Iranian Journal of Pathology (2012)7 (2), 86 - 91

Original Article

Incidence and Bacteriological Profile of Neonatal Conjunctivitis in Hajar Hospital, Shahrekord, Iran

Abolfazl Khoshdel[1], Shahla Taheri[2], Reza Khadivi[3], Ebrahim Saedi[4], Kurosh Ashrafi[5], Reza Imani[6], Faranak Jazaeri[1]

1. Dept. of Pediatrics, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran
2. Dept. of Pathology, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran
3. Dept. of Community Medicine, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran
4. Dept. of Parasitology, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
5. Dept. of Molecular Medicine, School of Medicine, Sanandaj University of Medical Sciences, Sanandaj, Iran
6. Dept. of Infectious Disease, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran

ABSTRACT

Background and Objective: In Iran, prenatal Chlamydia and gonorrhea screening of pregnant women and neonatal eye prophylaxis are not routine practice. The present research aimed to identify bacterial agents of neonatal conjunctivitis.

Materials & Methods: A cross sectional study was conducted on all babies born over a period from April 2007 to April 2008 in Hajar Hospital of Shahrekord University of Medical Sciences. Babies presenting clinical signs of erythema and edema of eyelid and purulent eye discharge were considered as clinical conjunctivitis. Specimens were obtained in all cases with conjunctivitis and were performed gram staining and cultures in specific media. A simple ELISA has been performed for measurement the immunoglobin M antibody to C. trachomatis and positive result rechecked by indirect immunoflurescent test.

Results: During the period of one year, 223 neonates have revealed bacterial conjunctivitis. The incidence rate of neonatal conjunctivitis was 2.8%. Chlamydia conjunctivitis was identified in 13.6% of cases and gonococcal conjunctivitis was identified in 5.5% of cases.

Discussion: The high incidence rate of Chlamydia and gonococcal conjunctivitis, have revealed that the eye prophylaxis from ophthalmia neonatorum is needed promptly.

Key words: Ophthalmia Neonatorum, Incidence, Chlamydia, Gonorrhea, Iran

Received: 9 May 2011
Accepted: 8 July 2011
Address communications to: Dr Abolfazl khoshdel, Department of Pediatrics, Shahrekord University of Medical Sciences, Shahrekord, Iran
Email: nikakhosh@gmail.com

Introduction

Neonatal conjunctivitis (ophthalmia neonatorum) is a commonly infection in neonatal period, affecting 2.6 to 8 percent of newborns (1, 2).

The majority of infectious neonatal conjunctivitis cases are due to bacterial etiology. Though most of these cases are benign, some of them may progress to systemic complications or visual loss. *Chlamydia trachomatis* and *Neisseria gonorrhea*, the two well described agents, associated with ophthalmia neonatorum, are known to be associated with systemic complications and severe visual loss (3). The exact determination of the etiology in neonatal conjunctivitis cases may help improve initial management and control, thereby preventing further complications (4).

Approximately half of neonates exposed to *C. trachomatis* and *N. gonorrhea* develop neonatal conjunctivitis without prophylaxis (3, 4).

Considering the more prevalence neonatal conjunctivitis in past Iranian study (5) and lack of routine prophylaxis in our country, the present study was undertaken to identify incidence of neonatal conjunctivitis and some of associated risk factor and the causative bacterial agents.

Materials and Methods

In this cross sectional study, all neonates born over a period of one year (2007-2008) in Hajar Hospital in Shahrekord (center of Chaharmahal and Bakhtyari Province in center of Iran) were studied. After delivery and before newborns were discharged from hospital, all mothers were requested, if their baby presenting clinical signs of erythema and edema of eyelid and purulent eye discharge, in neonatal period, come back to pediatrics clinic of Hagar hospital, for additional freely examination and treatment. Clinical characteristic were recorded on a form and included age, sex, birth weight, gestational age, present or absence of fever, other systemic illnesses, type of delivery, Apgar score, and history of maternal infection in third trimester. In Iran, there is no chemo prophylactic profile for preventing neonatal conjunctivitis. In addition, prenatal chlamydial and gonorrhea screening of pregnant women are not routine practice in country. Neonates, who received antibiotic before diagnosis of conjunctivitis, were excluded from the study. Specimens were performed after the mother permission, which information about the study was freely transmitted. The project was approved by the Shahrekord University Ethical Committee.

Specimens were obtained with cotton wool tipped swabs from the mucosal surface of the lower lids in all cases, with purulent discharge and gram stain and cultures in media of chocolate agar, blood sheep agar, EMB were done.

The procedures necessary to identify any bacterial growth such as catalyze, tube coagulase, DNAse, oxidase were performed. The gonococcal selective agar plates were incubated in candle jars, examined at 24 and 48 hours, and any colonies were tested with fresh oxidase reagent. Specific blood and chocolate agar media with factor of V, X for diagnosis of *Hemophilus Influenza* were used.

The method for identification of *C. trachomatis* was IgM antichlamydia trachomatis ELISA using provide kit (Euro Immune, made in USA). In addition positive results of ELISA were rechecked by indirect immunoflorescent test (Euro Immune, made in USA).

The data were examined for significant associations using SPSS, version 11.0 for windows. *P* Value <0.05 was considered to indicate a statistically significant.

Results

In one year, 5206 live birth, were born in Hajar Hospital. From these, 223 neonates (4.28%) had signs of conjunctivitis in clinical examinations. The mean age of neonates with conjunctivitis was 6.1 day .The most cases occurred between the forth and seventh day of life.

Samples of 223 neonates, who had conjunctivitis, in 148 cases, were positive in culture tests in laboratory. The incidence of neonatal conjunctivitis in Shahrekord will be 2.8%. In specimens of 148 neonates with bacterial conjunctivitis, they were grown one or more purulent bacteria. No did grow any microorganisms on 75 specimens (33%) of these neonates.

Negative coagulase *staphylococcus* was the most bacterial causes that were grown in 49 specimens (22%). *Neisseria gonorrhea* was grown in 9 (5.5%) of samples. ELISA test was revealed that IgM antichlamydia antibody, were positive in 22(13.6%). On the other hand, anti *Chlamydia* trachomatis indirect immunofluorescence test were positive in 18 neonates (8%). The causative bacterial agents were shown in Table 1.

Table 1 – Frequency of microbial agents that were grown in conjunctiva specimens of neonates with conjunctivitis

Microbial Agent	Frequency	Percent
Negative cuagulase *Staphylococcus aureus*	49	30.2
Positive cuagulase *Staphylococcus aureus*	23	14.2
Streptococcus Pneumonia	21	13
E. coli	16	9.9
Enterobacter	12	7.4
Kelbsiella	5	3
Pseudomonas	2	1.2
Hemophilus Influenza	3	1.8
Neisseria Gonorrhea	9	5.5
Chlamydia trachomatis	22	13.6
Total	162	100

There was no significant statistical relationship between age and conjunctivitis.

One hundred and one neonates were delivered in vaginal route (45%) and 122 neonates by cesarean section (55%). Chi square test revealed that there was significant statistical relationship between type of delivery and conjunctivitis (P<0.006). 63.7% of neonates were delivered as low birth weight and 71.5% were premature, and 85% had poor Apgar score (<7) at birth.

Twenty one neonates had been referred to hospital due to presumably sepsis, in which 17 neonates of them (76%) had purulent conjunctivitis concomitantly.

Forty five mothers of neonates with conjunctivitis had past history of infection in third trimester of pregnancy. Using chi

square test there was significant relationship between prenatal infection and development of conjunctivitis (P<0.001).

Discussion

In this study, 4.28% of neonates presented clinical signs of conjunctivitis. The incidence of such clinical presentation in our study is lower than other similar studies (5, 6).

Examinations on conjunctival specimens were revealed that conjunctivitis in 75 neonates (33%) had no bacterial causative. It however may be induced by other microorganisms like anaerobes or viruses. This frequency in our study is lower than the result of another study in which was concerned that conjunctivitis signs were seen in 50.3 percent of cases (7). Armstrong and Prentice observed that 44.4% of the conjunctivitis was of uncertain etiology while prentice *et al.* could not isolate any microorganism in 53.5% of cases (8, 9).

Examinations such as specimen culture and detection of IgM anti *C. trachomatis,* revealed that the incidence of neonatal conjunctivitis was 2.8%.

Conjunctivitis in newborn differs in different regions of the world and has been reported to range between less than 2% to 23% in developing countries (10). In India, its incidence was 0.5-33% (11). Low incidence of 0.87% has been reported by Armstrong *et al.* (8).

This study revealed that negative cuagulase *S. aureus* was the most bacterial causes that was grown in 49 specimens (22%), bear resemblance to another study (12), but in others ,the most common organism causing ophthalmia neonatorum was *S. aureus* (5, 6, 13, 14).

In our study, 63.7% of neonates whom had clinical conjunctivitis were male. There was no significant relationship in regard to gender which is an agreement with other similar studies (15, 16).

The incubation period of conjunctivitis may be helpful in presupposition the causative agent to certain extent. Gonococcal infection has an early onset, within 1-4 days. Armstrong *et al.* found the mean incubation period for gonococcal infection as 6.5 days while a significantly longer period of 8.1 days was noted for *Chlamydia* infections (8).

The mean age of our neonates with conjunctivitis was 6.1 day and the most cases were referred between the 4th and 7th day of own life. 91.6 percent of neonatal conjunctivitis developed within the first week of life (6).

In our study, 55 percent of neonates were delivered by cesarean section. We found significant association between type of delivery and development of conjunctivitis (P< 0.006). In spite of the conjunctiva of the neonates delivered vaginally showed more bacterial characteristic of vaginal flora (17), hence in similar study, 65% of the cases had been delivered by cesarean section (5). Sterile conjunctiva cultures were more frequent in neonate's delivery by cesarean section (66%) than in neonates delivered vaginally (20%) (P<0.001) (18).

In our study there was significant statistical relationship between conjunctivitis and low birth weight, poor Apgar and development of sepsis, (P< 0.001), which was in accordance with similar studies (5, 15, 16).

In this study, mean age for *C. conjunctivitis* was 8 days, of whom 73% had normal vaginal delivery. Rowe *et al.* also noted that more of *Chlamydia* culture positive babies reported eye discharge after 6 days (19), in contrast, Sandstorms *et al.*, did not find any correlation of age of onset with the cause (20).

In this study, *C. conjunctivitis* was identified in 8% of cases, thus the incidence of neonatal conjunctivitis was 3.4 in 1000 live birth. The incidence of *C. conjunctivitis* in Hong Kong

study was reported 4 in 1000 live birth (21).
The incidence of *C. conjunctivitis* in our study was higher than in the industrialized countries, where it was estimated from 0.5% to 5%, depending on the rate of maternal infection (22).
The incidence rate of ophthalmia neonatorum due to gonococcal infection in this study was 4%. In another survey in Iran, in Imam Khomeini Hospital study, the incidence rate of gonococcal conjunctivitis was 3% (23). Laga *et al* reported that incidence of gonococcal infection in Kenya was 2.8% when no prophylaxis was used (24).
Frost *et al.* estimated the incidence and etiology of ophthalmia neonatorum over a 7-month period in semi-rural African community. *Chlamydia trachomatis* was the most frequently observed pathogen, being isolated from 17 babies (2.7% of births), and *N. gonorrhoeae* was recovered from 12 (1.6% of births) (25).
Increased incidence rate of gonococcal infection in our province may be due to increased international travel and migration of her husbands to Persian Gulf countries and in otherwise, no prophylactic antimicrobial drops were instilled.
This study revealed the significant relationship between prenatal infection (past history of maternal infection in third trimester of pregnancy) and development of conjunctivitis ($P<0.001$). Higher incidence of conjunctivitis was associated significantly with prolonged rupture of membranes (5, 6).

Conclusion

The result of this investigation suggests that neonatal eye infection caused by sexually transmissible organism is common. The best method of preventing neonatal gonococcal and *C. conjunctivitis* is prompt diagnosis and treatment of these infections in pregnant women. However, since there is no regulation in force for screening gonorrhea and *Chlamydia* infection during prenatal care, ocular prophylaxis is recommended for neonates.

Acknowledgements

We would like to thank Professor Morteza Hashemzadeh, the director of Cellular and Molecular Research Center, at Shahrekord University of Medical Sciences. This study was funded by Vice Chancellery for Research of Shahrekord University of Medical Sciences. The authors declare that there is no conflict of interests.

References

1. Fransen L, Klauss V. Neonatal ophthalmia in the developing world. Epidemiology, etiology, management and control. Int Ophthalmol 1988;11(3):189-96.
2. Molgaard IL, Nielsen PB, Kaern J. A study of the incidence of neonatal conjunctivitis and of its bacterial causes including *Chlamydia trachomatis*. Clinical examination, culture and cytology of tear fluid. Acta Ophthalmol (Copenh) 1984;62(3):461-71.
3. Darville T. *Chlamydia trachomatis* infections in neonates and young children. Semin Pediatr Infect Dis 2005;16(4):235-44.
4. Chandler JW, Alexander ER, Pheiffer TA, Wang SP, Holmes KK, English M. Ophthalmia neonatorum associated with maternal chlamydial infections. Trans Sect Ophthalmol Am Acad Ophthalmol Otolaryngol 1977;83(2):302-8.
5. Amini E, Ghasemi M, Daneshjou K. A five-year study in Iran of ophthalmia neonatorum: prevalence and etiology. Med Sci Monit 2008;14(2):CR90-CR96.
6. Verma M, Chhatwal J, Varughese PV. Neonatal conjunctivitis: a profile. Indian Pediatr 1994;31(11):1357-61.
7. Kakar S, Bhalla P, Maria A, Rana M, Chawla R, Mathur NB. *Chlamydia trachomatis* causing neonatal conjunctivitis in a tertiary care center.

Indian J Med Microbiol 2010;28(1):45-7.
8. Armstrong JH, Zacarias F, Rein MF. Ophthalmia neonatorum: a chart review. Pediatrics 1976;57(6):884-92.
9. Prentice MJ, Hutchinson GR, Taylor-Robinsin D. A microbiological study of neonatal conjunctivae and conjunctivitis. Br J Ophthalmol 1977;61(9):601-7.
10. Isenberg SJ, Apt L, Wood M. A controlled trial of povidone-iodine as prophylaxis against ophthalmia neonatorum. N Engl J Med 1995; 332(9):562-6.
11. Rao K, Ramji S, Thirupuram S, Prakash K. Clinical and bacteriological study of normal and inflamed neonatal conjunctivae. Indian Pediatr 1992;29(2):161-5.
12. Mohile M, Deorari AK, Satpathy G, Sharma A, Singh M. Microbiological study of neonatal conjunctivitis with special reference to *Chlamydia trachomatis*. Indian J Ophthalmol 2002;50(4):295-9.
13. Gul SS, Jamal M, Khan N. Ophthalmia neonatorum. J Coll Physicians Surg Pak 2010;20(9):595-8.
14. Nsanze H, Dawodu A, Usmani A, Sabarinathan K, Varady E. Ophthalmia neonatorum in the United Arab Emirates. Ann Trop Paediatr 1996;16(1):27-32.
15. Malathi J, Madhavan HN, Therese KL, Joseph PR. A hospital based study on the prevalence of conjunctivitis due to *Chlamydia trachomatis*. Indian J Med Res 2003;117:71-5.
16. Javaloy J, Ferrer C, Vidal MT, Alio JL. Follicular conjunctivitis caused by *Chlamydia trachomatis* in an infant Saharan population: molecular and clinical diagnosis. Br J Ophthalmol 2003;87(2):142-6.
17. Singer TR, Isenberg SJ, Apt L. Conjunctival anaerobic and aerobic bacterial flora in pediatric versus adult subjects. Br J Ophthalmol 1988;72(6):448-51.
18. Isenberg SJ, Apt L, Yoshimori R, McCarty JW, Alvarez SR. Source of the conjunctival bacterial flora at birth and implications for ophthalmia neonatorum prophylaxis. Am J Ophthalmol 1988; 106(4):458-62.
19. Rowe DS, Aicardi EZ, Dawson CR, Schachter J. Purulent ocular discharge in neonates: significance of *Chlamydia trachomatis*. Pediatrics 1979;63(4):628-32.
20. Sandstrom KI, Bell TA, Chandler JW, Kuo CC, Wang SP, Grayston JT, *et al.* Microbial causes of neonatal conjunctivitis. J Pediatr 1984;105(5):706-11.
21. Yip TP, Chan WH, Yip KT, Que TL, Lee MM, Kwong NS, *et al.* Incidence of neonatal chlamydial conjunctivitis and its association with nasopharyngeal colonisation in a Hong Kong hospital, assessed by polymerase chain reaction. Hong Kong Med J 2007;13(1):22-6.
22. Hammerschlag MR, Cummings C, Roblin PM, Williams TH, Delke I. Efficacy of neonatal ocular prophylaxis for the prevention of chlamydial and gonococcal conjunctivitis. N Engl J Med 1989; 320(12):769-72.
23. Amini E, Ghasemi M, Zamanin A. Prevalence and etiology of neonatal conjunctivitis in neonates hospitalized in Imam Khomeini Hospital. Iran J pediatrics 2006;16(4):393-6.
24. Laga M, Plummer FA, Nzanze H, Namaara W, Brunham RC, Ndinya-Achola JO, *et al.* Epidemiology of ophthalmia neonatorum in Kenya. Lancet 1986;2(8516):1145-9.
25. Frost E, Yvert F, Ndong JZ, Ivanoff B. Ophthalmia neonatorum in a semi-rural African community. Trans R Soc Trop Med Hyg 1987;81(3):378-80.