ORIGINAL ARTICLE

Bacteriological Spectrum; Study of Neonatal Conjunctivitis

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ABSTRACT

Objectives: To study the bacteriological agents in neonatal conjunctivitis

Study Deign: An observational study.

Place & duration: The Mother and Child Health Center (MCHC), Pakistan Institute of Medical Science (PIMS) Islamabad, during the month of November 2008.

Material & Methods: All babies born in Mother and Child Health (MCH) nursery PIMS Islamabad in the month of November 2008 were included in the study. Conjunctival swab were taken for gram staining and culture from those with clinical diagnosis of conjunctivitis. Laboratory diagnosis was based on direct smear for gram staining and bacterial culture.

Result: A total 1010 babies were delivered. They were examined on first day and enrolled in study, out of which 173 (17.1%) babies developed clinical sign of conjunctivitis. About 50.3% (n=87) babies developed signs of conjunctivitis during first five days of life, while another 22% presented with conjunctivitis on 7th day of life. The total samples sent for Gram staining and culture and sensitivity. Forty-eight (29%) cultures were positive. The most common isolate was Staphylococcus aureus (65% of all positive culture) followed by Klebsiella species (22%). No case of gonococcus organism was isolated.

Conclusion: There was a high frequency of neonatal conjunctivitis with Staphylococcus aureus as the most common causative agent. Poor hygienic conditions and practices could be an important risk factor in Pakistan.

Key Words: Neonatal Conjunctivitis, Grams Staining, Culture, Bacteriological Agents

INTRODUCTION:

Ophthalmia neonatorum, a form of conjunctivitis occurring in infant younger than four weeks of age, is the most common eye disease of new born. The etiologic agent vary greatly in their virulence and outcome. The risk of conjunctivitis in new born depends on frequencies of maternal infection, prophylactic measures, circumstances during labor and delivery and post-delivery exposure to microorganisms[1-3].

Opthalmia neonatorum (ON) originally described in 1750, and is most common eye infection, occurs in first 28 days of life[4].

It is characterized by purulent eye discharge, redness of conjunctiva, swelling of eyelids and corneal involvement with potential risk of blindness if left untreated.

Despite prophylaxis, it is a worldwide problem with incidence varying from 2–23% in different countries. The epidemiology of this condition changed dramatically in 1981 when Crede, reported that when 2% silver nitrate solution is stilled in eyes of newborns, it reduced the incidence of gonococcal opthalmia from 10 to 0.3 %[4-6]. High- quality antenatal care in

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the West and the use of intrapartum antibiotic to treat a positive high- vaginal swab has led to a dramatic reduction in the incidence of gonococcal conjunctivitis[3]. Topical eye drops such as silver nitrate effectively prevent gonococcal neonatal conjunctivitis[1-3].

In India the reported incidence is 0.5 – 33%, whereas in united states, the incidence of neonatal conjunctivitis ranges from 1-2% depending on socioeconomically character of the area[7,8]. The causes can be septic (bacterial or viral) or aseptic (chemical) agents and majority of infectious neonatal conjunctivitis are of bacterial etiology[4-9].

The most common etiological agents of conjunctivitis are gram positive organisms including Staphylococcus aureus, Streptococcus pneumoniae, Streptococcus viridans, Staphylococcus epidermides, Gram negative organisms such as Escherichia coli, Klebsiella pneumonia, Serratiea marescans, Proteus, Enterobacter and Pseudomonas species, have also been implicated. The later organisms are probably acquired after birth, as their mode of delivery has little influence on the incidence. Chlamydia trachomatis (C.trachomatis) and Neisseria gonorrhea (N.gonorrhea) are the two well described agents associated with Opthalmia neonatorum, and are known to be associated with systemic complications and severe visual loss[10,11].

The later births, and their mode of delivery, have little influence on the incidence. The predisposing risk factors for conjunctivitis include maternal vaginitis, presence of meconium at birth, premature rupture of membranes, prolonged labor, un-trained birth attendant interference, low levels of lysozymes and immunoglobulin in neonatal conjunctiva with gestation less than 36 weeks, unhygienic practices and non- sterile environment[11,12]. Clinical presentations of conjunctivitis are not diagnostic of the cause, and microbiological workup with cytology and cultures is mandatory. Treatment of neonatal conjunctivitis should be initially based on the history, clinical presentation and results of smears. Later, as laboratory results become available, specific therapy can be instituted[4,9].

No data is available from Pakistan regarding this important disease and there is no routine eye prophylaxis practiced immediately after birth.

The objective of the present study was to measure the frequency of Opthalmia neonatorum, determine causative organisms and risk factors to suggest possible prevention.

MATERIAL & METHODS:

The study was performed on all newborn who were delivered in the Mother and Child Health (MCHC) Center, Pakistan Institute of Medical Science (PIMS), Islamabad from 1st to 30th November 2008.

After informed consent from the mother a questionnaire was filled for each child by the members of study team.

Details of mode of delivery, age at time of presentation, gender, signs and symptoms like conjunctival erythema, swelling of eye lids, mucopurulent discharge, unilateral and bilateral involvement and other problems were documented.

Babies born with major congenital malformation were excluded from the study. The baby were examined on first day and enrolled in the study, and were re-examined on the third day of life for any sign of conjunctivitis. Mothers / attendants were advised for follow up examination. These examinations were carried out on 5th, 7th, 14th, 21st, 28th day of life in a specially arranged clinic on daily bases. Data for maternal characteristics like gestational age, mode of delivery, risk factors such as prolong rupture of membrane (PROM) more than 18 hours, history of (UTI) fever & vaginal discharge were recorded. It was also recorded whether babies have received systemic anti-microbial therapy for risk factors and pre terms delivery as per protocol for Neonatology Department. Babies with evidence of clinical signs of conjunctivitis were further investigated by obtaining a specimen for culture. The sample was taken from inferior cul de sac with sterile swab. Each swab immediately transported to the laboratory and inoculated on blood agar McConkey agar and chocolate agar. Smear was made from swabs also for gram staining. The culture plate of

chocolate agar was incubated at 35° C in presence of 5% CO_2.

All isolates were identified according to conventional microbiological procedures and gram staining. The susceptibility patterns of bacterial isolates to antibiotic were determined using disc diffusion tests. The direct fluorescent antibiotic test and Giemsa's staining for Chlamydia trachomatis could not be done because of lack of facility.

RESULTS:

This study was conducted on 1010 neonates, delivered in MCH during November 2008.

A total 173 i.e. 17.1% babies developed clinical signs of conjunctivitis and all of these had eye discharge, 99% had redness; and 16.7% has chemosis as well. Only one had hemorrhage but pseudo membrane was not seen in any case.

Table 1: The Age Distribution of Neonates with Ophthalmia Neonatorum

Age (Days)	No. of Cases	Percent
5th day	N = 87	50.3%
7th day	N = 38	22%
14th day	N = 18	10.4%
21-28th day	N = 30	17.3%

87 (50.3%) babies developed signs of conjunctivitis during 5 days of life 22% present conjunctivitis on 7th day of life. About ten percent (n=18) presented at the clinical conjunctivitis on 14th day of life. Remaining 17.3% (N = 30) presented the end of 3rd and 4th week. (Table-1) Total samples sent for microbiological examination for gram stain, culture and sensitivity.

Sixty percent of these cultures were positive during first week of life. The most common isolate was Staphylococcus aueurs which was 65% (n=31) of all positive cultures, followed by Klebsiella 26% (n=11), coagulase negative staphyloccus (CNS) 4% (n=2) and E. Coli 8% (N = 4) Neisseria gonorrhea was not isolated from any case. (Table 2).

The antimicrobial susceptibility of isolated bacteria were tested against Chloramphenicol (10u), Gentamycin (10u), Tobramycin 10um and Ciprofloxacin by Mueller Hinton agar medium on Kirby Bauer disc diffusion method[12].

Table 2: Bacterial Isolates in 48 Cases of Ophthalmia Neonatorum

The causative micro organism	No. of positive isolate	Percent
Staph aureus	31	65%
Klebsiella spp	11	23%
E.Coli	4	8%
C.N.S	2	4%

Table 3: Clinical Characteristics of 1010 Neonates

Characteristics	Conjunctivitis positive	Conjunctivitis negative
Gestational Period		
Pre-term <37 weeks (117)	24 (20.5%)	93(79.5%)
Full Term >42 weeks (893)	149 (16.7%)	744(83.3%)
Gender		
Male (524)	95(18.1%)	429 (81.9%)
Female (486)	78(16%)	408 (84%)
Mode of delivery		
Spontaneous Vaginal Delivery (SVD) 709	97 (13.68%)	612(86.2%)
Caesarian Section (301)	76 (25.24%)	225(75%)

DISCUSSION:

Blindness due to Ophthalmia Neonatorum (ON) has been an important problem of developing countries and at present conjunctivitis is one o f important disease that causes visual loss in the first month of life[13]. During the 19th century ON was the leading cause of blindness in European children but ON and blindness due to it have significantly decreased since 1981 after Cred suggested prophylactic cleaning of eye lids at birth by silver nitrate[1,3,5,14].

Most of the affected babies in our study were males (55%), similar to Iran with male predominance 62% v.s 38% female, Norway 75% male neonates and Saudi Arabia 63% males.

In India the proportion between male and female was 1.1:1 which is also similar to this study[1,2]. The male gender as a risk factor for increase d neonatal infection has been attributed to y gene[14–16] (Table 3). PROM, UTI, vaginal discharge and fever were not found to be significant in this study. Poor hygienic conditions and practices could be an important risk factor in Pakistan. Neisseria gonorrhea reported as a cause of Ophthalmia neonatorum from other developing countries was not isolated in this study. Present study shows a high frequency of neonatal conjunctivitis with S aureus follow by Klebsiella spp 23%. The risk factors for staphylococcus aureous were also analyzed including caesarians section, PROM, U.T.I, vaginal discharge, meconium stained liquor and fever in mother but none of these were found to be significant.

In this study 17.1% neonates were found effected by conjunctivitis. In Kenya incidence of ON is 23%[3]. Iran incidence is ranging from 4.9% to 21.7%[4,6]. In India it is 0.5– 33%[5], while in UAE Ophthalmia neonatorum is a prevailing problem[10–14].

Incidence of neonatal conjunctivitis is 1–2% in USA, 2.6 – 12% in UK. In Hong Kong it is 0.5 – 33% while in Norway it is 8%[1]. The higher frequency in this study is possibly due to low socio economic status, un-hygienic environment, absence of eye prophylaxis and un-sterile handling of neonates by relatives.

In our study microrganisms causing neonatal conjunctivitis were Staphylococcus aureous (n = 31) 65%, Klebsiella spp 23% (n = 11), E.Coli 8%, coagulase negative Staphylococcus (CNS) 4% and . In a study by Soltanzadehet et al in which 170 of 3140 of neonates (5.4%) had conjunctivitis signs, the most common microbial organisms were coagulase negative staphylococci (15.3%), S. epidermides (13.5%), E. coli (7.6%) and C. trachomatis (6.0%)[5].

In other study by Amini et al in Iran the micro-organisms causing 198 of 4021 (4.9%) neonatal conjunctivitis were S. aureus, (31%), Escherichia coli (23%), S.epidermidis, (22%), Klebsiella pneumoniae (10%), N. gonorrhea (3%), Pseudomonas aeroginosa (2%) and C. Trachomatis (2%)[14-16]. In a study by IrohaEo and his colleagues in 1998 on 150 hospitalized neonates, the prevalence of conjunctivitis was reported as 1.8% and their microbial causes were S. auerus (37.4%), Klebsiella pneuomoniae (12.9%), and S. coagulase negative (12.3%)[10,17,18].

S. aureus was the most common organism cultured from neonates with acute conjunctivitis. In the study of Mohil M, the most common microbial pathogen causing neonatal conjunctivitis was S. epidermidis (57.14%) and correspond to some studies which showed that S. epidermidisis the most common organism causing neonatal conjunctivitis[12,19,20].

In the present study, seventy-one percent of cultures were negative, in other studies the range is between 50-55% in Iran, UK, India[4]. The fact that most cultures were negative could be due to infections by viruses or chlamydia which we did not screen. In this study the most common microbial agent was S. aureus. This is in line with studies from different countries like Hong Kong (34%)[7], Argentine (27.6%)[9], Nigeria (67.9%)[6], and Nordic countries[8]. However, the role of S. aureus in neonatal conjunctivitis is controversial because it is frequently isolated from eyes of asymptomatic neonates[6]. But, in the present study only neonates with signs and symptoms of conjunctivitis were evaluated. Other organisms were Klebsiella, Escherichia coli and coagulase negative S. aureus.

Klebsiella and Escherichia coli conjunctivitis (early onset) was only seen in babies during the first 3-5 days of life, indicating maternal transmission during delivery. Whereas, S. aureus was seen throughout the first month of life, suggesting post-delivery exposure, poor -hygiene, handling by relatives and colonization of newborns after birth. Neisseria gonorrhea was not isolated in this study. All babies with conjunctivitis recovered completely with the use of locally applied antibiotic eye drops/ointments as per sensitivity reports.

CONCLUSION:

There was a high frequency of neonatal conjunctivitis, with Staphylococcus aureus as the most common causative agent. Poor hygienic conditions and practices could be an important risk factor in Pakistan. Treatment of neonatal conjunctivitis should be initially based on the history clinical presentation and results of smears. Later, as laboratory results available, specific therapy can be instituted.

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