watery)	57	71.25
	Mucoid	3	3.75
	Yellow	1	1.25
	White	9	11.25
	Green	10	12.5
Consistency	Watery	71	88.75
	Purulent	9	11.25
Quantity	Scanty	53	66.25
	Moderate	23	28.75
	Profuse	4	5
Gram stain	Both pus cells and bacteria	53	66.25
	Pus cells	57	71.25
	Bacteria	48	60
	None	23	28.75

By the observation of table 5 findings, majority of the discharge were colourless (watery)57% and scanty 66.25%. Both inflammatory cells and bacteria were seen in 66.25% of gram stain smears

Table 6: Antibiotic sensitivity pattern of Gram positive isolates (Gram positive cocci)

Antibiotics	**Staphylococcus aureus (n=26) Number(%)**	**Streptococcus pneumoniae (n=19) Number(%)**	**CONS (n=5) Number(%)**	**Streptococcus viridans (n=2) Number(%)**	**Enterococcus species (n=3) Number(%)**	**Total numberof sensitive isolate (n=55) Number(%)**
Cefoxitin (MSSA)	18(69.2)	-	-	-	-	-
Ceftazidime	12(46.15)	14(73.68)	4(80)	0	2(66.6)	32(58.18)
Amikacin	20(76.9)	7(36.8)	2(40)	1(50)	0	30(54.54)
Ampicillin	7(26.9)	6(31.5)	2(40)	0	0	15(27.27)

Ciprofloxacin	17(65.38)	10(52.63)	3(75)	0	0	30(54.54)
Vancomycin	24(92.3)	17(89.47)	4(80)	2(100)	3(100)	50(90.09)
Erythromycin	8(30.76)	7(36.8)	2(40)	0	0	17(30.9)
Tetracycline	19(73.07)	8(42.10)	2(40)	0	0	29(52.7)
Clindamycin	17(65.38)	9(47.3)	4(80)	0	3(100)	33(60)
Cefotaxime	20(76.9)	14(73.68)	3(75)	0	3(100)	40(72.72)
Linezolid	16(61.53)	12(63.15)	4(80)	0	0	32(58.18)
Chloramphenicol	19(73.07)	13(68.42)	0	2(100)	3(100)	37(67.27)
Cotrimoxazole	20(76.9)	8(42.10)	2(40)	0	0	30(54.54)
Teicoplanin	13(50)	9(47.3)	3(75)	0	0	25(45.45)
Gentamycin	21(80.7)	18(94.73)	4(80)	2(100)	0	45(81.81)
Ofloxacin	17(65.38)	11(57.89)	4(80)	0	0	32(58.18)

It's evident from the values from table 6 that, predominant Gram positive cocci, Staphylococcus aureusis found to be sensitive to vancomycin 92.3% and gentamycin 80.7%with least sensitive to erythromycin 30.76% and ampicillin 26.9%.Among the Staphylococcus aureus30.8%were found to be MRSA

Table 7: Antibiotic sensitivity pattern of Gram negative isolates (Gram negative bacilli)

Antibiotics	**Pseudomonas aeruginosa (n=11)** **Number(%)**	**Klebseillapneumoniae(n=8)** **Number(%)**	**Proteus (n=1)** **Number (%)**	**E.coli (n=3)** **Number (%)**	**Citrobacter sp. (n=2)** **Number (%)**	**Total no of sensitive isolates** **(n=25)** **Number(%)**
Amikacin	10(90.9)	6(75)	1(100)	3(100)	1(50)	21(84)
Ampicillin	9(81.8)	7(87.5)	1(100)	3(100)	0	20(80)
cefixime	9(81.8)	3(37.5)	0	2(66.6)	0	14(56)
Ciprofloxacin	8(72.7)	5(62.5)	0	0	0	13(52)
Cefotaxime	10(90.9)	6(75)	1(100)	0	1(50)	18(72)
Cefuroxime	6(54.5)	7(87.5)	0	3(100)	0	16(64)
Ceftazidime/Clavulanic acid	11(100)	8(100)	1(100)	3(100)	1(50)	24(96)
Ceftazidime	6(54.5)	3(37.5)	0	3(100)	1(50)	13(52)
Cotrimoxazole	7(63.6)	5(62.5)	1(100)	2(66.6)	0	15(60)
Imipenem	10(90.9)	7(87.5)	1(100)	2(66.6)	1(50)	21(84)
Chloramphenicol	5(45.4)	4(50)	0	2(66.6)	0	11(44)
Tetracycline	6(54.5)	2(25)	0	3(100)	0	11(44)
Erythromycin	4(36.3)	3(37.5)	1(100)	1(33.3)	0	9(36)
Gentamycin	8(72.7)	7(87.5)	0	2(66.6)	1(50)	18(72)
Ofloxacin	9(81.8)	6(75)	0	3(100)	0	18(72)

From the findings from Table 7 it's clear that the predominant gram negative bacilli,Pseudomonas aeruginosais sensitive to Ceftazidime/Clavulanic acid 100% followed by imipenem 90.9% with least sensitive to erythromycin 36.3% and chloramphenicol 45.4%.

Discussion: Chronicdacryocystitis is the most commonly seen ocular condition in Ophthalmology OPD. This condition though seen in all age group, 4th and 5th decade of life is more prone. In this study maximum number of Chronicdacryocystitis cases were noted in the age group of 41-50 yrs (32.5%), which is similar to the findings in a study done by Kiniker VP et al and Hanumantha S et al.[9,10]

In our study, Chronicdacryocystitis infection was predominantly noted in females 72.5% as in others studies[8,11,12,13,14,15,16,17], this similar finding is due to the narrow nasolacrimal canal in females[16,17] and also due to decreased production of tears during menopause caused due to hormonal changes which in turn results in decreased protection against infections[18]

Our study findings of involvement of right eye, oculus dexter-OD 56.25% is more compered to left eye, oculus sinister-OS 30% and is in accordance with the findings of other studies too.[13,14,19]

Maximum number of Chronicdacryocystitis cases were seen in farmers 56.25% and least in professionals 3.75%, which is similar to the findings of[8, 10], this is due to the work environment where farmers are exposed to harsh environment with no use of eye protection.

72.5% of Chronicdacryocystitis cases were residing in rural in comparison with 27.5% cases in urban and according to modified Kuppuswamy scale 56.25% of patients were found to be from lower income group, which clearly correlates to the lack of hygiene and awareness among the low socioeconomic status groups about use of eye protections and eye precautions and this finding matched with that of[8, 20,21]

Co-morbid conditions lead to low immune status thus increasing the incidence of Chronic dacryocystitis and the study findings too found the prevalence of Chronicdacryocystitis to be more in those with Diabetes mellitus 8.75% and hypertension 6.25% which is similar to the findings of study by[10, 22]

In this pre-antibiotic era, most common causative organism for Chronicdacryocystitis was seen to be Streptococci. But subsequently with the discovery and use of antibiotics like Penicillin and cephalosporin's, Staphylococcus has replaced Streptococci in many infections including Chronicdacryocystitis and is also known to acquire drug resistance[23,24]

Of the 80 Chronicdacryocystitissamples cultured in our study, 96.25% samples were culture positive which is similar to the findings of Hanumantha S et al.[10] Whereas studies by Bharathi et al[11] reported 90% and Shals et al[25] 100%. This difference in the culture positivity may be due to different methods of sample collection as Chandra TJ et al[26] had the highest positivity in their study as the method they used was direct inoculation of the sample on the culture plates without use of swabs. Whereas HanumanthaS et al[10] inoculated the samples using bacteriological loop instead of swabs which in turn had the advantage of elimination of bacterial colonies present in the vicinity of the canthus of the eye.

The present study revealed gram positive cocci 68.75% to be the predominant causative organism in Chronicdacryocystitis, which closely matches with the findings of HanumanthaS et al[10], Bharathi et al[11], Prakash R et al[14] and Pradeep et al[27].

Our study showed that *Staphylococcus aureus* 47.27% followed by *Streptococcus pneumoniae* 34.54% to be the predominant Gram positive cocci which is similar to the findings of HanumanthaS et al[10]. On the contrary Bharathi et al[11] and Chaudhary M et al[28] found CONS to be the predominant followed by *Staphylococcus aureus.* Our study had 69.2% MRSA which is similar to the study findings of HanumanthaS et al[10] while Pradeep AV et al[27]did not isolate any MRSA.

Among the Gram negative organism, *Pseudomonas aeruginosa 32% and Klebsiella pneumoniae 20%* were predominantly isolated, and these findings correlated with the findings of the study done byHanumanthaS et al[10], Prakash R et al[14] and Delia AC et al[29]. This difference in the predominant organisms could be due to the discrepancy in the source of infection in each patient. Source could be either endogenous conjunctiva or exogenous like from contaminated eye drops or secondary to other infections like rhinitis, stomatitis or otitis.

Selection of antibiotics was done according to the CLSI guidelines for both gram positive and gram negative and also considered the commonly prescribed antibiotics by the clinicians at our institute for the treatment of Chronicdacryocystitis.

Gram positive cocci were found to be more sensitive to Vancomycin and Gentamycin 45% and 50 % respectively with least sensitivity to Ampicillin 15% and Erythromycin 17%, which is similar to the findings of other study findings done by Chaudhry et al, Hanumantha S et al and Prakash S et al.[10,12,14]

Gram negative bacilli were found to be sensitive to ceftazidime/clavulanic acid 24% followed by Amikacin 21% and Imipenem 21%, which is similar to the findings by HanumanthaS et al[10] while Chaudhary et al[12] reported Chloramphenicol and Nalidixic acid sensitivity as 90.90% each. Bharathi et al[11] in their study found gatifloxacin 96.55 and ofloxacin 94.8% to be more effective antibiotics. This variation in the antibiogram is due to the difference in the geographical region and difference in the antibiotic use by the clinicians of that area.

Conclusion: Detection of causative organism of Chronicdacryocystitis and periodic study of their antibiogram will help the clinicians in effective patient management. All the hospitals mandatorily should incorporate antibiotic policy which should be updated timely based on local antibiotic susceptibility profile studies done in that hospital settings, which will not only help in empirical treatment but also will help to prevent antibiotic misuse and thus antibiotic resistance and treatment failure.

Limitations: This is a single centre study and other etiological factors of Chronicdacryocystitis like fungal, anaerobes and parasites were not included in the study.

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