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## Bacterial agents and sensitivity pattern of neonatal conjunctivitis in Aminu Kano Teaching Hospital

DOI:<http://dx.doi.org/10.4314/njp.v40i4.2>

Accepted: 27th May 2013

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**Abstract** *Introduction:* In Africa alone, between 1000 – 4000 children are blinded annually by conjunctivitis. In view of the changing aetiological agents documented in other parts of the world and evolving resistance of infective agents to therapeutic agents, the present study was designed to define the bacterial agents, their antibiotic sensitivity pattern seen in AKTH, Kano, Nigeria.

*Patients and methods:* This was a cross sectional prospective study done over a period of 3 months. Consecutive neonates who satisfied the inclusion criteria were recruited until the sample size of 175 was obtained. samples were transported to the laboratory within one hour. Gram staining and antibiotic sensitivity were determined using standard

technique.

*Results:* The mean age at presentation was  $5.7 \pm 4.6$  days. Results of the eye swabs showed that 97 (55.4%) were bacteriologically positive while 78 (44.6%) yielded no growth. *Staphylococcus aureus* was the most frequently isolated organism and was most sensitive to ceftriaxone, (73.1%). *Escherichia coli* was most sensitive to gentamicin (78.3%). *Pseudomonas aeruginosa* and *Neisseria gonorrhoea* showed 100% sensitivity to ceftazidime and ceftriaxone respectively.

*Conclusion:* *Staphylococcus aureus* is the commonest bacterial agent responsible for neonatal conjunctivitis. *Staphylococcus aureus* was most sensitive to ceftriaxone.

**Key words:** Conjunctivitis, Neonates, Bacteria, Sensitivity.

### Introduction

Neonatal conjunctivitis was originally described in 1750 by Quellmaz.<sup>1</sup> It is one of the most common infections occurring in the first month of life and remains an important cause of ocular morbidity of great health concern.<sup>2</sup> Faal<sup>3</sup> noted that there were an estimated one and a half million blind children in the world in 1992 and every year about half a million more became blind. Neonatal conjunctivitis was responsible for blindness in the majority of these children in countries of Asia and Africa and.<sup>3</sup> In Africa between 1000 – 4000 children suffer blindness annually as a consequence of conjunctivitis.<sup>4</sup>

The major causes of neonatal conjunctivitis are, in decreasing order of frequency, chemical inflammation, bacterial infections and viral infections while bacteria are the major causes of infectious neonatal conjunctivitis.<sup>5</sup> The bacterial causes include sexually transmitted

disease agents (*Chlamydia trachomatis* and *Neisseria gonorrhoea*), microorganisms from the skin (*Staphylococcus aureus*) and the mother's gastrointestinal tract (*Pseudomonas spp* and *Escherichia coli*) and *Haemophilus influenzae* among others. *Neisseria gonorrhoea* is an important aetiological agent of neonatal conjunctivitis because of its potential damage to vision.<sup>6</sup> It accounts for up to 1.7% of all neonatal conjunctivitis recorded in the study from Benin, Nigeria.<sup>7</sup> However the introduction of prophylactic measures has led to a decrease in the incidence of gonococcal and chlamydial neonatal conjunctivitis.<sup>8</sup> Recent studies show that *Staphylococcus aureus* appears to be increasingly a common causative agent of neonatal conjunctivitis. It accounted for 60.5% of cases seen in Benin,<sup>7</sup> and 42.4% of cases seen in Abakaliki<sup>6</sup> both in Nigeria.

In view of the changing aetiological agents documented in Nigeria and other parts of the world as well as

evolving resistance of infective agents to routinely used therapeutic agents and the paucity of information on neonatal conjunctivitis in Nigeria, the present study was designed to identify the bacterial agents, their antibiotic sensitivity pattern and ocular clinical presentation of neonatal conjunctivitis among newborn babies seen in AKTH.

## Subjects and methods

This was a cross sectional, prospective study in which subjects were recruited over a period of three months (April to June 2010). Approval was obtained from the Ethics Committee of Aminu Kano Teaching Hospital and informed and written consent of the primary care givers of subjects were obtained. Aminu Kano Teaching Hospital (AKTH) is located in Kano metropolis. It is a tertiary centre with a bed capacity of 500. The catchment areas of the hospital include Jigawa, Bauchi, Katsina and Yobe states. The paediatric department of the hospital consists of five units; the Special Care Baby Unit, the Emergency Paediatric Unit, Paediatric Medical Ward, Paediatric Outpatient Unit and Paediatric Specialty Clinic. The SCBU is located adjacent to labour room and it consists of the inborn unit for neonates delivered in the hospital and out born unit for neonates delivered outside the hospital who require hospitalization.

Consecutive neonates who satisfied the inclusion criteria were recruited from the Special Care Baby Unit, the post natal ward and paediatric outpatient unit of the hospital until the desired sample size of 175 was obtained. The sample size was determined based on the highest prevalence of positive bacterial isolates of 13.15% reported from Ilorin.<sup>2</sup> Inclusion criteria were: all babies within the age of 0 –28 days presenting at Special Care Baby Unit, paediatric outpatient unit, the postnatal ward and labour ward with discharge from one or both eyes.

Relevant information was collected using a pre-tested questionnaire administered to caregivers in interview sessions. Birth weight was recorded for all inborn babies and for those delivered in other hospitals where the information was available. For those without birth records the weight and age at presentation were determined.

Physical examination was conducted on all study subjects and the severity of the conjunctivitis was scored in each case using the method described by Christian.<sup>9</sup> Scores were awarded as 1+, 2+ and 3+ for mild, moderate and severe cases respectively. Conjunctival swabs were collected from the eyes of the subjects with the aid of sterile swab sticks and samples were then immersed in the broth in universal bottles and transported to the laboratory within 30 minutes to one hour. The broth consists of peptone, Beef extracts and sodium chloride which serve as nutrient for the pathologic organisms.

Smears of the specimens were made on glass slides and

fixed using heat and alcohol. Gram staining of the slides was carried out using standard techniques. The swabs were also inoculated on the chocolate agar plates and were incubated for 24-48 hours at 37°C. Aerobic isolates were identified by the standard methods of Cowan (1974).<sup>10</sup> Anaerobes were not studied due to lack of facilities. Antibiotic sensitivity of the isolates was determined using standard disc diffusion technique.<sup>11</sup> However antibiotic sensitivity for *Chlamydia* was not done due to lack of facilities. Diagnosis of chlamydial infection was done through detection of Chlamydial antigens using a rapid immunochromatographic technique (ICT). After collection of specimens, patients were managed in accordance with standard departmental guidelines.

The data generated were entered into a Microsoft Excel spreadsheet and analyzed using EPI INFO version 3.5.1 2002. Continuous variables were summarized using means, medians, and ranges as appropriate. Frequency tables were generated and cross-tabulations to observe the relationship between categorical variables were done. Proportions were compared using Chi-square test of significance. A probability (p-value) of less than 0.05 was considered statistically significant.

## Results

A total of one hundred and seventy five (175) neonates that met the study criteria were studied. The age range of subjects at presentation was 1-24 days with the mean of  $5.7 \pm 4.6$  days. Ninety one (52.0%) neonates were males while eighty four (48%) were females with a male: female ratio of 1.1:1. A total of 1602 neonates were seen in AKTH during the study period thus giving an incidence of neonatal conjunctivitis of 60.5 per 1000 live births in this study.

**Table 1:** Distribution of age at onset of conjunctivitis

Age in days#	Total Number	Sex			
		Male	%	Female	%
0 – 2	82	47	26.8	35	20
3 – 5	76	39	22.3	37	21.1
6 – 14	10	5	2.9	5	2.9
>14	7	-	-	7	4.0
Total	175	91	52	84	48

# The unequal age intervals were used to reflect the incubation periods of common aetiological agents of neonatal conjunctivitis.

Table 2: shows the bacterial agents isolated in neonates with conjunctivitis. Results of the eye swabs showed that 97 (55.4%) were bacteriologically positive while 78 (44.6%) yielded no growth. Six bacterial genera were isolated, of which *Staphylococcus aureus* was the most frequently isolated organism. *Klebsiella species* and *Neisseria gonorrhoea* were the least isolated organisms accounting for 1.7% each.



Onile et al<sup>22</sup> who reported much higher sensitivities of 89.29% and 100% respectively. It is however higher than 42.8% reported by Ibekwe<sup>6</sup> from Abakaliki. The relatively high sensitivity of *Staphylococcus aureus* to ceftriaxone, ceftazidime and gentamicin could be explained by low potential for abuse as these drugs are present only in injectable and topical forms.

*Escherichia coli* showed a high sensitivity of 78.3% to gentamicin which is however, lower than the 100% reported by Ibekwe et al.<sup>6</sup> The sensitivity of *Escherichia coli* to ceftazidime(73.9%) and ceftriaxone(65.2%) is similar to the report of Kolade.<sup>19</sup> *Neisseria gonorrhoea* was highly sensitive to ceftriaxone (100%). The higher sensitivity of *E. coli* to these antibiotics may be due to the fact that they are present only in injectable forms, hence not commonly abused, thus less likelihood of resistance.

## Conclusion

*Staphylococcus aureus* and *Escherichia coli* are the commonest bacterial agents responsible for neonatal conjunctivitis in Aminu Kano Teaching Hospital. We therefore, recommend the use of Ceftriaxone and topical Gentamycin to treat neonatal conjunctivitis in Kano. Periodic survey should also be carried out to identify any change in the aetiological agents of neonatal conjunctivitis so as to guide modification in the treatment plan of the disease.

**Conflict of interest:** None

**Funding:** None

## References

1. Kaivonen M. Prophylaxis of ophthalmia neonatorum *Acta Ophthalmol 1965;Suppl 79 : 1-7*.
2. Ernest SK, Adeniyi A, Mokuolu OA, Onile BO, Oyewale B. Neonatal conjunctivitis in Ilorin, Nigeria. *Niger J Paediatr 2000;27:39-46*.
3. Faal HB. Childhood Blindness: causes and prevention strategies *Postgrad Doct Africa 1992; 114 (3): 47-50*.
4. Isenberg, Apt L, Wood MA. Controlled trial of povidone iodine prophylaxis against ophthalmia neonatorum. *N Eng J Med 1995; 332:562-566*.
5. Malika PS, Asok T, Aziz S, Faisal HA, Tan AK, Intan G. Neonatal conjunctivitis – a review. *Malaysian Family Physician. 2008; 3 (2):77-81*.
6. Ibekwe MU, Ibekwe RC, Umeora MC, Okafor IO. Aetiology and antibiotic sensitivity pattern of ophthalmia neonatorum in Ebonyi State University Teaching Hospital, Abakaliki, *Niger J Paediatr 2007; 34: 63*
7. Iyamu E, Enabule O. Survey on ophthalmia neonatorum in Benin City, Nigeria (emphasis on gonococcal ophthalmia). *Online J Health Allied Scs 2003;2:1-6*.
8. Ohara MA. Ophthalmia neonatorum. *Paediatr Clin North Am 1995; 40: 215 – 25*
9. Christian RJ: Comparism of ocular reactions with the use of silver nitrate and erythromycin ointment in Ophthalmia neonatorum prophylaxis. *J Paediatr 1960; 57(1): 55 – 60*.
10. Cowan ST: Cowan and Steel's manual for identification of medical bacteria. 2<sup>nd</sup> ed.
11. Cambridge University Press, Cambridge, London. 1985; 138-39.
12. Bauer AW, Kirby WM, Sherris JC, Antibiotic susceptibility testing by a standardized single disc method, *Ann Pathol 1966; 45:493*.
13. Ugbo RO. Prevalence of Ophthalmia neonatorum at the Ahmadu Bello University Teaching Hospital Zaria. Dissertation presented to the Faculty of Paediatrics, West African College of Physicians, 1991.
14. Olatunji FO. Ophthalmia neonatorum in Kaduna; a case control study. *Nig J Ophthalmol 2003;11;2: 1*.
15. Abdulkadir IA. Study of bacterial agents of ophthalmia neonatorum in Ahmadu Bello University Teaching Hospital, Zaria; a Dissertation presented to National Postgraduate Medical College of Nigeria, November 2008.
16. Mohile M, Deorari AK, Satpathy G, Sharama A, Singh M. Microbiological study of neonatal conjunctivitis with special reference to Chlamydia trachomatis. *Indian J Ophthalmol 2002; 50:295-9*.
17. Gotoff SP: Infection of the neonatal infant. In: Behrman ER, Kliegman MR, Jenson BH (editors) Nelson Textbook of Paediatrics 16<sup>th</sup> ed. Philadelphia: WB Saunders Co. (Pub). 2000; 538-552.
18. Ibrahim M, Ibrahim A, Kashibu E, Shehu UA. Bacteraemia in febrile children as seen at Aminu Kano Teaching Hospital, Kano. PAN-CONF 2010 41<sup>st</sup> Annual General Scientific Conference Abstracts : 8-9.
19. Vedantham V Prohylaxis of ophthalmia neonatorum. *Br J Ophthalmol 2004; 88:1352-3*
20. Kolade ES. Ophthalmia neonatorum at University of Ilorin Teaching Hospital, Ilorin. Dissertation presented to the West African College of Physicians, 1996.
21. Schober J. Therapic septischer infektionen bei fruh – und neugeborenen infektionen in der neonatologic; Frankfurt 1987; 72-79.
22. Onile BA, Odugbemi T, Nwafor C. Antibiotic susceptibility of Bacterial agents of septicaemia in Ilorin, Nigeria. *Nig. Med Pract. 1985; 9 (4):93-96*.