

The frequency of ophthalmia neonatorum in hospitalized neonates and newborn babies delivered in the maternity and children teaching hospital in Diwaniah

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Abstract

Objectives:

Determine the frequency of ophthalmia neonatorum among hospitalized neonates and those delivered in the labor room and operation theatres in the maternity and children teaching hospitals in Diwaniah in addition to determination of the causative microorganisms and their antibiotic sensitivity.

Materials & methods:

Two hundreds seventy conjunctival swabs were collected randomly from neonates admitted to the septic and aseptic neonatal care units and newborn babies delivered in the labor room and operation theatres in the maternity and children teaching hospital Diwaniah during the period from September 2002 to February 2003.

Results :

The clinical and microbiological diagnosis of ophthalmia neonatorum was made in 190 neonates (70.3 %) , 154 cases were due to Gram positive bacteria (84.6 %) and 28 were due to Gram negative bacteria (15.4 %) , six cases were due to Candida . Most infections were in neonates aged 1- 5 days . Gram positive bacteria were sensitive to Cefotaxime and resistant to Amikacin , while Gram negative bacteria were sensitive to Tetracycline.

Discussion :

The results were presented and compared with other studies and concentration on epidemiological and microbiological issues was made.

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Introduction

Ophthalmia neonatorum , a form of conjunctivitis occurring in infants younger than 4 weeks of age , is the most common eye disease of newborns. Its many different etiologic agents vary greatly in their virulence and outcome. The risk of conjunctivitis in newborns depends on frequencies of maternal infections , prophylactic measures , circumstances during labor and delivery and post delivery exposures to microorganisms (1 , 2).

Ophthalmia neonatorum was the leading cause of blindness in the ninetieth century . The epidemiology of this condition changed dramatically in 1881 , when Crede reported that when 2% silver nitrate solution instilled in the eyes of newborns reduced the incidence of gonococcal ophthalmia from 10 % to 0.3 % (3). The age of the affected newborn baby can provide a clue to the possible microorganism causing conjunctivitis , as ophthalmia in the first week of life is mostly due to *N. gonorrhoea* , and between 5 – 10 days is possibly due to other bacteria, while if ophthalmia occur between 7 – 40 days , then *Chlamydia* is mostly the cause (4).

The microorganisms responsible for causing ophthalmia include a variety of Gram positive and Gram negative bacteria as : *Staph. Aureus* , *Strep. Pyogenes*, *Neisseria gonorrhoeae* , *pseudomonas aeruginosa* , *proteus spp.* , *Haemophilus aegyptius* , *Moraxella spp.* , *Chlamydia trachomatis* , adenoviruses and herpes simplex virus and *Candida albicans* (5 , 6 , 7 , 8). The incidence of gonococcal ophthalmia in the united states had decreased to 0.3 per 1000 live births following silver nitrate prophylaxis while *Chlamydia* is now the most common cause occurring in the rate of 8.2 per 1000 live births (1).

A variety of drugs are now used as prophylaxis to prevent ophthalmia including : Erythromycin ointment 0.5 % , Tetracycline ointment 1% , silver nitrate 1% , povidine – iodine 2.5% and Benzyl penicillin solution (9, 10, 11, 12).

Materials and methods

This study was carried out in the maternity and children teaching hospital in Diwaniah during the period from September

2002 to February 2003. The target of the study was neonates admitted to the septic and aseptic neonatal care units and newborns delivered in the labor room and operation theatres. The neonatal care unit in this hospital consist of two subunits ; the aseptic unit received sick neonates from outside the hospital and is located near the pediatric wards , while the aseptic unit received only newborn babies delivered in the hospital and they have certain immediate neonatal problems and this subunit is located near the labor room. Conjunctival swabs were taken and collected randomly from the study neonates using sterile cotton swabs , the method of Virella was used to collect the samples (13). A three ml of physiological saline solution was added to the swab container , the swabs were taken to the hospital lab within short time and the swabs were then put in screw capped tubes containing 15 ml of Brain heart infusion medium and transferred to the lab of department of microbiology , college of medicine , Al-Qadisiyah university for further studirs.

The lab diagnosis involves direct examination of samples using Gram stain , culture on a variety of medias (Blood agar , MacConky agar , Chocolate agar and others) and biochemical tests including : Indole test , sugar fermentation test , motility tests , Nitrate reduction test , gelatin liquefaction test and others. Antibiotic sensitivity test was done using Disk diffusion method . The clinical diagnosis of ophthalmia was made depending on the classical signs and symptoms of the disease. The incidence rate of the disease was determined according to the following equation : (14)

Incidence rate (I) = $c/d \times 100$ c = the number of individuals having the disease , d = the total number of the study sample.

Statistical analysis was done using Chi-square at a probability level of 0.05 (15).

Results and discussion

One-hundred ninety neonates among 270 studied were found to have ophthalmia neonatorum depending on clinical and microbiological basis and this constitute 70.3 % of the total . In 182 cases bacterial cause were identified (95.8 %) , 84.6 % were due to Gram positive bacteria and 15.4 % were due to Gram negative

bacteria. The identified microbiological causes of ophthalmia in this study are summarized in table 1.

Table 1

| The causative microorganism | The number of positive isolates | % |
|------------------------------------|--|------------|
| Gram positive bacteria | 154 (total) | 84.6 |
| Staph. Aureus | 92 | 59.7 |
| Strep. pyogenes | 62 | 40.3 |
| Gram negative bacteria | 28 (total) | 15.4 |
| Pseudomonas aeruginosa | 14 | 50 |
| N. gonorrhoea | 4 | 14.3 |
| Proteus spp. | 4 | 14.3 |
| H. aegyptius | 4 | 14.3 |
| Moraxella lacunata | 2 | 7.1 |
| Yeasts | | |
| Candida albicans | 6 | 3.1 |

Microbiological causes of ophthalmia

This etiological finding is in agreement with similar studies (5, 16, 17). The high frequency of Staph. Aureus in this study could be due to contamination of the delivery places and utensils used during delivery. The frequency of N. gonorrhoea (14.3%) is similar to the result found in Iyamu study (11.9 %) (18).Female neonates were more frequently than males (73.5 % VS 68.4 %) .The highest frequency of the disease was found among neonates aged 1 – 5 days (64.2 %) while the least frequency was in the age group between 21 – 25 days (Table 2). This age distribution and etiology does not fit with the role stated by Detoled and Chandler (4) i.e ophthalmia in the first week of life is mostly due to N. gonorrhoea , in this study most cases are due to Gram positive bacteria and this in the absence of silver nitrate prophylaxis in this country can simply be attributed to the social and religious nature of the community as gonorrhoea is a classical sexually transmitted disease.

Table 2 :The age distribution of neonates with ophthalmia neonatorum

| Age (days) | Number of cases | Percent |
|--------------|-----------------|------------|
| 1 -5 | 122 | 64.2 |
| 6 - 10 | 37 | 19.5 |
| 11 - 15 | 21 | 11 |
| 16 - 20 | 7 | 3.7 |
| 21 - 25 | 3 | 1.6 |
| total | 190 | 100 |

If the etiological classification was aside , other studies had also conclude a similar age distribution (19, 20). Neonates delivered by caesarean section were more frequently affected than vaginally delivered ones (76.6 % vs 67.8 %) , this could be explained by the fact that those infant acquired infection from the hospital with the possibility of contamination of operation theatres and objects that come in contact with the newborns (21). The incidence rate ofophthalmia was more common in neonates admitted to the septic neonatal care unit in comparison to those in other units (91.4 %) , and this could be attributed to the fact that the majority of neonates in this unit are critically ill preterm babies with a variety of infectious complications.

Concerning antibiotic sensitivity test, the sensitivity of 182 bacterial isolates to 9 antibiotics were tested . Gram positive bacteria were highly resistant to Amikacin (96.7 % - 100 %) , moderately resistant to Tetracycline and Cephalexin (47.8% - 51.6 %) and mildly resistant to Cefotaxime (19.3% - 22.8%) . The result of other sensitivity tests is summarized in table 3.

The sensitivity results of Gram positive bacteria in this study is comparable to that of Segreti (22) and others (23), this was explained that it could be due to either bacterial enzyme production or membrane protein loss (24). Gram negative bacteria were resistant to the most commonly used antibiotics other than Tetracycline. The sensitivity of *H. aegyptius* , *N. gonorrhoea* and

M. lacunata to this antibiotic range between 75 – 100 % , this observation was also made by Sleigh et al and Monney et al (25, 26).

The incidence rate in this study (70.3%) is higher than that reported in one study (1) and comparable to that of Iyamu et al study (18).

Conclusions

1. The incidence rate of ophthalmia neonatorum of 70.3% is relatively high.
2. Two types of Gram positive bacteria were the most common cause of ophthalmia neonatorum (Staph. Aureus and Strep. Pyogenes).
3. Gram positive bacteria were sensitive to Cefotaxime while Gram negative bacteria were sensitive to Tetracycline.

| Type of bacteria | Staphylococcus Aureus (92) | | | | Streptococcus Pyogenes (62) | | | | Pseudomonas Aeruginosa (14) | | | | Nisseria Gonorrhoea (4) | | | | Proteus .spp. (4) | | | | Haemophilus Aegyptius(4) | | | | | | | |
|------------------|----------------------------|------|----|------|-----------------------------|------|----|------|-----------------------------|------|----|------|-------------------------|----|---|-----|-------------------|----|---|-----|--------------------------|----|---|-----|---|----|---|----|
| | s | % | r | % | s | % | r | % | s | % | r | % | s | % | r | % | s | % | r | % | s | % | r | % | s | % | r | % |
| Ampicillin | 5 | 5.4 | 87 | 94.5 | 3 | 4.8 | 59 | 95.1 | 0 | 0 | 14 | 100 | 0 | 0 | 4 | 100 | 1 | 25 | 3 | 75 | 2 | 50 | 2 | 50 | 0 | 0 | 0 | 0 |
| Amikacin | 3 | 3.2 | 89 | 96.7 | 0 | 0 | 62 | 100 | 2 | 14.2 | 12 | 85.7 | 1 | 25 | 3 | 75 | 1 | 25 | 3 | 75 | 0 | 0 | 4 | 100 | 0 | 0 | 0 | 0 |
| Amoxicillin | 7 | 7.6 | 85 | 92.3 | 2 | 3.2 | 60 | 96.7 | 0 | 0 | 14 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 0 | 0 |
| Cefotaxime | 71 | 77.1 | 21 | 22.8 | 50 | 80.6 | 12 | 19.3 | 1 | 7.1 | 13 | 92.8 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 0 | 0 |
| Chloramphenicol | 20 | 21.7 | 72 | 78.2 | 4 | 6.4 | 58 | 93.5 | 0 | 0 | 14 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 1 | 25 | 3 | 75 | 0 | 0 | 0 | 0 |
| Cephalexin | 48 | 52.1 | 44 | 47.8 | 45 | 72.5 | 17 | 27.4 | 3 | 21.5 | 11 | 78.5 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 4 | 100 | 0 | 0 | 0 | 0 |
| Cloxacillin | 10 | 10.8 | 82 | 89.1 | 16 | 25.8 | 46 | 74.1 | 1 | 7.2 | 13 | 92.8 | 1 | 25 | 3 | 75 | 1 | 25 | 3 | 75 | 0 | 0 | 4 | 100 | 0 | 0 | 0 | 0 |
| Tetracycline | 13 | 14.2 | 79 | 85.8 | 30 | 48.8 | 32 | 51.6 | 1 | 7.2 | 13 | 92.8 | 3 | 75 | 1 | 25 | 0 | 0 | 4 | 100 | 3 | 75 | 1 | 25 | 2 | 50 | 0 | 0 |
| Erythromycin | 55 | 59.7 | 37 | 40.3 | 40 | 64.5 | 22 | 35.5 | 0 | 0 | 14 | 100 | 2 | 50 | 2 | 50 | 1 | 25 | 3 | 75 | 2 | 50 | 2 | 50 | 2 | 50 | 2 | 50 |

S = Sensitive
R = Resistance

Table 3
The antibiotic sensitivity of the isolated Bacteria

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