

NEONATAL CONJUNCTIVITIS AND ITS DRUG SENSITIVITY PATTERN

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ABSTRACT

BACKGROUND

Neonatal conjunctivitis is eye discharge in neonates and it is a common infection in neonates in the first month of life. Worldwide, the incidence of neonatal conjunctivitis varies from 1% to 33% depending on the socioeconomic status of the people in the region. In India, the incidence varies from region to region from 0.9 to 35%.

MATERIALS AND METHODS

Single center prospective study. All neonates of age 0-30 days delivered and referred from neonatal ward of Chengalpattu Medical College and Hospital with complaints of eye swelling, redness, conjunctival discharge to the eye department for treatment are included in the study.

RESULTS

In this study, age group from 0-7 days were most commonly affected by neonatal conjunctivitis. Both eyes were commonly affected together. Neonates born by both LSCS and normal vaginal delivery were almost equally affected. The most common organism found in culture and Gram staining was staphylococci.

CONCLUSION

Neonatal conjunctivitis is more likely to be acquired postnatally. It acquires during the 1st week and responds well to local application of antibiotics, which covers common causative bacteria.

KEYWORDS

Neonatal Conjunctivitis, Culture and Sensitivity, Gram Staining, Antibiotics.

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BACKGROUND

Neonatal conjunctivitis is the infection of conjunctiva of the newborn.¹ Bacterial and viral infections are the major cause of septic neonatal conjunctivitis.

Pathology of neonatal conjunctivitis is due to the anatomy of the conjunctival tissues of the newborn, as it contains non-keratinising squamous epithelium, a thin richly vascularised substantia propria contain lymphatic vessels and cells such as lymphocytes, plasma cells, mast cells and macrophages. Conjunctiva also has accessory lacrimal glands and goblet cells.¹

The inflammation of the conjunctiva may cause blood vessel dilatation, chemosis and excessive secretion. However, in neonates, the infection maybe more serious due to the lack of immunity absence of lymphoid tissue in conjunctiva and absence of tears at birth.

Neonatal conjunctivitis maybe due to the transmission of organisms from maternal cervix during birth or acquired after birth. During birth, the risk of transmission of streptococci, gonococci or chlamydia to the child is more. Infections like *E. coli*, staphylococcus, *H. influenzae* can lead to conjunctivitis, corneal ulcer and perforation, secondary meningitis, cellulitis and septicaemia. So, clinically, we should be able to identify the severity of infection and treat it at the earliest to avoid complications. The microbial flora isolated from the normal conjunctiva are predominantly bacterial with rare isolation of fungi. Virus and protozoa are not usually isolated from the conjunctiva. The most common bacteria isolated being coagulase-negative staphylococci.

Aseptic neonatal conjunctivitis often called as chemical conjunctivitis caused by silver nitrate used at birth for Crede's prophylaxis of infectious conjunctivitis. Chemical conjunctivitis is now less common due to the use of antibiotic eye ointments, which took the place of silver nitrate solution for the prophylaxis of infectious conjunctivitis.

According to various studies, the normal flora of human eyelids are coagulase-negative staphylococcus, *Staphylococcus aureus*, diphtheroids, corynebacterium, streptococci species, enterococcus species, proteus species, *Acinetobacter* species and *Propionibacterium acnes*.² Patients with chronic ocular disease have more

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Staphylococcus aureus, Pseudomonas aeruginosa and gram-negative bacteria. Contact lens wearers, HIV patients and other immune compromised patients have similar bacterial flora with small differences.

AIMS AND OBJECTIVES

To identify the microorganisms causing neonatal conjunctivitis and their drug sensitivity pattern in babies delivered at Chengalpet Medical College and Hospital.

MATERIALS AND METHODS

All neonates of age 0-30 days delivered and referred from neonatal ward of Chengalpattu Medical College and Hospital with complaints of eye swelling, redness, conjunctival discharge, to the eye department for treatment were included in the study.

Two conjunctival smears from both eyes of the newborn were collected using sterile conjunctival swabs and transported to Microbiology Department in sterile test tubes immediately.

Conjunctival smear studied for Gram strain, culture and sensitivity of organism and modification of the treatment to be done accordingly.

Duration- October 2016 to December 2016.

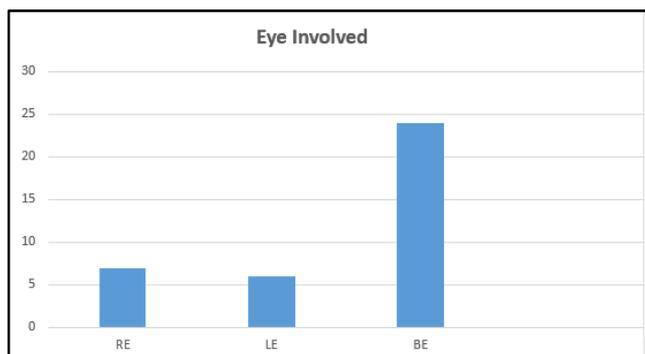
Inclusion Criteria

1. Neonates born in Chengalpattu Medical College and Hospital.
2. Age 0-30 days.
3. Delivered by normal vaginal delivery/assisted vaginal delivery.
4. Delivered by LSCS.

Exclusion Criteria

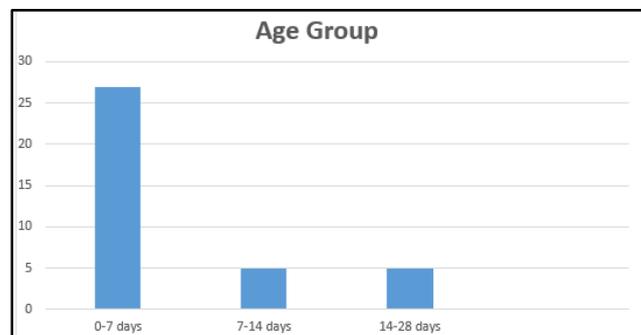
1. Babies age group >30 days.
2. Associated congenital dacryocystitis.
3. Birth injury to eye.
4. Congenital defects of eye.

RESULTS



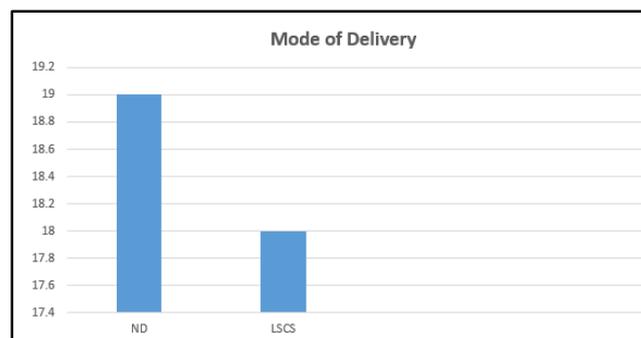
Graph 1. Eye Involved

64.8% newborn have both eye affected, 18.91% have right eye involved only, remaining 16.21% have left eye involved only.



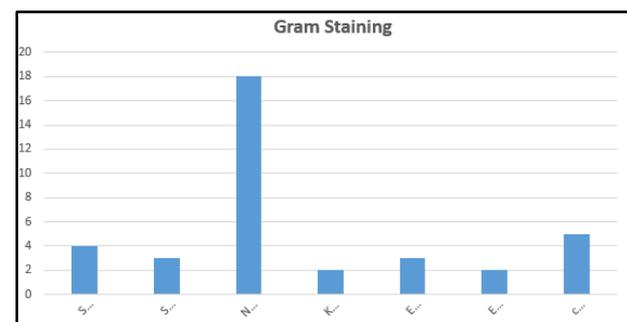
Graph 2. Age Group

Out of 37 newborn, 72.9% cases affected within 0-7 days, 13.5% cases affected within 7-14 days, remaining 13.5% cases affected within 14-28 days.



Graph 3. Mode of Delivery

51.35% of cases were born out of normal delivery, 48.64% were born out of LSCS. Babies born out of normal delivery having neonatal conjunctivitis was slightly higher than those born by LSCS.



Graph 4. Gram Staining

10.43% had Staphylococcus aureus positive in Gram staining, 8.1% had Staphylococcus albus, 48.7% had no growth, 5.4 had Klebsiella, 8.1% had E. coli, 5.4% had enterococcus and 13.5% had coagulase-negative staphylococci. A total of 32% of the organisms were found to be staphylococci of which coagulase-negative staphylococci is the most common in cultures.

Sl. No.	Age/Sex	IP/OP NO.	RE/LE/BE	ND/LSCS	Gram Staining	C/S
1.	2/365	44,217	RE	ND	Klebsiella	Cephalexin, cefoxitin, moxifloxacin
2.	6/365	46,013	BE	LSCS	No growth	
3.	7/365	38,851	LE	ND	No growth	
4.	5/365	38,850	BE	ND	Klebsiella	Tobramycin, moxifloxacin
5.	10/365	44,247	BE	LSCS	No growth	
6.	6/365	46,013	BE	LSCS	No growth	
7.	20/365	39,360	LE	LSCS	No growth	
8.	7/365	46,947	BE	ND	No growth	
9.	4/365	47,097	LE	ND	Staphylococcus aureus	Tobramycin, moxifloxacin
10.	12/365	27,473	LE	LSCS	Coagulase-negative Staphylococci	Tobramycin, moxifloxacin
11.	16/365	46,454	LE	ND	No growth	
12.	6/365	25,582	BE	LSCS	Coagulase-negative Staphylococci	
13.	4/365	35,432	RE	ND	Enterococcus	
14.	3/365	42,218	BE	ND	No growth	
15.	13/365	28,365	BE	ND	Coagulase-negative Staphylococci	Tobramycin, moxifloxacin
16.	6/365	34,876	BE	LSCS	No growth	
17.	3/365	34,765	BE	LSCS	No growth	
18.	17/365	55,598	BE	ND	No growth	
19.	6/365	57,120	RE	ND	E. coli	Tobramycin, moxifloxacin, norfloxacin
20.	18/365	47,032	BE	LSCS	No growth	
21.	4/365	54,376	BE	LSCS	Staphylococcus Albus	Tobramycin, moxifloxacin
22.	3/365	44,337	BE	LSCS	Enterococcus	Tobramycin, moxifloxacin, norfloxacin
23.	4/365	58,749	BE	LSCS	No growth	
24.	4/365	57,361	BE	LSCS	No growth	
25.	10/365	73,021	BE	LSCS	No growth	
26.	2/365	59,708	BE	LSCS	Staphylococcus aureus	Tobramycin, moxifloxacin
27.	22/365	39,891	RE	ND	Staphylococcus aureus	Tobramycin, moxifloxacin
28.	23/365	35,765	RE	ND	Coagulase-negative Staphylococci	Tobramycin, moxifloxacin
29.	15/365	37,687	BE	LSCS	No growth	
30.	4/365	20,793	BE	ND	No growth	
31.	27/365	45,119	RE	LSCS	Staphylococcus aureus	Tobramycin, moxifloxacin
32.	4/365	25,241	BE	ND	E. coli	Tobramycin, moxifloxacin, norfloxacin
33.	10/365	16,120	BE	ND	Coagulase-negative Staphylococci	Tobramycin, moxifloxacin
34.	2/365	45,821	LE	ND	Staphylococcus Albus	Tobramycin, moxifloxacin
35.	9/365	54,276	RE	ND	No growth	
36.	6/365	58,754	BE	LSCS	Staphylococcus Albus	Tobramycin, moxifloxacin
37.	1/365	55,805	BE	LSCS	E. coli	Tobramycin, moxifloxacin, norfloxacin

Master Chart

DISCUSSION

Neonatal conjunctivitis is common in neonates because of lower level of lysozyme and IgA in the tears of neonates.³ In neonates, the tear film is not well developed. The incubation period of conjunctivitis will give idea about the causative agent to certain extent and culture and sensitivity will give the definite result of the organism involved and its drug sensitivity.

Possibility that neonatal conjunctivitis is often passed through maternal passages has been given by certain studies gonococcal and chlamydial infection. Prolonged rupture of membrane and Membrane Ruptured Outside (MRO) has increased the occurrence of conjunctivitis.^{4,5} But, minor difference is noted among babies vaginally or LSCS. Many studies show no correlation between neonatal conjunctivitis and various factors like prolonged labour, mechanical intervention and vaginal examination. In

addition, most common organism in the studies was Staphylococcus aureus is mostly acquired after birth.⁶ In these studies, 48.7% conjunctival culture didn't reveal any growth, which may be due to organism like anaerobes or viruses.

Corneal involvement in infection of conjunctiva should be carefully watched for since untreated corneal ulceration may occur in infections like gonorrhoea, which may proceed to corneal perforation. When not identified and treated properly, pseudomonas infection can lead to endophthalmitis and loss of vision and septicaemia. Pneumonia and septicaemia are reported in 10 to 20% of infants with chlamydial conjunctivitis.⁷

Previously, chlamydia and Neisseria gonorrhoea were the most common sexually transmitted disease, which transmitted from heavily infected mother to infant. Chlamydia being the most common single cause of

infective neonatal conjunctivitis infecting about 2-40% of cases previously. *Neisseria gonorrhoea* has now become very rare and reported to be <1% to be the cause of neonatal conjunctivitis. The incidence of the 2 pathogens have declined over the past 2-3 decades due to prenatal screening for infection. Non-sexually transmitted bacteria such as staphylococci, streptococci, *Haemophilus* species, gram-negative bacteria, ophthalmia neonatorum cases constitute 30-50%.⁴

The incubation period of conjunctivitis may help in knowing the causative agent of neonatal conjunctivitis as different infection present at different time of neonate period.

Gonococcal infection occurred typically after 1-5 days of birth with hyperacute conjunctival injection, chemosis and severe purulent discharge.⁸

They are associated with corneal ulceration and perforation. Chlamydial infection occurs 5-14 days after birth with unilateral or bilateral watery discharge, which can later become purulent. The eye are less inflamed in chlamydial infection.⁷

Viral conjunctivitis is an acute infection occurring 1-14 days after birth. They maybe unilateral or bilateral. Serosanguineous discharge associated with vesicular skin lesions. Keratitis, anterior uveitis and cataract are associated with viral conjunctivitis.

Chemical conjunctivitis due to silver nitrate application, which was earlier rampantly used occurred within 48 hours of birth.

Dissemination of eye infection may involve other organs including central nervous system. Viral infections can produce ulcer and scarring of cornea. *Ureaplasma urealyticum* is supposed to have transmitted mainly from mother to baby.⁹

Armstrong et al in a chart review found the mean incubation period of gonococcal as 6.5 days and chlamydial infection as 8.1 days. In contrast, Sandstorms et al did not find any correlation of age of onset with the cause. The prolonged rupture of membranes also increases the chance of acquiring infection.⁹

However, in some studies, a high degree of correlation was given between the organism grown from maternal cervix and neonatal conjunctiva soon after birth.^{9,10} An increased incidence of Staphylococcal conjunctivitis was anticipated by Armstrong et al after the decreasing use of hexachlorophene.

Neonatal conjunctivitis is more likely to be acquired postnatally especially in children weighing 2000 grams at birth.¹¹ It acquires during the 1st week⁴ and responds well to local application of antibiotics, which covers common causative bacteria. In resistant cases those with corneal involvement and lid oedema, oral erythromycin could be added to treat the infection successfully. For mild conjunctivitis of neonates, only lid hygiene is recommended.^{12,13}

Armstrong⁹ observed 44.4% of conjunctivitis of uncertain aetiology. Prentice et al⁵ could not isolate any organism from 53.5% of cases.

Prentice et al observed an excellent response to neomycin.⁵ Prentice et al reported after antibiotic sensitivity test that Chloromycetin was effective against all bacterial conjunctivitis except inclusion conjunctivitis. Here, in our study, we find tobramycin and moxifloxacin to be very effective against almost all cases of neonatal conjunctivitis. Certain studies show that a combination of cefotaxime and gentamycin to be more effective in treating conjunctival infections.¹⁴ In very mild cases of congestion of conjunctiva, only lid hygiene is advised.¹³

CONCLUSION

In the present study, 48% of culture didn't reveal any growth, which may be explained by organisms such as chlamydia, viruses, etc. Staphylococci (32.03%) is the most common infective agent identified, which is acquired by babies postnatally. It responds well to topical tobramycin and moxifloxacin eye drops. *E. coli* was found in 8.1% of culture, which may be due to maternal infection from maternal cervix.

In this study, most of the babies developed conjunctivitis within the first week.

Mild difference was only noted among babies born vaginally and by LSCS.

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