

Incidence of Bacterial Conjunctivitis among Patients attending Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Nigeria

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ABSTRACT

Conjunctivitis infection is associated with purulent discharge, swelling of the eyelid and itching. In the bacteria infection, a crust of sticky muco-purulent discharge is present. Here we highlight the aetiological agent of bacterial conjunctivitis and their antibiogram pattern. About 120 patients were examined for bacterial conjunctivitis at Obafemi Awolowo University Teaching Hospital Complex Ile-Ife. 90 of the patients had bacterial conjunctivitis indicating a prevalence rate of 75%, male patients had prevalent of (76.4%), while female patients (73.8%). In relation to age group of patients, 11-20 years (25.6%) had the highest prevalence of bacterial conjunctivitis followed by age <12 months (22.2%), while the prevalence for other ages were 1-10 years (17.7%), 21-30 years (16.7%), 31-40 years and 41-50 years (5.6%) each, 51-60 years (4.4%) and 61-70 years (2.2%), bacterial isolates obtain most was *Staphylococcus aureus* with a prevalence of 53.3% while the least was *Escherichia coli*, 3.3%. *Staphylococcus epidermidis* (14.4%), *Klebsiella* and *Pseudomonas species* (11.1%) each and *Proteus species* (6.7%). All isolated bacteria were subjected to antibiotic susceptibility. For gram-positive isolates, 61 where sensitive to Rocephin antibiotic having 90.8% efficacy, followed by Cefuroxime (72.1%), Cloxacillin (67.2%), Gentamycin (57.4%), Erythromycin (55.7%), Streptomycin (52.5%), Chloramphenicol (41.0%), Ceftazidime (36.1%), Tetracycline (29.5%), Ampicillin (9.8%) and Penicillin (1.6%). Also, all Gram negative isolates, 29 in number were sensitive to Rocephin (89.7%), Gentamycin (65.5%), Streptomycin (51.7%), Tetracycline (51.7%), Colistin (48.3%), Ceftazidime (41.4%), Coltrimoxazole (34.5%), Cefuroxime (10.3%) and Ampicillin was found to be resistant. Most of the bacterial isolated, showed high sensitivity to antibiotics especially the Gram-positive isolates to commonly used antibiotics for the treatment of bacterial conjunctivitis, while the gram negative isolates showed varying degree of sensitivity with some bacterial isolates being resistant to ampicillin.

Keywords: Conjunctiva; Bacterial conjunctivitis; Anti-biogram; Apollo II

INTRODUCTION

The conjunctiva as described is a transparent membrane, which is attached to the sclera at the margins of the cornea, with which it blends. It is loosely attached over the anterior part of the sclera and thence reflected to the inner surface of the eyelids [1]. It is firmly attached to the tarsal plates and blends with the skin at

the margin of the lids. The conjunctival sac in normal newborns is usually sterile at birth and becomes contaminated soon afterward by organisms either saprophytic or parasitic in nature. In such cases, it is referred to as conjunctivitis. Just about the time that the Apollo II space ship hit the moon surface in July, 1969, this eye disease conjunctivitis hit Accra, Ghana and in line

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with the tropical African sense of humour, the people of Accra named the eye disease Apollo as it was believed that the disease was brought to earth by Apollo II astronauts [2].

Conjunctivitis, commonly known as pink eye is characterized by infection and redness of the conjunctiva with clear to purulent discharge, swelling of the eyelid and itching, which usually indicate allergic conjunctivitis. In the bacteria form, a crust of sticky muco-purulent discharge is present. Upper respiratory infection and fever may be associated with conjunctivitis particularly when due adenovirus type 3 or 7. Allergic conjunctivitis may be associated with the seasonal rhinitis of hay fever [3].

Besides the cases of primary infections, there were many cases with secondary infections, probably, the result of using contaminated solutions for bathing the eyes. These cases presented with similar features, but with added purulent or muco-purulent discharge, cornea ulceration and its complication. Since people believe that astronaut Apollo II brought conjunctivitis, when his ship hit the moon surface in 1969, therefore, for this investigation [2].

This project is designed to determine the incidence of bacteria conjunctivitis, relationship of conjunctivitis and age of patients, aetiological agent of conjunctivitis and the antibiogram pattern of the infection.

MATERIALS AND METHODS

The samples for this survey were obtained from both in and out patients who reported at the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife. Clinical diagnosed for conjunctivitis or ophthalmia neonatorum constituted the study population. Before this study there is no record or statistical data reflecting the antibiotic usage of antibiotics for the treatment of conjunctivitis. Neonates and adults presenting with purulent exudates from the eyes and itching were included for these studies, while those with history of bacterial conjunctivitis were excluded from the study. Patients participating in this study were informed and they gave their written permission before they were examined and samples collected. Laboratory diagnosis of bacterial conjunctivitis was carried out based on the microscopy and cultural analysis of specimen collected from patients [4]. Organisms isolated by cultural methods were further identified by various biochemical tests [5] and their susceptibility to antibiotics was determined by Kirby baur technique [6].

RESULTS

A total of 120 patients were bacteriologically examined for bacterial conjunctivitis. In the investigation, it was discovered that 90 of them had bacterial conjunctivitis indicating a prevalence of 75%. This research also revealed that male patients had the higher incidence of bacterial conjunctivitis (76.4%) than the female patients 73.8% (Table 1). Occurrence

rate in relation to the age group of patient was also revealed by this project, 11-20 years had the highest prevalence (25.6%) of bacterial conjunctivitis, while the occurrence for other ages were as follows: <12 months (22.2%), 1-10 years (17.7%), 21-30 years (16.7%), 31-40 years and 41-50 years (5.6%), 51-60 years (4.4%) and 61-70 years (2.2%) (Table 2). Further investigation into bacterial conjunctivitis based on microbes isolated from the patients reveals that *Staphylococcus aureus* had the highest prevalence (53.3%), followed by *Staphylococcus epidermidis* (14.4%) while the other isolates were *Klebsiella* species and *pseudomonas* species (11.1%) each, *proteus* species (6.7%) and *Escherichia coli* (3.3%) (Table 3). In this research all isolates were subjected to antibiogram. It was discovered that the most effective antibiotic for treatment of Gram positive organisms causing bacterial conjunctivitis was Rocephin (91.8%). This was followed by Cefuroxime (72.1%), Cloxacillin (67.5%), Gentamycin (57.4%), Erythromycin (55.7%), Streptomycin (52.5%), Chloramphenicol (41%), Ceftazidime (36.1%), Tetracycline (29.5%), Ampicillin (9.8%) and Penicillin (1.6%) (Table 4).

Table 1: Prevalence of bacterial conjunctivitis in relation sex of the patient.

Sex	No. of patients examined	No. of patients positive	Frequency of patients positive
Male	55	42	76.4
Female	65	48	73.8
Total	120	90	75

Table 2: Prevalence of bacterial conjunctivitis in relation to age.

Age	No. of positive patients	Frequency of positive patients
<12 months	20	22.2
1-10yrs	16	17.7
11-20yrs	23	25.6
21-30yrs	15	16.7
31-40yrs	5	5.6
41-50yrs	5	5.6
51-60yrs	4	4.4
61-70yrs	2	2.2
Total	90	100

Table 3: Occurrence of bacterial Isolates among the subjects.

Isolates	No. of isolates	Frequency of isolates
<i>Staphylococcus aureus</i>	48	53.3
<i>Staphylococcus epidermidis</i>	13	14.4
<i>Escherichia coli</i>	3	3.3
<i>Klebsiella species</i>	10	11.1
<i>Pseudomonas species</i>	10	11.1
<i>Proteus species</i>	6	6.7
Total	90	100

Table 4: Antibiotics Susceptibility to Gram Positive bacteria Isolates.

Antibiotics	<i>Staphylococcus aureus</i> no=48		<i>Staphylococcus epidermidis</i> no=13		Total (%)
	No. sensitive	%	No. sensitive	%	
Penicillin	0	0	1	7.7	1.6
Ampicillin	6	12.5	0	0	9.8
Cloxacillin	32	66.7	9	69.2	67.2
Erythromycin	27	56.3	7	53.8	55.7
Tetracycline	15	31.3	3	23.1	29.5
Chloramphenicol	20	41.7	5	38.5	41
Streptomycin	27	56.3	5	38.5	52.5
Gentamycin	28	58.3	7	53.8	57.4
Rocephin	44	91.7	1	92.3	91.8
Cefuroxime	36	75	8	61.5	72.1
Ceftazidine	17	35.4	5	38.5	36.1

Out of 29 Gram negative isolated, Rocephin was found to be the best effective antibiotics (89.7%) for the treatment of Gram-negative isolates. This was followed by Gentamycin (65.5%), Streptomycin and Tetracycline (51.7%) each, Colistin (48.8%),

Ceftazidine (41.4%), Coltrimoxazole (34.5%), cefuroxime (10.3%) and Ampicillin which was found to be resistant (Table 5).

Table 5: Antibiotic susceptibility to gram negative bacterial isolates.

Antibiotics	<i>E. coli</i> no=3		<i>Klebsiella</i> species no=10		<i>Pseudomonas</i> species no=10		<i>Proteus</i> species no=6		Total
	No. sensitive	%	No. sensitive	%	No. sensitive	%	No. sensitive	%	%

Ampicillin	0	0	0	0	0	0	0	0	0
Tetracycline	1	33.3	6	60	6	60	2	50	51.7
Streptomycin	1	33.3	5	50	6	60	3	50	51.7
Gentamycin	2	66.7	7	70	6	60	4	66.7	65.5
Colistin	2	66.7	5	50	7	70	0	0	43.3
Rocephin	3	100	9	90	9	90	5	89.6	89.7
Cefuroxime	1	33.3	1	1	0	0	1	16.7	10.3
Ceftazidime	2	33.3	4	40	5	50	1	16.7	41.4
Coltrimoxazole	0	0	5	50	3	30	2	33.3	34.5

DISCUSSION

Conjunctivitis is one of the various infectious diseases that are easily contacted by newborns and elderly individual under poor hygienic conditions [7]. This is why the diseases are sometimes seen as an indication of possible outbreak of an infectious diseases and an increase should therefore be of serious concern [8]. This study revealed that 90 (75%) of 120 patients were positive and the remainder do not show any growth. The result showed that male patients had the most prevalent of bacterial conjunctivitis (76.4%), followed by the female patients with (73.8%). Although, there was no gender predilection, conjunctivitis occurs in all ages [9]. Therefore this result showed an occurrence rate in relation to the age group of patients. 11-20 yrs (25.6%) had the highest prevalence of bacterial conjunctivitis, followed by age <12 months (22.2%), while the prevalence for other ages were 1-10 yrs (17.7%), 21-30 yrs (16.7%), 31-40 yrs and 41-50 yrs (5.6%) each 51-60 yrs (4.4%) and 61-70 yrs (2.2%). According to Jellife [10], the predisposing factors and natural tendency of an individual age group to develop this disease depend on the level of hygiene and immune status of the individual. The most common isolated microorganism was *Staphylococcus aureus* constituting (53.3%) of the total bacterial isolated. This was in line with the work of Martins [11], that the predominantly associated bacterium in conjunctivitis is *Staphylococcus aureus* due to its presence in large number on the skin surface around the eye. The next organism that has high occurrence was *Staphylococcus epidermidis* in 13 (14.4%) patients, which could possibly have been skin flora, since the organism is generally seen as an opportunistic pathogen and normal flora of the conjunctiva and skin [12]. Both *pseudomonas* and *klebsiella* species formed the third most frequent organisms encountered with 10 (11.1%). *Klebsiella* has also been documented by various investigators [13,14]. *Pseudomonas pyocyanea* has been reported to cause conjunctivitis following the use of contaminated eye drops [15]. *Proteus* species has 6 (6.7%) Obi et al, also reported the occurrence of *proteus* species in conjunctivitis in their study [13]. *Escherichia coli* were reported as the most frequent organism among the coliforms [16]. The occurrence 3 (3.3%) may indicate the possibility of fecal materials as a source of infection otherwise members of

the *Enterobacteriaceae* are less commonly found with bacterial conjunctivitis.

CONCLUSION

The absence of growth of bacterial in considerable number of patient eyes and subsequent negative culture could be attributed to the blinking action of the lids, flushing mechanism of the tear fluid and the inhibitory effect of lysozyme, possible misdiagnosis of other forms of conjunctivitis for the bacterial type. The possibility of self-medication by patients before clinical consultation could be another possible reason. All the isolated bacteria were subjected to antibiogram were Rocephine was found to be the best effective antibiotics for (91.8%) of the treatment of gram-positive isolates. This was followed by Cefuroxime (72.1%), Cloxacillin (67.2%), Gentamycin (57.4%), Erythromycin (55.7%), Streptomycin (52.5%), Chloramphenicol (41%), Ceftazidime (36.1%), Tetracycline (29.5%), Ampicillin (9.8%) and Penicillin (1.6%). Out of 29 gram negative isolates, Rocephine was found to be the best effective antibiotic (89.7%) for the treatment of gram-negative isolates. This was followed by Gentamycin (65.5%), Tetracycline and Streptomycin has (52.7%) efficacy each, Colistin (48.3%), Ceftazidime (41.4%), Coltrimoxazole (34.5%), Cefuroxime (10.3%) and Ampicillin which was found to be resistant.

RECOMMENDATION

Conjunctivitis is an infectious disease that affects young and old, male and female. It is therefore necessary that the following recommendations for the prevention and management of conjunctivitis could be found useful.

- I. Health education and personal hygiene such as access to clean water for washing
- II. The use of appropriate antibiotics
- III. Provision of facilities for the early diagnosis of the aetiological agent of conjunctivitis.

REFERENCES

1. McMinn RMH. Last's Anatomy, New York, Churchill Livingstone Press. 1997, pp: 507-508.
2. Lim KH. Epidemic conjunctivitis: Discovery of a new aetiologic agent. Singapore Med J. 1973; 2: 82-85.
3. Wright KW, Spiegel PH. Paediatrics ophthalmology and Strabismus. Springer.1995;2: 285-286.
4. Higgins C. An introduction to the examination of specimens. Nurs Times. 1994; 90 47:29-32.
5. MacFaddin JF. Biochemical Tests for Identification of Medical Bacteria (3) Lippincott Williams & Wilkins, Philadelphia. 2000.
6. Jan Hudzicki. Kirby Bauer Disk Diffusion Susceptibility Test Protocol. Ameri Society Microbiol. <https://www.asm.org/getattachment/2594ce26-bd44-47f6-8287-0657aa9185ad/Kirby-Bauer-Disk-Diffusion-Susceptibility-Test-Protocol-pdf.pdf>
7. Karen KY, Barry AW. Bacterial Conjunctivitis (Pink Eye). <https://emedicine.medscape.com/article/1191730-overview>. 2019
8. Høvdning G. Acute bacterial conjunctivitis. Acta Ophthalmol. 2008; 86 1:5-17.
9. Allensandrini EA. The case of red eye. Paediatric Annals of Medicine. 2000;29 2.
10. Jellife DB. Disease of Children in the subtropics and tropics (2nd Edn) Edward Arnold Publications. 1970;585-602.
11. Martins JE, Armstrong JH, Smith PB. New system cultivation of Neisseria gonorrhoeal, Appli Microbiol, Washington.1996; 27: 802-805.
12. Prescott LM, Harley JF, Klein DA. Microbiology (3rd Edn), Published by Wm.C. Brown. 1996; 777-780.
13. Obi JO Wemanbu NC. Opthamia Neonaturum in Nigerian community, Nigeria Medical J. 1997;17 2: 418-421.
14. Duke-Elder WS. Disease of the outer eye system of ophthalmology by Henry Kimpton. 1965; 8 5: 168.
15. Duguid JP, Robert Cruickshank, Marmon BP, Swain RHA. Medical Microbiology: A Guide to the Laboratory Diagnosis and Control of Infection. 1989;12 1:515.
16. Perkin RE, Kundsinn RB, Pratt MV, Abrahamson I, Leibouwl TZ. Bacteriology of normal and infected conjunctiva. J Clin Microbiol. 1975;1 2:147-149.