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Full Length Research Paper

Conjunctivitis among children in a teaching hospital in South-West of Nigeria: Role of *Staphylococcus aureus* as an aetiologic agent and its antibiogram

O. A. Adeyeba[1], M. C Anorue[2], O. A. Adefioye[1]*, Y. O. Adesiji[1], A. A. Akindele[3], O. S. Bolaji[1], and I. K. Adewuyi[4]

[1]Department of Medical Microbiology and Parasitology, College of Health Sciences (Ladoke Akintola University of Technology) LAUTECH, Osogbo, Nigeria.
[2]Department of Medical Microbiology and Parasitology, (University College Hospital) UCH, Ibadan, Nigeria.
[3]Department of Community Medicine, College of Health Sciences, Ladoke Akintola University of Technology, Osogbo, Nigeria.
[4]School of Medical Laboratory Sciences, Obafemi Awolowo University Teaching Hospital, Ile-Ife, Nigeria.

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This study was done at the University College Hospital Ibadan, Nigeria between January and June, 2006. It was designed to determine the incidence and prevalence of *Staphylococcus aureus* in conjunctivitis in the Ophthalmology clinic of the hospital as well as the antibiotic sensitivity profile to chloramphenicol. A total of 210 swabs were gram-stained and cultured bacteriologically. 158 were positive for bacterial pathogens while 26 were bacteriologically sterile. A total of 174 bacterial isolate both in pure and mixed culture were isolated and 72 of the isolates were *S. aureus*. The age group < 1 year had the highest occurrence rate of 44.4%, followed by age group 1 - 5 years (30.6%) while the age group 6 - 10 years had the least (11.1%). More males (63.9%) than females (36.1%) were infected (p < 0.05). Susceptibility test result showed that gentamicin, ciprofloxacin, pefloxacin, erythromycin were active against *s. aureus* and are therefore, recommended as first line drugs. Chloramphenicol (61.1%) showed moderate activity against the organism.

Key words: Prevalence, incidence, *staphylococcus aureus*, ophthalmology, chloramphenicol.

INTRODUCTION

Conjunctivitis is an inflammation of the conjunctiva characterized by cellular infiltration and exudation. The exudates may be purulent, mucopurulent, foamy, pseudo membranous or catarrhal. Conjunctivitis may be infectious; caused by micro-organism or non-infectious; which may be allergy caused by drug and devices such as hard and soft contact lens (Pierce et al., 1982; Stenson, 1983). The most common type of infective conjunctivitis is bacterial conjunctivitis and about 90% or more of the reported cases of infective conjunctivitis are of bacterial origin (Mcdonell et al., 1990; Nicholas and Goolden, 1966). Bacterial conjunctivitis has been associated with a wide variety of micro-organisms in which *Staphylococcus aureus* is one of them (Levin et al., 1981).

S. aureus is the most common bacterial cause of ocular infections. Staphylococcus which is a constant inhabitant of the skin and most membrane including the conjunctiva has been incriminated as a cause of *ophthalmia neonatorum* (Mcdonell et al., 1990; Ako – Nai et al., 1991). During the 1950's chloramphenicol was widely used clinically was accepted as a promising broad spectrum antibiotics, but for recent years there was multi-resistant *S. aureus* and also the reported cases of aplastic anemia and childhood leukemia after prolonged use of chloramphenicol (Mcdonell et al., 1990). Despite the preponderance of purulent conjunctivitis among the children attending the ophthalmology clinics of our health facilities, there is a dearth of data on the aetiologic agents

*Corresponding author. E-mail: olusegunadefioye@yahoo.co.uk and akindeleaa@yahoo.com.

of conjunctivitis in the country. Those that exist in literature are either out-dated or not addressing the issue of staphylococcal infection in children. More often than not, there is absence of data on susceptibility to chloramphenicol. Therefore, this study is designed to determine the prevalence of *S. aureus* and susceptibility to chloramphenicol comparative to other anti-microbial agents in children in ophthalmology clinic.

MATERIALS AND METHODS

Study area

This study was carried out among children of both sexes with 0 - 15 years of age, attending ophthalmology clinic of the University College Hospital (UCH) Ibadan between January and June, 2006.

Sample collection and culture

The conjunctiva of the eyes was swabbed with sterile swabs and was immediately taken to the laboratory for prompt attention. A total of 210 samples were collected. Samples were inoculated onto blood agar, chocolate agar and MacConkey agar, respectively, using the method described by Baker and Silverton (1982). The Blood and MacConkey agar plates were incubated aerobically at 37°C for 24 h while the chocolate agar plates were incubated in the presence of carbon dioxide ($C0_2$) for 24 h at 37°C. The swabs were thereafter gram stained. After overnight incubation, isolates were identified and characterized using the standard methods for bacteriological identification as described by Cowan and Steel (1974).

Antibiotic sensitivity

Sensitivity testing was carried out with the agar diffusion technique described by Stokes and Rigway (1989) using Mueller-Hinton agar and paper antibiotic multodiscs that contained the following antibiotics: erythromycin (5 ug), cloxacillin (5 ug), gentamycin (10 ug), ampicillin (10 ug), chloramphenicol (10 ug), tetracycline (10 ug), streptomycin (10 ug), penicillin (1 ug), pefloxacin (5 ug), and ciprofloxacin (5 ug). The antibiotics from the disc were allowed to diffuse into the agar medium for 1 h and the plates were incubated at 37°C for 24 h. Zones of inhibition of the organisms were measured using meter rule and interpretation chart was used to determine the resistance patterns of the isolates (Brock and Brock, 1978), *S. aureus* NCTC 6571 was used as the control organism.

RESULTS

Of the 210 eye swabs examined, 158 (75.2%) were positive for bacterial pathogens while 52 (24.8%) were bacteriologically sterile. Table 1 shows the total distribution of bacterial pathogens isolated. 174 bacterial isolates were obtained. *S. aureus* 72 (41.4%) had the highest prevalence, followed by *Staphylococcus albus* 42 (24.1%) while *Proteus mirabilis* 2 (1.2%) occurred least in frequency ($p < 0.05$).

The distribution of pathogens in pure and mixed culture is shown in Table 2. 142 (81.6%) bacterial isolates accounted for pure culture while 32 (18.4%) accounted for mixed culture ($p < 0.05$). Table 3 shows the prevalence of *S. aureus* incriminated with conjunctivitis by age and sex. 72 (41.4%) *S. aureus* were isolated from the samples. The age group < I year had the highest occurrence rate (44.4%), followed by age group 1 - 5 years (30.6%) while the age group 6 - 10 years had the least (11.1%). However, more males (63.9%) than females (36.1%) were infected ($p < 0.05$).

The antibiogram pattern of *S. aureus* isolated from eye swabs is shown in Table 4. Gentamicin (91.7%) appeared as the most potent antibiotic, followed by cipro-floxacin (86.1%), pefloxacin (80.6%) and erythromycin (75%). Chloramphenicol showed moderate activity against *S. aureus* with 61.1% of the isolates sensitive. Penicillin (94.4%), tetracycline (83.3%) and ampicillin (61.1%) were resisted by *S. aureus*.

Table 1. Distribution of bacterial pathogens isolated from eye swabs.

Organisms	Number	(%)
Staphylococcus aureus	72	41.4
Staphylococcus albus	42	24.1
Pseudomonas aeruginosa	20	11.5
Klebsiella spp.	18	10.4
Streptococcus pneumonia	8	4.6
Neisseria gonorrhoea	4	2.3
Hemophilus influenzae	4	2.3
Escherichia coli	4	2.3
Proteus mirabilis	1	1.2
Total	174	100%

Table 2. Distribution of bacteria pathogens from eye swabs both in pure and mixed cultures.

Organisms	Pure Number (%)	Mixed Number (%)
Staphylococcus aureus	62 (43.7)	10 (31.3)
Staphylococcus albus	40 (28.2)	2 (6.3)
Pseudomonas aeruginosa	14 (9.9)	6 (18.3)
Klebsiella spp.	8(5.6)	10 (31.3)
Streptococcus pneumonia	6 (4.2)	2 (6.3)
Neisseria gonorrhoea	4 (2.8)	0 (0.0)
Hemophilus influenzae	4 (2.8)	0 (0.0)
Escherichia coli	2 (1.4)	2 (6.3)
Proteus mirabilis	2 (1.4)	0 (0.0)
Total	142 (81.6)	32 (18.4)

DISCUSSION

The importance of conjunctivitis caused by *S. aureus* in children cannot be overemphasized especially in the

Table 3. Prevalence of *Staphylococcus aureus* conjunctivitis by age and sex.

Age group (Years)	Males		Females		Total	
	Number	%	Number	%	Number	%
< 1	20	43.5	12	46.2	32	44.4
1 – 5	14	30.4	8	30.8	22	30.6
6 – 10	4	8.7	4	15.4	8	11.1
11 – 15	8	17.4	2	7.7	10	13.9
Total	46	63.9	26	36.1	72	100

Table 4. The antibiogram pattern of staphylococcus aureus isolated from conjunctival swabs.

Antibiotics (ug)	Sensitivity		Resistance	
	Number	%	Number	%
Gentamicin (10)	66	91.7	6	8.3
Erythromycin (5)	54	75.0	18	25.0
Tetracycline (10)	12	16.7	60	83.3
Ampicillin (2)	28	38.9	44	61.1
Pefloxacin (5)	58	80.6	14	19.4
Penicillin (1)	4	5.6	68	94.4
Streptomycin (10)	48	66.7	24	33.3
Cloxacillin (5)	46	63.9	26	36.1
Ciprofloxacin (5)	62	86.1	10	13.9
Chloramphenicol (10)	44	61.1	28	38.9

tropics as the pathogen is cosmopolitan (Ako – Nai et al., 1991). This study reveals that conjunctivitis due to bacteria accounts for 75.2% of the cases of infectious conjunctivitis in children in the study area. These findings accords well with that of Nicholas et al. (1966) who reported that about 90% or more of the reported cases of infectious conjunctivitis are of bacterial origin. The finding reveals that infectious conjunctivitis is a common disease phenomenon in communities especially in developing countries like Nigeria where climatic factors, unhygienic behavious, poverty and shortage of competent medical personnel's contributes to the spread of the micro-organism.

S. aureus (41.4%) was the most prevalent organism isolated in this study. This is in agreement with the work of Locather-khorazo et al. (1967) who while working in New York reported that two-thirds of ocular infections were due to *S. aureus*. This finding and that of other workers such as Nicholas et al. (1966), Bentley (1979) should make one erase the erroneous belief that the presence of *S. aureus* in the eye is born out of a mere contamination, thus, its role as a predisposing factor to the total destruction of the eye should not be easily overlooked, especially in this part of the globe where many factors responsible for the weakening of the eyes defense mechanism are very prevalent. However, *S. aureus* had the highest frequency in the age group below 1 year old. This is in accordance with the finding of other workers (Gighotti and Williams, 1981; Levin et al., 1981). The reason for high frequency in this age group is due to the fact that neonates produce little, if any, tears thus, has no opportunity to develop immunity to Staphylococcal organism. They also lack lymphoid tissue in the periorbital area, thus do not benefit from the protection offered by this structure (Fox and Golomb, 1979).

The antibiotic susceptibility pattern of the organisms heavily favours gentamicin, ciprofloxacin and pefloxacin. Gentamicin has to be used with caution because of its toxigenicity to the kidney nephron as reported by Greenwood (1998). It is to be noted however, that certain antibiotics such as erythromycin is just 75% effective against *S. aureus*. The antibiotic could therefore, be used for the management of infection if other first line drugs are not available. The organism is slightly sensitive to chloramphenicol (61.1%) and this could be as a result of indiscriminate use of this antibiotic. Moreover, chloramphenicol has also been reported to cause bone marrow toxicity and aplastic anaemia.

The predisposing factors to Staphylococcal conjunctivitis include pollution and poor diet while overcrowding, poor hygiene and poor ventilation help in the spread of the disease. The organism can be introduced to the eye through contact, formites, dust and rubbing of the eye with contaminated finger. Thus, the need for maintenance

of a clean environment and proper personal hygiene should be emphasized. The importance of local ocular hygiene cannot be overemphasized. This includes removal of scales from lid margins, simply washing of face with warm water and mild soap morning and night can markedly improve the condition. Sensitivity test should be carried out on all the isolates before prescription by clinicians in order to prevent antibiotic resistant-strains.

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