Iranian Journal of Pediatric Society
Volume 1, Number2, 2007: 49-53

Original Article

The Prevalence and Etiology of Ophthalmia Neonatorum among Hospital-Born Babies in Tehran, Iran

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ABSTRACT

Background: *To determine the prevalence rate of ophthalmia neonatorum and its bacterial and chlamydial causes among hospital-born babies in three medical centers in Tehran, during 2001–2002.*

Materials and Methods: *This descriptive study was performed on 3140 hospital-born babies including 1699 male and 1441 female subjects. All newborns were examined and followed up to the age 30 days after discharge for the signs of conjunctivitis. In the cases of ophthalmia neonatorum, the bacterial etiology was verified by examination of smears and cultures of ophthalmic exudates and Chlamydia Tracomatis was verified by direct immunofluorescent (DIF) microscopy.*

Results: *There were 170 cases of ophthalmia neonatorum (5.4%). Exudate smears were positive for Gram positive cocci in 20.6%, Gram –ive bacilli in 8.8%, and Gram negative cocci in 1.8% and were negative in 68.8%. The most frequent microorganisms found based on cultures were: coagulaseive staphylococci (15.3%), Staphylococcus epidermidis (13.5%), E. coli (7.6%), and Staphylococcus aureus (5.9%), but there was no growth in 48.2% of the cultures. DIF samples were positive for Chlamydia trachomatis in 10 cases (5.9%). Most of the affected babies were male (62.4%) and more than 75% were born through normal vaginal delivery (NVD). Premature rupture of membranes (PROM) was the most common maternal precipitating factor (10%).*

Conclusion: *The prevalence rate of ophthalmia neonatorum among hospital-born babies in Tehran is considerable and neonates born to mothers with PROM through NVD, especially the male newborns should be carefully observed for development of ophthalmia neonatorum.*

Key Words: *Ophthalmia neonatorum, Prevalence, Etiology.*

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INTRODUCTION

Ophthalmia neonatorum is one of the most common infectious diseases during the first month of life with the prevalence of 1.6-66.5%.[1-4] Its clinical signs include red eye, tearing, exudation, keratoconjunctivitis, blepharitis, and pseudomembrane formation. It may cause corneal ulceration and blindness.[1]

The major organisms that may produce neonatal conjunctivitis are Staphylococcus aureus, Haemophillus influenza, Streptococcus pneuomonia, gonococcus, Pseudomonas aeruginosa, and Chlamydia trachomatis with different prevalence rates in different communities and various courses and treatments.[2]

Credé prophylaxis by 1% silver nitrate is effective for the prevention of gonorrheal ophthalmia but not for inclusion blennorrhea or herpetic infection. The slight chemical conjunctivitis induced by silver nitrate is minor and short duration.[1]

Some precipitating factors such as premature rupture of membranes (PROM) and urinary tract infections (UTI) in mother or gestational age, birth weight, gender, prematuriy, sepsis, pulmonary infecion, or dermatitis in the neonate could increase the occurence of ophthalmia neonatorum.[3]

Epidemiological studies are the first step for estimating the burden of a disease in any community and planning the required interventions, but there are inadequate published data on the prevalence rate of ophthalmia neonatorum in Iran. The aim of this study was to determine the prevalence rate of ophthalmia neonatorum and the bacterial and chlamydial causes of neonatal conjunctivitis in Iran.

MATERIALS AND METHODS

This descripitve study was conducted on 3140 hospital-born neonates in three neonatal units at three medical centers in Tehran during 2001-2002.

All newborns were examined by a pediatrics resident and refered to an ophthalmologist for confirming the diagnosis of ophthalmia neonatorum. In cases of conjunctivitis, samples of ophthalmic exudate were taken from inferior fornix by sterile swabs for Gram's and Giemsa staining, culturing on blood agar, chocolate agar, and thioglycolate media, and also for direct immunofluorescence (DIF) microscopy for Chlamydia trachomatis. Ophthalmic signs with time of occuring after birth and laterality of eye involement were recorded in all the cases.

Maternal data including education, parity, prenatal care, kind of delivery, PROM, and UTI were gathered by asking the mothers through a questionaire. Neonatal data such as gestational age, birth weight, gender, first and fifth minute Apgar score, and hospitalization duration and history of prematuriy, sepsis, pulmonary infecion, or dermatitis were obtained from their hospital records.

At the time of discharging any newborn, the mother was aware about signs of conjunctivitis (redness, inflammation, watery or purulent discharge, epiphora, hemorrhage, pseudomembrane, corneal opacity, and corneal ulcer) and was asked about referring the baby to our clinic up to one month of age for more evaluation and treament if needed.

We made a call to all parents every week up to one month of age of the baby and asked them about their neonates eyes and if they reported any signs, we invited them to bring the baby for evaluation and if the parents didn't attend our clinic, a trained nurse was sent to their homes for more information and referring the neonate to our center if needed.

RESULTS

The study subjects included 1699 male (54%) and 1441 female (46%) newborns. There were one or more signs of conjunctivitis in 170 babies (5.4%).

The involvement was unilateral in 70.5 % and bilateral in 29.5 %.

The results of smears and bacterial cultures are shown in table 1 and figure 1, respectively. The most organism found in smears was gram +ive cocci (20.6%), but most of the smears were negative (68.8%). Of 170 smears, 68 (40%) were positive for polymorphonuclear (PMN) cells. The most frequent microorganism found in cultures was coagulase negative staphylococcus (15.3%), but most of the cultures were negative (48.2%).

Table 1. Results of Smear Examination

Culture	No	%
Gram^{+} Cocci	35	20.6
Gram^{-} Cocci	3	1.8
Gram^{-} Bacilli	15	8.8
Negative	117	68.8
Total	170	100

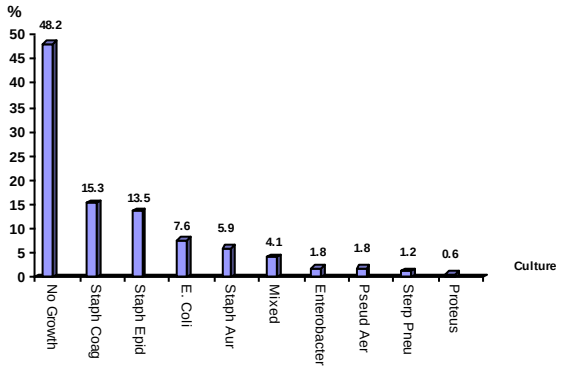

Figure 1. Result of Cultures in 170 Cases of Ophthalmia Neonatorum

Chlamydia trachomatis was seen in 10 cases (5.9%), in which there were also positive cultures for Staphylococcus epidermidis (3 cases), coagulase negative staphylococci (2 cases), and E. coli (one case).

Most of the affected babies (62.4%) were male. Four cases had neonatal sepsis and two had dermatitis. (Table 2)

Table 2 Frequency of Neonatal Precipitating Factors

Variables	No	%
Gender: Male	106	62.4
Female	64	37.6
Low Apgar Score: 1st min	4	2.35
5th min	0	0
History: Sepsis	4	2.35
Dermatitis	2	1.17
Pulmonary Infection	0	0
Affected Eye: Right	62	36.5
Left	58	34.0
Both	50	29.5

Mean gestational age of the affected babies was 38.2 weeks with mean birth weight of 3062±639 g and mean age of them at the time of diagnosis was 3.7±6.4 days. (Table 3)

Table 3 Mean and 95% Confidence Interval of Some Variables

Variables	Mean	CI 95%
Age at Onset (day)	3.7	3 - 4.3
Gestational Age (wk)	38.23	37.9 - 38.5
Birth Weight (gr)	3062	2965.6 - 3158.4
Hospitalization duration (wk)	2.76	2.2 - 3.3

The most frequent maternal precipitating factor was PROM which was found in 17 cases (10%). Mothers of the affected babies were primigravid in 37% and below age of 15 in 1.8%. None of them had reported UTI during pregnancy. More than 75% of the affected babies were born through normal vaginal delivery (NVD). (Table 4)

The most frequent sign of conjunctivitis was eye secretion (92.3%) followed by redness (73.5%), inflammation (68.8%), edema (48.2%), and pseudomembrane formation (2%). There were more than one sign in most of the cases.

Table 4 Frequency of Maternal Precipitating Factors

Variables	No	%
Age (yr): ≤ 15	3	1.8
> 15	167	98.2
Education: Literate	142	83.5
Illiterate	28	16.5
Parity: 1	53	31.2
2	66	38.8
≥ 3	51	30.0
Prenatal Care: Yes	150	88.2
No	20	11.8
Rout of Delivery: Normal	128	75.3
Vaginal	42	24.7
Cesarean Section		
PROM: Yes	17	10.0
No	153	90.0

DISCUSSION

The study revealed that the prevalence rate of ophthalmia neonatorum among hospital-born babies in three medical centers in Tehran was 5.4%. This rate is in the average range comparing to 1.8% among hospital-born babies at a neonatal unit in Laues[5] and 19% among babies in rural areas of Northern Norway.[6] This discrepancy may be due to racial difference and different setting of the study, in addition to sample size and technique of the diagnosis.

Based on smear examination 68.8% of the samples were negative. A previous study which performed on influencing factors of ophthalmia neonatorum among hospital-born babies in another medical center in Tehran revealed that 65.3% of the smears are positive.[7] This difference is probably based on the technique of the examination but much more probable cause should be the different type and severity of the conjunctivitis between the two study subjects; so that in the present study, cultures were also negative in 48.2% but all the cultures in the previous study were positive.

The most frequent microorganisms found in cultures were coagulase negative staphylococci (15.3%), Staphylococcus epidermidis (13.5%), E. coli (7.6%), and Staphylococcus aureus (5.9%). This figure in the previous study was as follow: Staphylococcus aureus (53%), Staphylococcus epidermidis (40%), and Pseudomonas aeroginosa, E. coli, and Diphterioid (each 2.3%).[7] The most frequent microorganisms found in the study of Iroha et al[5]. were Staphylococcus aureus (37.4%), Klebsiella pneumonia (12.9%), and coagulase negatve staphylococci (12.3%). The most frequent microorganism found in a comparable study was pyosianic (50%) followed by Staphylococcus aureus (20%), Streptococcus pneuomonia (10%), and Haemophillus influenza (6.5%). [3]This figure is due to different epidemiology of bacteria conjunctivitis in different population that should be considered for trial therapy prior to verifying the microorganism by culture.

Chlamydial infection was diagnosed in 5.9% of the cases by DIF microscopy. This figure was not assessed in the previous study but it is reported from 5.9% in Northern Norwey up to 41% in the study of Salpietro et al. as the causative agent.[6,7,9] Incidence of chlamydial infection depends on maternal colonization during pregnancy, which is different in each population.[10] Another cause of these different reports is the technique of laboratory diagnosis.

Most of the affected babies in our study were male (62.4%) equal to a M:F ratio of 1.66. In the Northern Norway study 75% of the cases were male. [6] Pendy et al .reported a M:F ratio of 1.1. In the study of Nsanz et al .63% of the cases were male. [8,11]This figure suggest that male gender may be an important risk factor.

Present study revealed that more than 75% of the cases were born through NVD. It differs from previous study in which 40.8% of the affected babies

were born this way.[7] This difference also shows the different study population.

PROM was the most frequent maternal precipitating factor in this study that is comparable with the study of Iroha et al.[5]

CONCLUSION

We suggest that the prevalence rate of ophthalmia neonatorum among hospital-born babies in Tehran is considerable and neonates born to mothers with PROM through NVD, especially the male newborns should be carefully observed for development of ophthalmia neonatorum.

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