Diagnostic Study of Some Microbiological Dacryocystitis with in Baghdad City Patients

Zena K. Khalil[1], Ala'a K. Husain[2], Saif S. Al-Kamil[3]

[1]Assist. Prof., [2]Optometrist, [3]Biologist, Al-Mansur Medical Technical Institute/Middle Technical University/Iraq

Abstract

The study was conducted from May -November 2019 among 114 dacryocystitis patients attending to ophthalmology department of Al-Yarmuk central hospital in Baghdad city. From of 114 patients with dacryocystitis, 90 (79%) patients had bacterial dacryocystitis, 24 (21%) with fungal dacryocystitis. According to the results 83(73%) recorded with chronic dacryocystitis and 31(27%) with acute dacryocystitis. The high percentage was bacterial dacryocystitis (32%), fungal dacryocystitis (38%) were at age of 74±0.3 y and the low percentage of bacterial was (11%) at 63±0.5 y and with fungal dacryocystitis (8%) at age of 42±0.3y. Patients with bacterial dacryocystitis had diabetes mellitus (56 %),arthritis and hypertension (28%,16 %) while the DM with fungal dacryocystitis (46%), arthritis, hypertension (38 %,16 %), *S.aureus* 23(26%), *S.epidermidis* 18 (20%),*Streptococcus spp.* 14 (16%), *Pseudomonas spp*. 11 (12%), *E. coli* 10 (11%), *Enterobacter spp* 9 (10%) finally *Proteus spp*. 5 (6%), while *Aspergillus flavus* represented 9 (37%) as causing fungal dacryocystitis, *Aspergillus fumigates* 7 (29%)*, Aspergillus niger* 4 (17%)and *Candida spp* 4 (17%) . The antibiotic susceptibility tests revealed that *S. aureus* isolates were sensitive to Chloramphenicol (83%),. *S.epidermidis* isolates showed sensitivity to Gentamycin and Tetracycline (88%), *Streptococcus spp* showed the susceptibility to Erythromycin (93%), Ciprofloxacin (86%) respectively,*Pseudomonas spp* isolates considered highly sensitive to Tetracycline and Chloramphenicol (91%), *E.coli* isolates were also susceptible to Chloramphenicol (90%), *Enterobacter spp* were sensetive to Tetracycline and Gentamicin (78%),*Proteus spp* isolates seems sensitive to Chloramphenicol and Tetracycline (100%), *Aspergillus spp*. and *Candida spp*. isolates remain sensitive to Itraconazole, Voriconazole .

Keywords: *Dacryocystitis, bacterial and fungal infuctions, antibiotic susceptibility tests, Baghdad.*

Introduction

Dacryocystitis refers to lacrimal sac inflammation, which can be due to obstruction or blockage of normal tears drainage which leads to anathoe secondary infection and this is related to structural abnormality or eye disorders, and traumatic injury[1] . In acutetype of dacryocystitis which is basically caused by nasolacrimal duct abscess and maybe sometimes it is accompanied by dissemination of another infection as orbital cellulitis or thrombosis of the superior ophthalmic vein, and sometimes cavernous sinus, the patient presents with pain, redness, and edema around the lacrimal sac[2]. Diagnosis is depended on symptoms and signs and when pressure over the lacrimal sac causes reflux of mucoid material through the puncta. while the chronic form is associated with a mass under the medial canthal tendon and chronic conjunctivitis with epiphora. polymicrobial dacryocytitis were common and concurrently isolated from bacterial, fungal, and viral origin[3,4]. In general gram-positive bacteria were most common which were followed by gram-negative bacteria of both anaerobic and aerobic origin. most reports showed that fungal pathogens like *Fusarium spp.*, *Aspergillusspp*. and *Candida albicans* were the predominant ones isolated in dacroyocystitis patients with other bacterial pathogens[5,6]. It is important tomention that the clinical results, broad-spectrum antibiotic therapy till now are not effective to be as a diagnostic tool or a therapeutic

Corresponding Author:
Zena K. Khalil
Assist. Prof., Al-Mansur Medical Technical Institute/ Middle Technical University/Iraq
e-mail: zenakassem2009@gmail.com

strategy. so, in each geographic area, total information about nearly the most microorganisms whic responsible for dacryocystitis is very necessary, as well as,the pattern of antibiotic susceptibility[7] .

The study was done to identify the microbial etiology and of dacryocystitis and investigate the patterns of antibiotic susceptibility among adult patients in Baghdad city.

Patients and Method

The study was conducted from May -November 2019 among 114 dacryocystitis diagnosed patients attending to ophthalmology department of Al-Yarmuk teaching hospital in Baghdad city .the information documented directly from the patients. data were collected using a structured and pre-tested questionnaire. Patients were examined by an ophthalmologist and specimens were collected from those patients presented dacryocystitis in their nasolacrimal dischargeunder sterile conditions. Specimens were collected with a sterile cottonswabs and inoculated on blood agar, MacConkey agar, Chocolate agar (Oxiod, Hampshire,UK) and Sabouraud agar (Biolife/Italy) .when incubation time is over, biochemical reaction teststhen done to confirm the species, API system was used (bio Merieux).[8]. For examination of hyphae and spore morphological microscopically, lacto phenol–stain was used[9].

Antibiotic Susceptibility: Antimicrobial susceptibility testing was performed following the disk diffusion technique according to the Clinical and Laboratory Standards Institute (CLSI), [10]. The following antibioticdisks were used; "Erythromycin (15 µg), Clarithromycin (15 µg), Chloramphenicol (30 µg), Clindamycin (2 µg), Tetracycline,(30 µg), Doxycycline (30 µg), Amikacin (30 µg), Gentamicin (10 µg), Ciprofloxacin (5 µg), Ceftriaxone (30 µg) supplied by (Oxiod,Hampshire, UK)".Strains of "*Staphylococcu*s (ATCC 25923), *E. coli* (ATCC25922) and *Pseudomonas aeruginosa* ATCC27853" were used as controls. CLSI M38-A2 BMD method foe antifungal drugs susceptibility[11]. The following antifungal agents:

"Voriconazole (1 µg), fluconazole (25 µg), itraconazole (10 µg), ketoconazole (50µg) metronidazole (50 µg), and amphotericin B(20 µg)". *Candida krusei* ATCC 6258 used as a controls,the results of susceptibility were recorded assensitive, intermediate and resistant.[12]

Statistical Analysis: Chi-square test and t-test used to analyze the findings as (P value <0.05) used to find the significance of difference[13] .

Results

From 114 patients with dacryocystitis, there were 90 (79%) patients of bacterial dacryocystitis and 24 (21%) with fungal dacryocystitis. Men with bacterial dacryocystitis were 52 (58%) and women 38 (42%), men diagnosed with fungal dacryocystitis were 17 (71%) and women 7 (29%) . According to the results 83(73%) recorded with chronic dacryocystitis and 31(27%) with acute dacryocystitis.

Patients with bacterial dacryocystitis (32%), fungal dacryocystitis (38%) were at the mean age of 74±0.3 y, lowest ratio with bacterial was (11%) at 63±0.5 y and with fungal dacryocystitis (8%) at age of 42±0.3y, the significant differences recorded between groups, table 1.

Most bacterial dacryocystitis patients were having DM(56%) and the others having arthritis or hypertension (28%,16%) while the DM with fungal dacryocystitis represented (46%) then arthritis or hypertension (38%,16%).

Table 1: Bacterial and fungal dacryocystitis related to the age groups

Age-years	Mean of±SD	N. of patients, bacterial dacryocystitis %	N. of patients, Fungal dacryocystitis %
15-25	20±0.5	21(23%)	6(25%)
26-36	31±0.7	13(14%)	2(8%)
37-47	42±0.3	18(20%)	2(8%)
58-68	63±0.5	10(11%)	5(21%)
69-79	74±0.3	28(32%)	9(38%)

p value (< .05)

S.aureus seemed as the most common cause of bacterial dacryocystitis 23(26%),, secondly *S.epidermidis* 18(20%), *Streptococcus spp*. 14(16%), *Pseudomonas spp*. 11 (12%), *Escherichia coli* 10(11%), *Enterobacter spp* 9(10%) and *Proteus spp*. 5(6%), and while *Aspergillusflavus* represented 9(37%), *Aspergillusfumigates* 7(29%), *Aspergillus niger* 4 (17%) and *Candida spp* 4(17%) were the main causative agents of fungal dacryocystiti as in table 2.

Table 2: Types of bacterial and fungal isolates from patients

Type of bacterial strain	Number %	Type of fungal strain	Number %
S.aureus	23(26%)	Aspergillus flavus	9(37%)
S.epidermidis	18(20%)	Aspergillus fumigatus	7(29%)
Streptococcus	14(16%)	Aspergillus niger	4(17%)
Pseudomonas	11(12%)	Candida	4(17%)
Escherichia coli	10(11%)		
Enterobacter spp	9(10%)		
Proteus spp	5(6%)		
Total	**90(100%)**	**Total**	**24(100%)**

The resent results revealed the susceptibility of *S. aureus* isolates to Chloramphenicol (83%) followed by Amikacin and Gentamycin (78%),. *S.epidermidis* isolates showed high susceptibility to Gentamycin and Tetracycline (88%) then Erythromycin and Amikacin (83%),*Streptococcus spp* showed the susceptibility to Erythromycin (93%), Ciprofloxacin (86%), table 3.

Table 3: Susceptibility patterns of *S.aureus, S.epidermidis* and *Streptococcus spp* isolates.

Antibiotics	*S.aureus* n = 23			*S.epidermidis* n = 18			*Streptococcus spp* n = 14		
	S	I	R	S	I	R	S	I	R
Chloramphenicol	19(83%)	1(4%)	3(13%)	15(83%)	1(6%)	2(11%)	11(79%)	2(14%)	1(7%)
Gentamycin	18(78%)	2(9%)	3(13%)	16(88%)	1(6%)	1(6%)	-	-	-
Tetracycline	17(74%)	2(9%)	4(17%)	16(88%)	1(6%)	1(6%)	11(79%)	1(7%)	2(14%)
Erythromycin	16(69%)	2(9%)	5(22%)	15(83%)	1(6%)	2(11%)	13(93%)	-	1(7%)
Amikacin	18(78%)	-	5(22%)	15(83%)	1(6%)	2(11%)	-	-	-
Doxycycline	16(69%)	2(9%)	5(22%)	11(61%)	2(11%)	5(28%)	-	-	-
Ciprofloxacin	-	-	-	-	-	-	12(86%)	1(7%)	1(7%)
Ceftriaxone	-	-	-	-	-	-	10(71%)	1(7%)	3(22%)

Pseudomonas spp isolates were high susceptible to Tetracycline and Chloramphenicol (91%), Ciprofloxacin (82%) and Amikacin and Gentamycin (73%) each of them, *E.coli* isolates reported susceptible for Cloramphenicol (90%), Ciprofloxacin (80%) but they were resistant to Amikacin and Tetracycline (80%,90%).

Enterobacter spp remained susceptible to each of Tetracycline and Gentamicin (78%), Amikacin (67%%), *Proteus spp* confirmed susceptible to Cloramphenicol and Tetracycline (100%), Ciprofloxacin and Ceftriaxone (80%), table 4.

Table 4: Susceptibility of *Pseudomonas spp, Escherichia* coli and *Enterobacter spp*.

Antibiotic	*Pseudomonas spp.* n = 11			*Escherichia coli* n = 10			*Enterobacter spp* n = 9			Proteus spp n = 5		
	S	I	R	S	I	R	S	I	R	S	I	R
Chloramphenicol	10(91%)	1(9%)	-	9(90%)	1(10%)	-	5(56%)	2(22%)	2(22%)	5(100%)	-	-
Amikacin	8(73%)	1(9%)	2(18%)	1(10%)	1(10%)	8(80%)	6(67%)	2(22%)	1(11%)			
Tetracycline	10(91%)	1(9%)	-	-	1(10%)	9(90%)	7(78%)	1(11%)	1(11%)	5(100%)	-	-
Doxycycline	7(64%)	2(18%)	2(18%)	6(60%)	2(20%)	2(20%)	5(56%)	3(33%)	1(11%)			
Ciprofloxacin	9(82%)	1(9%)	1(9%)	8(80%)	2(20%)	-	5(56%)	2(22%)	2(22%)	4(80%)	1(20%)	-
Gentamycin	8(73%)	1(9%)	2(18%)	6(60%)	1(10%)	3(30%)	7(78%)	1(11%)	1(11%)	2(40%)	1(20%)	2(40%)
Ceftriaxone										4(80%)	1(20%)	-

(90%) *Aspergillus spp* when tested to Itraconazole, Voriconazole, Amphotericin B and Natamycin, they considered sensitive at (80%,70%,60%), *Candida spp.* confirmed high sensitive to Itraconazole (100%) and (75%) to the rest of antifungal types used in the study, table 5 .

Table 5: Susceptibility of *"Aspergillus spp* and *Candida spp".*

Drug	*Aspergillus spp* n = 20			*Candida spp* n = 4		
	S	I	R	S	I	R
Amphotericin B	14(70%)	3(15%)	3(15%)	3(75%)	1(25%)	-
Natamycin	12(60%)	3(15%)	5(25%)	3(75%)	1(25%)	-
Itraconazole	18(90%)	1(5%)	1(5%)	4(100%)	-	-
Voriconazole	16(80%)	2(10%)	2(10%)	3(75%)	1(25%)	-

Discussion

The study revealed that patients with bacterial dacryosistitis were (79%) and (21%) were having fungal dacryocystitis, men represented the highest levels (58%), (71%) respectively, the highest ratio of males related to microbial dacryocystitis as a compression to females has been recorded in some other studies[14,15]. Acute and chronic dacryocystitis forms were found in the study, but (73%) were chronic, as a same as found in many previous studies that explained the role of chronic structural disorders of the tears drainage[16]. Patients with microbial dacryosistitis at mean age of 74±0.3 were hight and started to decrease, these fining are disagreed to other study in Baghdad, this may related to selecting of the known causes of infection[17] . Bacterial dacryosistitis patients, recorded with DM were (56%) and the rest patients recorded with arthritis and increase of blood pressure (28%,16%) while the diabetic with fungal dacryosistitis were (46%), arthritis then hypertension (38%,16%), these findings disagreed with other studies depending on the age and some other chronic disease may be due to health style including food as well as environmental changes[18,19] . *S.aureus*, the common cause of dacryosistitis 23(26%), *S.epidermidis* 18 (20%) in the second degree then *Streptococcus spp*. 14(16%), *Pseudomonas spp*. 11 (12%), *Escherichia coli* 10 (11%), *Enterobacter spp* 9(10%) and *Proteus spp*. 5(6%), the main causes of keratitis were *Aspergillus flavus* 9(37%), *Aspergillusfumigates* 7(29%), *Aspergillus niger* 4 (17%),*Candida spp* 4(17%), the results agreed to other studies in Baghdad[20,21]. Other study mentioned that Pseudomonas spp. represented most of bacterial isolates, as well as,Staphylococcus spp. while the fungal causes detected in 15 cases.[22] these result scan be changed depending on the climatic disturbance conditions or socioeconomic parameters[23] . G+ and G- bacterial isolates were almost susceptible to the antibiotics in the study and these findings were similar to different other studies[24,25] fungal isolates appeared its high susceptibility to the common antifungal drugs, *Aspergillus spp*, were clearly had asensitive reactions to Itraconazole, Voriconazole. *Candida* recorded sensitive

when tested, these seems to have a great match with some results done[26].

Conclusions

Among dacryocystitis patients, *S. aureus*came in the highest ratio of g+ bacterial isolates, *S.epidermids* secondly while g-*Pseudomonas spp* looked very dominant. *Aspergillus spp*was the highest among the fungus then *Candida spp*. All of gram + and gram -, as well as the fungus seems highly susceptible for the different antibiotics discs,so,we recommend the importance of antimicrobial susceptibility testing which must be done as a routine clinical, diagnostic practices method to manage the resistance patterns of microbial infections a long time hoping to completethe treatment strategies supporting and continuous personal educations to control the improper self-medication.

Ethical Clearance: The Research Ethical Committee at scientific research by ethical approval of both MOH and MOHSER in Iraq

Conflict of Interest: None

Funding: Self-funding

References

1. Harish V, Benger RS. Origins of lacrimal surgery, and evolution of cryocystorhinostomy to thepresent. Clinical and Experimental Ophthalmology 2014; 42: 284–287. [DOI: 10.1111/ceo.12161]
2. Wladis E.J., Shinder R., LeFebvre D., Sokol J., Boyce M. Clinical and microbiologic features ofdacryocystitis-relatedorbitalcellulitis.Orbit2016; 35(5):258–261.[DOI: 10.1080/01676830.2016]
3. Goel R, Nagpal S, Kumar S, et al. Transcanalicular laser-assisted dacryocystorhinostomy with endonasal augmentation in primary nasolacrimal duct obstruction: our experience. Ophthal Plast Reconstr Surg 2017; 33:408–12.[DOI: 10.1097/ IOP.0000000000000802]
4. Raposo A, Piqueras F, García-Purriños F, et al. Influence of septal deviation on the prognosis of transcanalicular diode laser-assisted dacryocystorhinostomy. J Ophthalmol. 2016; 2016:9573760[DOI: 10.1155/2016/9573760]
5. Li EY, Wong ES, Wong AC, Yuen HK. Primary vs Secondary Endoscopic Dacryocystorhinostomy for Acute DacryocystitisWith Lacrimal Sac Abscess Formation: A Randomized Clinical Trial. JAMA Ophthalmol. 2017;135(12):1361-1366. [DOI: 10.1001/jamaophthalmol.2017.4798]
6. Pornpanich K, Luemsamran P, Leelaporn A, et al. Microbiology of primary acquired nasolacrimalduct obstruction: simple epiphora, acute dacryocystitis, and chronic dacryocystitis. Clin Ophthalmol 2016; 10:337–342. [DOI: 10.2147/OPTH.S100280]
7. Feijó ED, Caixeta JA, de Souza Nery AC, et al. A comparative study of modified transcanalicular diode laser dacryocystorhinostomy versus conventional transcanalicular diode laserdacryocystorhinostomy. Eur Arch Otorhinolaryngol 2017; 274:3129–3134. [DOI:10.2147/OPTH.S100280]
8. Pandya VB, Lee S, Benger R, et al. External dacryocystorhinostomy: assessing factors that influence outcome. Orbit 2010; 29(5):291-297. [D OI:10.3109/01676830.2010.485715]
9. Feng YF, Cai JQ, Zhang JY, Han XH. A meta-analysis of primary dacryocystorhinostomy withand without silicone intubation. Can J Ophthalmol 2011; 46(6):521-527. [DOI:10.1016/j. jcjo.2011.09.008]
10. Ozsutcu M, Balci O, Tanriverdi C, Demirci G. Efficacy of adjunctive mitomycin C in transcanalicular diode laser dacryocystorhinostomy. Eur Arch Otorhinolaryngol 2017; 274:873–877. [DOI: 10.1007/s00405-016-4308-7]
11. Prakash R, Babu RG. A Bacteriological Study of Dacryocystitis. J Clin Diagn Res. 2012;6(4):652–655.
12. Eshraghi B, Abdi P. Microbiologic spectrum of acute and chronic dacryocystitis. Int J Ophthalmol. 2014;7(5):864–867.
13. Assefa Y, Moges F, Endris M, Zereay B, Amare B, Bekele D. Bacteriological profile and drug susceptibility patterns in dacryocystitis patients attending Gondar University Teaching Hospital. BMC Ophthalmol. 2015;15(1).
14. Chaudhary M, Bhattarai A, Adhikari S, Bhatta D. Bacteriology and antimicrobial susceptibility of adult chronic dacryocystitis. N J Oph. 2010; 2(4):105–113.
15. Madhusudhan MY, Ismail N, Hussein A. Microbiological aetiology of acute dacryocystitis in hospital Universiti Sains Malaysia, Kelantan Malaysia. J Acute Dis. 2012;1(1):31–34.
16. Sarkar I, Choudhury S, Bandyopadhyay M.

A Clinicobacteriological Profile of Chronic Dacryocystitis in Rural India. Int J Health Sci Res. 2015;5(7):82–87

17. Chen L, Fu T, Gu H, Jie Y, Sun Z, Jiang D et al. Trends in dacryocystitis in China: a STROBE-compliant article. Medicine (Baltimore) .2018; 97(26):e11318
18. Das JK, Deka AC. Bacteriology of chronic dacryocystitis .India J Clin Diagn Res. 2014;(24) 322-345.
19. Amin RM, Hussein FA, Idriss HF, Hanafy NF, Abdallah DM. Pathological, immunohistochemical and microbiological analysis of lacrimal sac biopsies in patients with chronic dacryocystitis. Int J Ophthalmol. 2013;6(6):817–826. [PMC free article] [PubMed] [Google Scholar]
20. Kebede A, Adamu Y, Bejiga A . Bacteriological study of dacryocystitisamong patients attending in Menelik II Hospital, Addis Ababa, Ethiopia.Ethiop Med J.2010; 48(1):29–339.
21. Mandal R, Banerjee AR, Biswas MC, Mondal A, Kundu PK, Sasmal NK . Clinicobacteriological study of chronic dacryocystitis in adults. J Indian MedAssoc. 2018; 106(5):296–298.
22. Mills DM, Bodman MG, Meyer DR, Morton AD. The microbiologic spectrum of dacryocystitis: a national study of acute versus chronic infection. Ophthal Plast Reconstr Surg .2017;23(4):302–306.
23. Shahraki K, Makateb A, Shirzadi K, Khosravifard K. Frequency of bacterialsamples from patients with chronic acquired nasolacrimal duct obstruction. Med Arch. 2016; 70(6):433–436.
24. Sun X, Liang Q, Luo S, Wang Z, Li R, Jin X . Microbiological analysis of chronic dacryocystitis. Ophthalmic Physiol Opt. 2015; 25(3):261–263.
25. Wayne, PA: Performance standards for antimicrobial susceptibility testing. 2017; 27th ed. clinical laboratory standard institute supplement M100.
26. Zeng B, Wang P, Xu LJ, Li XY, Zhang H et al. Amniotic membrane covering promotes healing of cornea epithelium and improves visual acuity after debridement for fungal keratitis. Int. J. Ophthalmol. 2014;7:785-9.