BACTERIAL AETIOLOGIC AGENTS AND ANTIBIOTIC SENSITIVITY PATTERN IN EYE INFECTIONS IN NEONATES AT AMINU KANO TEACHING HOSPITAL, KANO.

NWANKWO E.O.K.,[1] NWOKEDI E.E.,[1] ADELEKE S.I[2]

[1]Department of Medical Microbiology and Parasitology, Bayero University, Kano.
[2] Department of Paediatrics Bayero University, Kano.

Corresponding Author: NWANKWO E.O.K.

ABSTRACT

Background: Eye infections account for a large proportion of workload in ophthalmic centers. In neonates this constitute an urgent referral since it can lead to childhood blindness, irrespective of its origin.

Aims: This study was undertaken to determine the bacterial aetiologic agents of eye infection in neonates and their antibiotic susceptibility pattern as well as present the associated risk factors.

Subjects and Methods: Eye swab specimens were taken from the purulent discharge of 182 neonates consecutively aged between 0-28 days diagnosed as having ophthalmia neonatorum between April 2001 and May 2005 and sent to the Microbiology department of Aminu Kano Teaching Hospital. They were bacteriologically analysed by standard procedures. The paper-disc diffusion method was used for the antibiotic susceptibility testing. Eye swabs were taken from 100 neonates in the same hospital which served as healthy controls after obtaining verbal consent from their parents and processed similarly.

Result: The age and sex distribution shows that the neonates were mostly affected in the first week of life. They were 70 (38.3) males and 112 (61.4%) females. Out of 182 specimens collected 114 (62.6%) culture yielded bacterial growth.
The predominant organism isolated was Staphylococcus aureus (47.4%), followed by Escherichia coli 28 (24.5%), Pseudomonas aeruginosa 16 (14.03%) and proteus spp. 10 (8.7%). Over 70% of the common isolates were sensitive to ceftriaxone, gentamicin, ceftazidime, cefuroxime and amoxicillin clavulanate. Risk factors were obtained from their case files. These included virginal delivery, premature rupture of membrane and local eye injury during child birth.

Conclusion: S. aureus was the predominant infective agent while Klebsiella spp. was the least.

KEY WORDS: Bacterial aetiologic agent, Eye infections, Neonates.

INTRODUCTION:

Eye infections which can be bacterial, viral, chlamydial, fungal or acanthamoebic in origin constitute a large proportion of the workload in the ophthalmic centres.-[1,2]

Bacterial conjunctivitis in neonates which present with sticky purulent discharge with peripheral conjunctival redness constitutes an urgent referral because it can lead to childhood blindness[1].

In the pathophysiology of eye infections, two factors play very prominent roles. These are the integrity of the cornea and the pre-corneal film. A healthy cornea and intact pre-corneal film offer prolonged protection against infection. At birth, the conjuctiva in the neonate is sterile but soon become colonized by pathogenic and non pathogenic organisms[2].

The conjuctiva in the neonate is prone to infection because there are low levels of antibacterial agents and proteins like

lysozyme and immunoglobulins A and G, consequent upon the tear film and flow that are just beginning to develop[3,4].

Ophthalmia neonatorum still leads to blindness in approximately 10,000 babies annually worldwide[5]. In a study carried out in Kenya, four perinatal factors namely maternal vaginitis, presence of meconium at birth, delivery in an unsterile environment and postnatal development of endometritis were identified[5]. In another study premature rupture of membrane was identified as a risk factor in ophthalmia neonatrum[6]. Vertical transmission may play an important role in neonatal conjuctivitis as 67% of bacteria from the infected neonates were similar to those infection in lower genital tract and placenta of mothers as shown in the study conducted in Beijing[7].

MATERIALS AND METHODS

Eye swab specimens were taken consecutively from the purulent discharge of 182 neonates diagnosed as having ophtalmia neonatorum between April 2001 and May 2005, avoiding skin contamination, and sent to the Microbiology Department of Aminu Kano Teaching Hospital. One hundred neonates without eye discharge were equally swabbed for cultures after obtaining verbal informed consent from the parents. Their case files were reviewed to obtain the risk factors.

These specimens were cultured on chocolate blood agar, blood agar and MacConkey agar media and incubated overnight at 37°C. The chocolate blood agar plates were incubated in a candle jar to aid the isolation of fastidious organisms such as Neisseria gonorrhoeae, and Haemophilus spp. Gram staining and Giemsa staining were done on all the specimens collected. Giemsa staining was included to aid identification of inclusion granules of chalmydia trachomatis. Identification of isolates were done according to the methods of Cheesborough[8] while the antibiotic susceptibility testing was done by standard paper disc diffusion technique[9].

RESULTS:

The sex and age distributions in neonate with eye infection as presented in Table 1 show that the infection is common in the first week of life. Out of 182 specimens collected, 114 (62.6%) cultures yielded bacterial growth. There were no mixed infection as all the isolates were single bacterial cultures. While 112 (61.4%) of the patients were females, 70 (38.3%) were males.

Table 2 shows the various bacteria genera isolated as aetiologic agent of ophthalmia neonatorium in this study. The different percentages in each genera were compared with healthy controls. The predominant organism was S aureus 54 (47.4%). Other isolates were as follows E. coli 28 (24.5%), Pseudomonas aeruginosa 16 (14.0%) proteus Spp 10 (8.7) and Klebsiella spp. 6(5.2%).

Table 3 shows the percentage of positive and negative cultures from the subjects compared with control using chi-squared test. There was a statistically significant difference ($P<0.05$).

Table 4 shows the antibiotic susceptibility pattern of the isolates to various antibiotics. Over 70% of the common isolates were sensitive to ceftriaxone, gentamacin, ceftazidime, cefuroxime and amoxicillin clavulanate. However, ampicilin and cotrimoxazole showed resistance to most drugs tested.

Table 1: Age and sex distribution of neonates with eye infection

Age (days)	Male (%)	Female (%)	Total
0 7	46 (25.3)	72 (39.6)	118 (64.9)
8 14	8(4.3)	8(4.3)	16(8.6)
15 21	4(2.2)	10(5.5)	14(7.7)
22 28	12(6.5)	22(12.1)	34(18.6)
TOTAL	**70(38.3)**	**112(61.4)**	**182**

Table 2: Bacterial isolates from neonates with eye infections and healthy controls.

TYPES OF BACTERIA	PATIENTS		HEALTHY SUBJECTS	
	n = 114	(%)	n = 100	(%)
E. coli	28	(24.5)	5	(5.0)
S. aureus	54	(47.4)	6	(6.0)
Pseudomonas aeruginosa	16	(14.03)	2	(2.0)
Proteus spp	10	(8.7)	4	(4.0)
Klebsiella spp	6	(5.2)	3	(3.0)
S. epidermidis	-		7	(7.0)

Table 3: Percentage positive and negative cultures in subjects and healthy controls

ISOLATES	PATIENTS (%)	CONTROL (%)	TOTAL
Positive	114 (62.6)	27 (27)	141
Negative	68 (37.4)	73 (73)	141
TOTAL	**182**	**100**	**282**

Chi-square 61.0 df: 1 P<0.05

Table 4: Antibiotic susceptibility pattern of bacterial isolates no (%) of isolates sensitive to

PATHOGENS	NO TESTED	GEN	CAZ	CHL	ERY	AUG	CRO	AMP	SXT
E. coli	28	20(71.4)	26(92.8)	4(14.3)	ND	23(82.1)	27(96.4)	1(3.5)	10(35.7)
S. aureus	54	36(66.7)	40(74.0)	26(48.1)	48(88.9)	42(77.8)	40(74.0)	0(0)	0(0)
Pseudomonas aeruginosa	16	12(75.0)	10(62.5	0(0)	ND	10(62.5)	14(87.5)	0(0)	0(0)
Proteus spp	10	7(70.0)	8(80.0)	5(50.0)	ND	7(70.0)	9(90.0)	1(10)	0
Klebsiella spp	6	5(83.0)	5(83.0)	0(0)	ND	4(66.7)	5(83.0)	0(0)	0

GEN	-	GENTAMICIN
CAZ	-	CEFTAZIDIME
CHL	-	CHLORAMPHENICOL
ERY	-	ERYTHROMYCIN
AUG	-	AUGMENTIN
CRO	-	CEFTRIAXONE
AMP	-	AMPICILLIN
SXT	-	COTRIMOXAZOLE
ND	-	NOT DONE

DISCUSSION:

The predominance of S. aureus in this study agrees with the result of earlier studies[6],[11]. It is of much concern to the results of all in view of the emergence of methicillin-resistant strains which was believed to be a nosocomial infection but now isolated from communities. The treatment of this organism still poses a lot of challenges globally to health care providers.

The prevalence rate of 47.4% for S. aureus obtained in this study is lower than that reported in the study carried out in Benin-City[14] which was 60.5%. The reason may be due to higher sample size used in their studies. However, Iroh et al[15], Asonye[16] and Ezelum had a prevalence rate of 37.4% and 40% respectively in their studies.

In the past, ophthalmia neonatorum was believed to be caused predominantly by either Neisseria gonorrhoea or Chlamydia trachomatis. However, several organisms have been isolated as aetiologic agent in this study which is consistent with previous studies[11].

Neisseria gonorrhoea and Chlamydia trachomatis were not isolated in this study probably due to a reduction in indiscriminate sex to avoid the much dreaded HIV/AIDS. Antibiotic abuse through self medication may also be responsible.

The isolation of the other gram-negative bacteria though of lower prevalence is not of less significance in terms of virulence. They are capable of causing childhood blindness if untreated or poorly treated. This study confirms that the presence of sticky purulent discharge is a major symptom in ophtalmia neonatorum, both eyes are commonly affected.

CONCLUSIONS:

The main bacterial aetiologic agents we found in neonatal eye infection to be S. aureus 54 (42.2%), E. coli 28 (24.5%), Pseudomonas aeruginosa 16 (14.0%), Proteus spp.10 (8.7%) and Klebsiella Spp 6(5.2%). Their associated risk factors were vaginal delivery, prolonged rupture of membrane and local eye injury during child birth. About 70% of the common isolates were sensitive to ceftriaxone, gentamicin, ceflazidime, cefuroxime and amoxicillin clavulanate. This will be of local clinical relevance in the treatment of ophtalmia neonatorum.

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