BACTERIAL OPHTHALMIA NEONATORUM IN MUHIMBILI MEDICAL CENTRE DAR ES DALAAM

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DECLARATION

I here by solmenly declare that, this dissertation is my original work, and has never been submitted for a diploma or degree in any other University.

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To my wife **SUBIRA** and to my children

AISHA, NAKILINDO, HASSAN AND HUSSEIN.

In appreciation for all the love support and encouragement you gave me, without which my study would not have been possible,

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ABSTRACT

This is a study conducted on 125 women admitted in labour in the maternity wing of Muhimbili Medical Centre, and in the babies born of these mothers. The main objective was to find out the prevalence of intrapartum gonococcal cervical infection in the mothers and the aetiology of ophthalmia neonatorum in their babies.

The results showed that the prevalence of maternal gonococcal infection and incidence of ophthalmia neonatorum in their new borns were very high. The prevalence of maternal gonococcal infection was 4%, whereas the incidence of ophthalmia neonatorum in the babies was 20%.

Staphylococcus aureus was the commonest orgnism causing neonatal conjuctivitis, and was isolated in 14 out of 25 babies with ophthalmia (56%). Other bacteria isolated were *Streptococcus pneumoniae* (1 case) and *Staphylococcus albus* (2 cases). Gonococcal conjuctivitis was not seen in the new borns. There were 8 babies (32%) with clinical conjuctivitis but with negative cultures.

Organismal resistance to antibiotics was seen in isolates from mothers as well as in the newborns. Thus, of those mothers with gonococcal infection, the organisms were resitant to penicillin in 20% of the cases. Also, amongst babies with Staphylococcal conjuctivitis, the sensitivity testing showed that 94% were resistant to penicillin. The organisms were highly sensitive to erythromycin and chloramphenicol. All infected babies responded promptly to 0.5% chloramphenical eye drops.

In conclusion, the incidence of ophthalmia neonatorum in Muhimbili Medical Centre is high and there is a need for an effective ocular prophylaxis regime in the neonates. From the results of culture and sesitivity tests done, either erythromycin eye drops or chloramphenicol eye drops are recommended for the treatment and prophylaxis of the neonates.

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INTRODUCTION

Definition:

Ophthalmia neonatorum is defined as a conjuctivitis occuring in an infant less than 30 days old. The clinical signs of the disease are swelling of the eye lids and the palpebral conjuctiva, purulent eye discharge and one or more polymorphonuclear leucocytes per oil immersion field on a gram stained conjuctival smear[1].

Why Ophthalmia Neonatorum is a problem in Tanzania.

Ophthalmia neonatorum is a wide spread problem in developing countries including Tanzania. Studies done in the Gambia[2] and Kenya[3], showed that the incidences of neonatal conjuctivitis in these countries were very high, 34.0% (340 per 1000 live births) and 23.2% (232 per 1000 live births) respectively. These and other studies done in Uganda[4] and Central Africa[5] have shown that bacteria account for 1/3 or more of the cases. The commonest bacteria implicated was *N.gonorrhoeae* accounting for between 12% and 73% in the different studies. The other organisms were *Staphylococcus aureus*, *Hemophyllus influenza*, *Streptococcus pneumoniae* and *Escherichia coli*[2,3,4,5,6].

The prevalence of gonorrhoea among mothers in labour is high too in these countries, 14% in Cameroun[5] and 7% in Kenya[3]. The corresponding transmission rate of gonococcal infection

from mother to baby was 30% in Cameroun and 42% in Kenya. These statistics indicate that a large number of new borns get infected with gonococcal organisms.

Although at present the risk of blindness resulting from bacterial ophthalmia neonatorum is difficult to estimate, there is data to indicate that about 10% of the cases will suffer from severe permanent corneal damage and remain with low vision[7]. Fransen et al (1986) examined Kenyan neonates in Nairobi with bacterial ophthalmia and found that 16% of the infants had corneal lesions leading to permanent low vision[8].

There are several factors which sustain ophthalmia neonatorum in these countries:-

(i) Anti-microbial resistance:

There is a rapid increase in penicillinase produducing (Beta-Lactamase) Neisseria gonorrhoeae (PPNG) in African countries, accounting for about 50% of the gonococcal isolates. In Kenya[1] it is 52% and in Dar es Salaam[9] is 40%. The risk of penicillin resisistant gonococcal ophthalmia is therefore very high in these countries and treatment is made more difficult.

(ii) Poor Antenatal care:

Pregnant women are not screened and therefore treatment is not given to asymptomatic mothers with *N.gonorrhoeae*.

(iii) Labour ward equipment:

Sterility and cleanliness in our labour wards and the hospitals in general are very poor and favour infection.

(iv) Non-use of prophylactic ocular treatment:

Newborn babies are not given prophylactic ocular treatment soon after birth. More over, there is no proper treatment regimen for the neonates with the disease, that could be used at the dispensaries where most of the patients are seen.

(v) Health education:

This is not regularly provided both to the mothers and to the hospital staff who handle the babies. In so doing, transfer of infection to the babies could be avoided.

(vi) Bad social behaviour:

Promiscuity is still rampart in towns in spite of the on going campaign against AIDS.

Broad Objectives:

Ophthalmia neonatorum is a public health problem in this country and no study yet has been done to show its full extent. It is imperative therefore that a proper study for this important disease be done now, to explore its epidemiology, to recommend management and to suggest ways of prevention in our community.

REVIEW OF THE LITERATURE

HISTORY:

Ophathalmia neonatorum has a very ancient history. It is known to have flourished in the Greek and Roman times[7]. The idea that this disease was related to the vaginal discharge of the mother was first postulated by Quellmaltz in 1750 and was supported by Gibson in 1807 and by Mackenzia in 1830[7]. The oculogenital relationship was finally confirmed in 1841 when Piringer demonstrated that genital discharges were actually infective for the human eye[7].

In 1879, Neisser[10] found the gonococcus in genital and conjuctival discharges, and for a time ophthamia neonatorum was regarded as a strictly gonococcal disease. In 1881 when Crede[10] first introduced his method of prophylaxis with 2% silver nitrate solution for ophthalmia neonatorum, more than 30% of pregnant women in Europe were infected with gonorrhoea, and gonorrhoeal ophathalmia neonatorum was one of the principal causes of blindness there[10]. As a result of this method of prophylaxis, there was a dramatic and substantial fall in the incidence of gonococcal ophthalmia neonatorum world wide.

With the decline of gonococcal ophthalmia neonatorum, it was soon recognized that other maternal genital infections could

also infect the conjuctiva of the new born. Among these, a form of conjuctivitis in the new born unassociated with pathogenic bacteria was described by Morax in 1903[11]. He called it "conjonctivite amicrobienne." The finding of cytoplasmic inclusion bodies (Heymann 1909) similar to those which Halberstaedter and Prowazek (1907) had found in the conjuctival scrapings of patients affected by trachoma led Lindner (1909) to call this new disease "Einchlussbleneorrhoe" or "inclussion blennorhoea". This term is still in use, although the commoner term today is inclussion conjuctivitis. Its causative agent is *Chlamydia oculogenitalis*.

As laboratory techniques improved, other genital agents were isolated. Among these were viruses[12], such as the well known herpes simplex virus type 2, which infects the female cervix[10], and is passed on to the newborn's conjuctiva during birth.

In addition to Neisseria, Chlamydia and Herpes simplex virus, other infectious agents found in the female genital tract rarely may infect the eyes of the newborn during passage through the birth canal[10]. Such infectious agents include Mimeae, Candida and Mycoplasma[10].

Of recent, a variety of agents which are not normally associated with maternal infections have taken an increasingly important role in the causation of ophathalmia neonatorum. Among these are bacteria such as staphylococcus spp, streptococcus spp and Hemophyllus spp, which infect the

conjuctiva soon after birth; and chemical agents such as 2% silver nitrate solution used for prophylaxis of ophthalmia neonatrum which causes a chemical conjuctivitis[6,13,14].

AETIOLOGY:

1. Mode of transmission:

Infection may occur in three ways: before, during and after birth[7]. Infection occuring before birth is unusual. That occuring during and after birth is common[7].

(i) Infection before birth:

Access through the liquor amnii is possible as is seen in the occurrence of bacteriologically proved gonococcal conjuctivitis in the newborn, sometimes associated with corneal ulcer and perforation, without any lesion in the body and without the presence of gonococii in the blood[7]. This can be possible following premature rupture of membranes before birth.

Isenberg found that it takes at least three hours for infection to ascend from the vagina to the uterus through ruptured membranes to infect the baby[15]. The gonococcus is not intrinsically motile but its surface fimbriae and outer membranes, permit attachment of the organism to host epithelial cells, host polymorphonuclear leukocytes and to other gonococci thus enabling it to migrate[15]. Such a motion takes time.

The organism can also traverse intact membranes before birth to infect the baby. This can explain reported infections after birth by Caesarian section in a mother with intact membranes[7].

(ii) Infection during birth:

This infection is acquired from the vagina during birth. Typical examples are gonococcal and chlamydial infections[1]. At birth the eyes are tightly closed and the skin is covered by a fatty material. The margins of the lids are usually glued together with meibomian secretions and epithelial debris. Only occasionally are the eyes open but more frequently the water tight junction of the lids is forced open either by forceps or the fingers of the attendant or by pressure of the tightly stretched perineum. From the point of view of infection the most dangerous type of confinement is a protracted labour with a face presentation[7].

The transmission rate of infection during birth from mother to child, is very high. Between 25-50% of new borns exposed to N.gonorrhoea and C.trachomatis during birth develop a corresponding eye infection if no prophylaxis is given[1,3].

(iii) Infection after birth

There are three modes by which the conjuctiva of a new born may get infected after birth[7].

(a) A direct infection from the mother in cases where the child and mother share the same bed.

(b) From linen or other soiled cloths and dressings either while wiping the lids or during the first bath.

(c) Airborne infection due to staphylococcus in the hospital enviroment.

2. Aetiological agents:

The causative agents can be either microbial (infectious) or chemical in origin. The infectious causes are sub divided into (i) sexually transmitted diseases and (ii) other micro-organisms[1].

(i) Sexually transmitted diseases (STD)

The two STD's of major public health importance are *N. gonorrhoea* and *C. trachomatis*[1]. The infections are acquired during passage through the cervix and/or vagina. However, Herpes simplex virus type 2, is another STD which is known to cause an acute ophthalmia in neonates.

It would seem that either geographical factors or the quality of immediate neonatal care seem to determine the relative importance of the causative organisms. In 1982 Meheus[16] in Central Africa found that ophthalmia neonatorum due to *N. gonorrhoea* was more common than that due to *C. trachomatis*, whereas Laga et al in 1986[3] in Nairobi, Kenya, found that chlamydial infection was commoner than gonococcal, inspite of the fact that eye prophylaxis was not used soon after birth in both cases.

In the developed world the importance of *N. gonorrhoea* as a cause of neonatal ophthalmia, seems to have markedly declined, probably as a result of extensive use of Crede's prophylaxis[17,18] or the use of antibiotic drops shortly after delivery[19]. Thus in UK[13], Denmark[17] and USA[18,19] gonococcal ophthalmia is rare whereas chlamydial is still common.

(ii) Other Micro-organisms:

These organisms infect the infant's conjuctiva after birth. Of recent these organisms have taken an increasingly important role in the causation of ophthalmia neonatorum. In Uganda[4,6] Staphylococcus was the most commonly isolated organism in neonates with parulent conjuctivitis. In USA[18, 19] the leading cause for neonatal conjuctivitis was staphylococcal spp and in UK[7] streptococcal spp. Other organisms shown to cause ophthalmia include a wide range of microbes such as

Hemophillus spp, Klebsiella spp, Pseudomonas spp and herpes simplex viruses.

(iii) Chemical conjuctivitis:

Chemical conjuctivitis occurs after use of prophylactic agents; both silver nitrate solution and topical antibiotics have been shown to cause neonatal conjuctivitis[14]. However, chemical conjuctivitis is seen 5 to 10 fold more commonly following application of silver nitrate than is the case with topical antibiotics[14, 20].

There are several ways in which silver nitrate solution causes ophthalmia neonatorum. First, silver ions react with the proteins of conjuctival epithelial cells causing irritation[14]. Secondly the silver ions combine with chloride ions in the tears and produce silver chloride precipitate which is irritant so the conjuctiva and thirdly rinsing the neonates' eyes with saline following the application of silver nitrate solution further increases the precipitation of silver chloride and worsens the conjuctivitis[14].

EPIDEMIOLOGY

The true incidence and prevalence of ophthalmia neonatorum in Dar es Salaam is not known. For the past two years from March, 1988 to February, 1990, there were 35 neonates admitted to the Muhimbili Medical Centre (MMC) eye ward beacause of neonatal conjuctivitis. During the same period 31, 618 babies were born alive in the maternity ward of the hospital. This is an incidence of 0.11 per 100 live births (1.1 per 1000 live births). However this is not the true incidence because; (i) some of the children admitted here were born elsewhere in the city , not necessarily in this maternity ward; (ii) it is possible that some of the infants who were born here and got a neonatal conjuctivitis, were treated in other centers in town and (iii) it is also possible that babies with mild conjuctivitis remain at home and never seek medical advice at all.

But it would appear that the true incidence of ophthalmia neonatorum in Dar es Salaam is much higher than 1.1 per 1000 live births because of the factors that sustain ophthalmia neonatorum described previously which include (i) antibiotic resitant bacteria causing ophthalmia, (ii) Poor antenatal care, (iii) poor sterility in the labour ward, (iv) lack of prophylactic ocular treatment to newborns, (v) lack of health education to mothers and (vi) promiscuity is still rampart in town.

No one at all has tried to work out the true incidence of ophthalmia neonatorum in Dar es salaam and as a result literature on this aspect is not available. In one Nairobi hospital in Kenya, where ocular prophylaxis against ophthalmia had been discontinued, the incidence of ophthalmia neonatorum was found to be 23.2 per 100 live births (232 per 1000 live births)[3]. In that study bacteria were the leading cause accounting for 37% of all the cases with ophthalmia neonatorum. Chlamydial ophthalmia neonatorum accounted for 31.4%. Of the bacterial causes, *N. gonorrhoeae* was the leading cause accounting for 12% of all the cases with ophthalmia. Other important bacterial organisms in a descending order were *Hemophiyllus influenzae* 6.6%; *Staphylococcus aureus* 6.0%, *Streptococcus pneumoniae* 5.5% and the rest were *Streptococcus irridans*, *Escherichia coli* and Moraxella spp each 1.1%.

Other studies in developing countries have shown similar results that bacteria are the leading cause of ophthalmia neonatorum in those countries[2, 4, 6, 16]. At Mulago hospital in Uganda, Onyango-Ogony[4] found among 34 cases with ophthalmia neonatorum referred from other Kampala clinics, 94% were bacterial and in the remaining 6% organisms were not isolated. *N. gonorrhoeae* was isolated in 73% of the cases. Other organisms were *Escherichia coli* 9% and *Staphylococcus aureus* 6%. Others accounted for the rest.

At Mbale Hospital (Uganda) Otiti[6] found among 246 babies with ophthalmia who attended the eye clinic, 74.4% were due to

bacterial causes. Negative cultures and contaminants accounted for the remaining 25.4%. The leading causes were *Staphylococcus aureus* (36.2%) and *N. gonorrhoeae* (22.0%). Other Staphylococcal spp accounted for 11.4%, Streptococcal spp 1.6% and mixed growth 3.2%.

In the Gambia, Callier and Sawa[2] studied 297 babies born in a general hospital where Crede's ophthalmic prophylaxis was not practised. Out of those neonates, 101 contracted conjuctivitis within two weeks of birth. This was an incidense of 34.0% (340 per 1000 live births). The organism most often isolated from their eyes was staphylococci (60% of the cases). Other important organisms were Corynebacteria Pseudomonas and Streptococcus spp. *N. gonorrhoea* was reported relatively rare occurring in only 4%. Chlamydia was isolated in only 2 cases (2%) among 9 cases which were initially sterile on blood agar culture.

In the Central African Republic Meheus[16] reported that the incidence of ophthalmia neonatorum was 9.7% (97 per 1000 live births). The gonococci and chlamydia each accounted for 26% and 19% respectively. Other organisms were not reported in the paper.

The incidence of ophthalmia neonatorum in the developed countries is generally much less. In countries where neonatal ophthalmic prophylaxis is still practised for example the USA, the incidence is around 1% (10 per 1000 live births)[18, 19]. A study done at Mount Sinai hospital in New York city in

1987[19], found the incidence was 0,31% (3.1 per 1000 live births). The hospital was using intramuscular penicillin 500,000 units and topical tetracycline 1% ointment as the ocular prophylaxis. Of the cases with ophthalmia neonatorum, the leading aetiological causes were *Staphylococcus aureus* (30.2%) and other pathogns included were *Eschrichia coli* and streptococcal spp which together accounted for 25.3%. Chemical conjuctivitis was seen in 7.4% and gonococcal and chlamydia each was 3.1%. About 22% of the cultures were negative and in 9.4% of the cases the specimen were not obtainable.

Another study done in Atlanta, Georgia, showed the incidence was 1.6% (16 per 1000 live births)[18]. The new borns in this study received 1% silver nitrate solution for prophylaxis. Chlamydial ophthalmia was the commonest (28.5%), followed by gonococcal (14.2%) and staphylococcal (10.3%). 44.4% of the cultures were negative and chemical conjuctivitis was seen in 1.6%.

In the UK hospitals, where neonatal prophylaxis is usually not practiced[13,21] the incidence of ophthalmia neonatorum is much higher than that of USA. Prentice et al found in 1977[21] the incidence was 8.2% (82 per 1000 live births) and later Pierce in 1982[13] found the incidence was 12%. The leading causes were bacterial such as *Staphylococcus aureus*, *Strepococcus pneumoniae*, *Escherichia coli* and Haemophylus spp.

SUMMARY:

The two tables below summarize the important points on the epidemiology of neonatal conjuctivitis [2,3,19,21].

Table 1: Incidences of Ophthalmia Neonatorum in Different Countries

COUNTRY	INCIDENCE per 1000	BACTERIA	CHLAMYDIA	CHEMICAL	NEGATIVE CULTURES
KENYA	232	37%	31.4%	-	31.5%
GAMBIA	340	91%	2.0%	-	7.0%
U S A	3.1	58%	3.0%	7%	32.0%
U.K.	82	46%	-	-	63.5%

Table 2: Important Bacterial Causes in Different Countries

COUNTRY	TOTAL % OF BACTERIA	STAPHYLO-COCCUS SPP	NEISSERIA GONORRHOEA	STREPTO-COCCUS SPP	HEMO-PHYLUS SPP	E.COLI	OTHERS
KENYA	37%	6%	12%	6.6%	6.6%	1.1%	4.7%
GAMBIA	91%	60%	4%	9.0%	6.0%	20%	39.0%
U S A	58%	30%	3%	-	-	-	25.0%
U.K.	46%	29%	-	16.0%	-	5.4%	5.0%

NOTE: More than one organism were isolated in some eyes and the per centages do not always add up to 100%.

The important points are:

(i) The incidence of ophthalmia neonatorum in developing countries is much higher, at least 5 times more than in developed countries.

(ii) Bacteria are relatively the most important cause of ophthalmia in borth developing and developed countries.

(iii) Gonococcal ophthalmia is still prevalent in African countries whereas it is almost non existent in developed countries.

(iv) Chlamydia ophthalmia neonatorum is important in many countries, both developing and developed.

(v) Herpes virus ophthalmia is rare.

Prevalence of maternal infection in relation to ophthalmia neonatorum

The prevalence of gonorrhoea among antenatal attenders in African countries ranges from 5 to 15%[1]. Genital chlamydial infections are also highly prevalent. One study in the Gambia showed the prevalence was 6.9% and another recent one in Kenya showed it was 29%[2,3]. Between 25-50% of infants exposed to *N. gonorrhoeae* and *C. trachomatis* during birth develop a corresponding eye infection if no eye prophylaxis is given

soon after birth[1,3]. Both of these sexually transmitted pathogens are therefore still very common pontential causes of ophthalmia neonatorum in these countries.

It must be pointed out that, these mothers of infants with ophthalmia neonatorum are at a high risk of sexually trensmitted diseases. It has been demostrated that 40% of mothers of infants consulting for ophthalmia neonatorum had gonorrhoea and 9% had positive syphillis serology[1]. These mothers are also at high risk of developing complications like postportum endometritis. However, they often donot present with their own complaints but recquest advice and treatment for the sticky eyes of their newborns.

Sexually transmitted diseases are almost as frequent in fathers as in the mothers. But a large number of fathers have recieved previous treatment with antimicrobial drugs and are often asymptomatic, whereas their partners have remained untreated[1].

CLINICAL FEATURES

(1) Factors limiting the development of ophthalmia neonatorum:

(a) Maternal:

The acidic enviroment of the vagina limits the type of bacteria that can survive there. The most common organisms present in the posterior fornix of pregnant women are Lactobacillus spp, Coryrebacterium spp and *Staphylococcus epidermidis*[22]. The microbial flora change very little during the first, second and third trimester, apart from a trend towards an increase in the isolation rates of Mycoplasma hominis in the third trimester. None of these organisms cause ophathalmia neonatorum[15,23].

(b) New born baby

Watertight junction of the lids during delivery help to prevent infection of the newborns conjuctiva from the vaginal microbes[7]. At birth the eyes are qlued by the meibomian lipid secretions and open later after birth. This prevents most vaginal bacteria from entering and infecting the conjuctiva of the baby.

2. Factors which make infection more serious

(a) Absence of tears at birth:

Full differentiation of the lacrimal glands donot take place till after birth and tears are not produced till the beginning of the third month. The tears are important in controlling eye infections because they contain anti microbial agents such as Ig A antibodies, lysozyme, lactoferrin and interferon[24,25,26,27].

(b) Lack of Lymphoid tissue in the conjuctiva at birth

The lymphoid follicles are absent at birth and develop after 2-3 months. The absence of lymphoid tissue decreases the cellular immunity of the conjuctiva and renders it liable to infection.

3. The Incubation period

The time of onset of the inflammation is not always helpful in the differential diagnosis of ophthalmia neonatorum. However the incubation period varies with the type of infection[28].

Table 3:

The incubation period of different types of neonatal conjuctivitis are summerized on Table 3.

Type of Ophthalmia	Incubation Period
Chemical	within 24 hours
Gonococcal	2 - 4 days
Other bacteria	4 - 5 days
Herpes simplex	5 - 7 days
Chlamydia	5 - 14 days

4. Signs and Symptoms:

(a) Bacterial Ophthalmia Neonatorum

Gonococcal ophthalmia neonatorum is a severe, usually bilateral hyperacute conjuctivitis associated with a marked purulent exudate, chemosis and injection of the conjuctiva. A slight redness of the conjuctiva is followed within 2-4 days by a discharge which may be watery. The lids become swollen, tense and red. When they are separated the conjuctiva is seen to be brilliantly injected, swollen and velvety. Sometimes the chemosis is so marked that the cornea is seen at the bottom of a crater like pit. On the surface of the conjuctiva there can be seen flakes of lymph, ecchymoses and sometimes a

membrane or pseudomembrane. The discharge at first watery, becomes turbid and finally rapidly purulent.

If not treated this picture may continue for 2 to 3 weeks or more and then the lids become more lax. The conjuctiva is puckered up into folds and into papillary elevations looking like granulation tissue. The discharge lessens and becomes serous and finally ceases in from 6 to 8 weeks. Very slight conjuctival cicatricial changes may be left[7].

The cornea may be involved. This first appears as diffuse epithehal oedema which gives the cornea a hazzy greyish appearance. Coarse white opacities (infiltrations) appear near the border of the cornea and sclera. When new blood vessels invade the cornea scarring may result.

Ulceration can progress to perforation of the eye and loss of vision. 16% of infants with gonococcal ophthalmia neonatorum developed corneal lesions in Kenya[8]. Furthermore a corneal ulcer and disseminated gonococcal infection developed in 1 of 70 such patients.

Gonococcal infection of the newborn is not limited to the eyes. The respiratory tract, middle ear, mouth and digestive tract can be involved. Meningitis and septicemia may develop.

The start of treatment dramatically changes the course and outcome of the disease usually within twenty four hours[1, 7].

Ophthalmia neonatorum due to other bacterial agents usually presents a milder picture. Corneal complications are rare but have been reported in cases of ophthalmia due to Pseudomonas[29].

(b) Chlamydial Ophthalmia Neonatorum

Ophthalmia due to chlamydial agents appears later than gonococcal[28]. Infammatory membranes (pseudomenabranes) may occur in some cases during the second week. If the disease is active during the second month of life discrete nodules (Lymphoid fallicles) can appear in the upper conjuctiva. Blindness is rare and the progress of the disease is much slower than in gonococcal ophthalmia. Corneal scarring is not due to direct involvement, but due to eyelid scarring and distortion together with pannus formation as in trachoma. Chlamydial neonatal infection can also be extraocular, and pneumonitis, otitis, pharyngeal and rectal colonisation can occur[1,7,28].

The ocular discharge usually dissappears within 2-3 days with treatment, but inflammatory hypertrophy and follicles of the conjuctiva may persist for several weeks[7].

(c) Herpes Simplex:

Herpes simplex keratoconjuctivitis is rare in the newborn[7]. It occurs in 1 out of 75,000 deliveries. The risk of herpetic infection of the infants of mothers with genital herpes varies

with the type of delivery. It is 54% with vaginal delivery[30]. It is due to Type 2 herpes virus in the majority of cases and is characterized by a mild blepharo-conjuctivitis. Corneal involvement may occur especially in an infant with a generalised herpes simplex disease[28].

(d). Chemical Conjuctivitis:

This develops in the 24 hours following instillation of a prophylactic drug usually silver nitrate solution[14, 28]; and lasts for only a day. It can also be caused by prophylactic antibiotics against neonatal conjuctivitis. The clinical picture is that of a transient mild hyperemia[14, 28].

DIAGNOSIS

(1) During pregnancy:

Cervical swabs should be taken during the 3rd trimester for Gram stain, Giemsa staining, culture and sensitivity tests. Mothers with positive swabs for *N. gonorrhoea* and *C. trachomatis* should be treated because they carry a 25-50% chance of transmitting the infection to their babies[3]. Routine screening is not possible in many countries, however, it is desirable to investigate and treat all mothers presenting at the antenatal clinic with vaginal discharge[1].

(2). After Birth:

In the new borns, a clinical diagnosis should be augmented by a laboratory diagnosis. A Gram stained conjuctival smear should be per formed on all cases. The presence of intracellular Gram negative diplococci gives a sensitive fast presumptive diagnosis of gonococcal infection which has more severe sequelae. Inclusion bodies on Giemsa is also helpful in diagnosing Chlamydial ophthalmia.

Well equiped laboratories should culture for *N. gonorrhoeae* and *Chlamydia trachomatis*. Drug sensitivity results can influence treatment schedules when available a few days later. Detection of beta-lactamase producing strains of *N. gonorrhoeae* can be done and a definitive diagnosis of chlamydia infection made. Conjuctival smears are stained with

monoclonal antibodies against *C. trachomatis* and read in a fluorescence test[31]. An ELISA test can also be performed. These results will give guidance in the treatment of their parents if antenatal screening was not done[1].

MANAGEMENT

Table 4: Summary of Treatment:

1. GONOCOCCAL

   A: (i) Admission to hospital
   (ii) Penicillin 1.m or i.v.
   (iii) Topical anti microbial therapy e.g. Tetracycline ointment, Gentamycin drops.

   B: If PPNG prevalence more than 1%
   (i) Single IM injection of Cefotaxime 100mg/kg.
   (ii) Kanamycin 25 mg/kg plus
   (iii) either tetracycline 1% ointment
   (iv) Or Erythromycin 0.5% ointment

2. CHLAMYDIAL-Systemic treatment:

Erythromycine estolate orally (syrup) 50mg/kg/day for 14 days.

3. BACTERIAL (Non-gonococcal; non-chlamydial).

   (i) Tetracycline 1% ointment 4 times/day for 14 days or

   (ii) Erythromycine 0.5% ointment 4 times/day for 14 days

4. HERPES VIRUS: Adenosine arabinoside (ARA-A) orally and ointment

5. CHEMICAL CONJUCTIVITIS
   Observation

6. Treatment of parents.

Treatment of neonatal conjuctivitis depends on the causative agent.

(i) Gonococaal Ophthalmia neonatorum:

In view of the seriousness of the disease and possible complications, the highly predictive Gram stain of a conjuctival smear can be used to direct the choice of treatment immediately the child presents. The recommended treatment for gonococcal ophthalmia is intramuscular or intravenous penicillin, with or without topical antimicrobial therapy and hospital admission of the infant [1,30]. However, these regimens are only suitable in areas where gonococci are not resistant to penicillin.

A cheap, single dose treatment given to an infant as an outpatient would be better adapted to the needs of developing countries. Several such regimens have recently been shown to be effective in the treatment of conjuctivitis of the new born in areas with a high prevalence of penicillin resistant gonococci (Table 4).

The World Health Organisation recommends that when Penicillinase Producing Neisseria Gonorrhoeae (PPNG) prevalence is more than 1%, the ophthalmia should be treated with cefotaxime 100mg/kg or kanamycin 25mg/kg as a single intramuscular dose, with tetracycline 1% or erythromycin 0.5% eye ointment for 10 days [32,33]. A single dose of 75mg kanamycin combined with topical gentamycin ointment for seven

days has also been shown to be effective[32]. However the easy availabity of these drugs in most developing countries is not possible[1].

(2). Chlamydial Ophthalmia Neonatorum:

Infants with neonatal conjuctivitis who have negative laboratory tests for gonococci but with presumed or definite chlamydial infection, can be treated with erythromycin estolate (50mg/kg/day) by mouth for a minimum of 14 days. Systemic treatment is necessary because of associated chlamydial pneumonia, in which case topical anti-microbial therapy is not recquired[1]. Washing of the eyes with saline or water should always be performed.

(3). Other Bacteria:

Most non-gonococcal and non-chlamydial conjuctivitis of the new born can be treated adequately with topical tetracycline 1% or erythromycin 0.5% eye ointment 4 times each day for 14 days[1].

(4) Viral Conjuctivitis:

Adenosine arabinoside (ARA-A) is less toxic than cytosine preparation (ARA-C) and should be used systmically and as 3.0% eye ointment[30].

(5). Chemical Conjuctivitis:

This is transient and usually lasts within 24 hours. It requires observation only[14,28].

(6). Treatment of Parents

Both parents should be investigated for sexually transmitted diseases and treated appropiately.

PREVENTION:

Preventive measures can be taken in pregnancy, during labour or after delivery.

1. During Pregnancy:

Detection and treatment of sexually transmitted diseases (STD) in pregnant women can be used as a method of preventing ophthalmia neonatorum. In practice this is not always easy, not even in developed countries where pregnant women at risk can be screened for STD and adequately treated if infection is found[1]. The high risk women for STD are not easily motivated to accept screening, and if they do, they are often rapidly re-infected after treatment. How ever, it is possible in most countries to investigate and treat all mothers presenting with vaginal discharge at the antenatal clinics. This would prevent neonatal infection and complications in the mother such as secondary infertility. The use of condoms to prevent transmission of HIV is also likely to result in a reduction of sexually transmitted diseasees and associated ophthalmia neonatorum[1].

2. Eye prophylaxis in the neonate at birth:

Crede introduced this method in Germany in the last century[10]. The original procedure had two steps; first mechanical cleansing of the childs eye lids as soon as the

head was born and before the eyes opened, and second, instillation of an antiseptic into the conjuctival sac as soon as possible. Crede himself recommended an aqeous solution of 2% silver nitrate[10]. This was later changed to 1% which was less irritating. Other silver preparations such as argyrol 5% have been used[19].

The silver nitrate solution has been used primarily for the prevention of gonococcal ophthalmia neonatarum. How ever it has many negative characteristics: (1) variable efficacy against modern strains of gonococci (2) no efficacy against chlamydia, (3) induction of severe comjuctivitis by the solution itself, (4) blindness from accidental overdosing, (5) the loss of efficacy from the post-administration saline wash and (6) it is not effective against extraocular gonococcal infection[14]. Hence it was abandoned in in several places and alternative prophylactic methods were introduced. These included topical and intramuscular penicillin[19,34,35,36,37], tetracycline 1% ointment[1, 19, 34, 35] erytromycin 0.5% ointment[1, 34, 35, 38, 39] and aureomycin ointment[40].

Ocular penicillin has be abandoned as a drug of choice largely because of drug sensitization and emergence of penicillinase producing *N. gonorrhoeae*[35]. Erythromycin and tetracycline are considered to be more effective in preventing chamydial as well as gonococcal ophthalmia[1, 38, 39], than silver nitrate. How ever a recent study from Kenya reports silver nitrate prevents a considerable amount of chlamydial conjuctivitis

(68% against 77% by tetracycline 1% ointment) and the difference may not be significant[39].

Neonatal ocular prophylaxis should be directed primarily toward preventing ophthalmia due to sexually trasmitted diseases: *N.gonorrhoeae* and *C. trachomatis*. The choice of preparation in a country like Tanzania will depend on the availability, the desire to avoid chemical conjuctivitis and the cost of the drug. To prevent ophthalmia neonatorum due to both gonococcal and chlamydial organisms, a single application of tetracycline 1% ointment could be used as the first choice in many developing countries where the prevalence of maternal gonococcal and chlamydial infection is high. Tetracycline ointment is widely available, cheap and has less side effects than silver nitrate solution. However, silver nitrate can still be recommended if used in single dose applications and stored with protection from exposure to light.

3. After delivery:

Adults handling the neonates including the mothers and the hospital staff, should maintain cleanliness and aseptic procedures to avoid cross infection. Linen and dressings should also be clean or sterile if possible.

In addition to the infant with conjuctivitis, the mother and her partner(s), are investigated and treated adequately. It has the advantage of often effectively treating disease in the

mother and her partner(s). This will prevent infection to future new borns.

AIMS OF STUDY

OBJECTIVES

1. To determine the incidence of bacterial ophthalmia neonatorum at Muhimbili Medical Centre - Dar es Salaam.

2. To find out the prevalence of gonorrhoeal infection in pregnant mothers attending for labour in the hospital.

3. To find out the aetiological agents of bacterial ophthalmia neonatorum.

4. To determine the transmission rate of *N. gonorrhoeae* from affected mothers to their new born babies.

5. To document the pattern of clinical presentation.

6. To find out the sensitivity of bacterial organisms to commonly used antibiotics.

7. To assess the therapeutic results.

8. To recommend methods of prophylaxis.

MATERIALS AND METHODOLODY

1. Study population:

(a) Mothers:

Pregnant women admitted for labour in the maternity ward of Muhimbili Medical Centre (MMC) were selected for this study. The women had their cervical swabs taken in the admission room and then assessed for labour. Those with an established labour (a cervical dilatation of 4cm or more) and with intact membranes were included in the study. Those with ruptured membranes were excluded. An average of 2 - 3 women satisfied the above criteria each day. Cervical swabs were taken from these cases during the weeks days for laboratory investigations. A total of 125 women were screened from December 1990 to February, 1991. The cervical swabs were investigated for *N. gonorrhoeae*.

(b) New born babies:

All the newborns from the selected mothers were included in the study. At admission mothers were instructed to come for follow up with their babies at the eye clinic on the seventh day after delivery. They were also advised to bring the child for evaluation on any day, if the baby developed discharge in the eyes within a period of one month after delivery. The babies who reported to the eye clinic had their eyes examined

by the author for conjuctivitis and conjuctival swabs taken fromall of them. The swabs were investigated for bacterial organisms. Babies without conjuctivitis acted as a control group. A total of 30 babies were brought for follow up to eye clinic. Among these 25 had conjuctivitis and 5 did not. The 5 normal babies became the contral group. The babies were each followed up for a period of four weeks and this ended at the end of March,1991.

2. Collection of swabs

(a) Cervical swabs from mothers:

Using a sterile vaginal speculum, a sterile cotton tipped applicator was introduced into the vagina and a cervical swab taken. The swab was put into Stuart's transport medium and sent to the laboratory.

(b) Conjuctival swabs from neonates:

These swabs were taken from the lower conjuctival sacs of every neonate brought to the eye clinic. A sterile cotton tipped applicator was lightly rotated in the inferior conjuctival sac of each eye. Where the dischange was resticted to one eye, the swab was taken from that eye. The swab was put into Stuart's transport medium and delivered to the laboratory immediately.

3. Staining, Culture and sensitivity techniques:

(a) Cervical swabs:

First, a direct smear was performed on a microscope glass slide and stained with Gram's method. The slide was examined under oil immersion with a standard light microscope for the presence of intracellular gram negative diplococci presumptive of gonococci.

Secondly, the specimen was inoculated on a plate containing Thayer-Martin medium, selective for *N.gonorrhoeae*. The medium contained vancomycine, colistin, nystatin, and trimethoprim which allow the growth of gonococci only. The plates were incubated at 35 °C in a candle jar or Co_2 incubator for 48 hours. Any glittering greyish - white raised colonies suspect of *N. gonorrhoeae* were taken with a sterile bacteriological inoculating loop smeared on a glass slide and stained with Gram's stain. The slide was examined as above for the presence of Gram negative diplococci. Other colonies were subjected to axidase tests and sugar fermentation tests for the identification of *N. gonorrhoeae*.

(b) Conjuctival swabs

A direct smear was performed for Gram staining and examined for both Gram positive and negative organisms. Then culture was performed on blood, chocolate and Mackonkey agars. The

organisms were identified by colony morphology and Gram staining.

(c) Sensitivity Tests

Antibiotic discs containing commonly available antibiotics were used such as penicillin, tetracycline, chloramphenicol, sulfonamide, gentamycine, cloxacillin, erythromycin and co-trimaxazole.

4. Treatment of Patients

(a) Newborns with Ophthalmia neonatorum

The first five cases were treated with chloramphenicol eye drops because it was available from the eye clinic during the study. Later on patients recieved chloramphenicol eye drops, tetracycline 1% ointment or soframycin eye drops because of availability and they proved to be sensitive to most cases.

(b) Mothers positive for gonorrhoea

There was only one gonococci positive mother who brought her baby to the eye clinic for follow up. She was treated with penicillin 4.8 mu intramuscularly at once.

RESULTS

The total number of women examined during labour was 125, and the total number of children born alive from these mothers was 125. All mothers had cervical swabs taken for investigating gonococcal intrapartum cervical infection. Among the 125 babies born to those mothers, 30 babies (24%) were brought back to the eye clinic for follow up. Those are the babies who were evaluated for conjuvtivitis and had conjuctival swabs taken for investigation.

1. Epidemiology:

(a) Prevalence of Intrampartum maternal gonococcal infection

Intrapartum maternal gonococcal infection was defined as the presence of intracellular gram negative diplococci on a direct smear and a positive cervical culture. However one woman who had a positive gram stain but a negative culture, was also included in the group of women with maternal infection. Thus a total of 5 women (4%) were found to be positive for gonococcal infection. Table 5 below shows the distribution of the women according to their age groups and four women did not know their ages.

Table 5: Distribution of the women according to age groups and their results for gonococcal infection:

Age group	Number of women sampled	Number of women positive for gonococcal
15-19 years	31 (25%)	1
20-29 years	55 (44%)	2
30-39 years	31 (25%)	2
40-45 years	4 (3%)	0
Unknown	4 (3%)	0
Total	125 (100%)	5 (4%)

(b) Rate of gonococcal transmission from mother to baby:

There was no child with gonococcal conjuctivitis who was brought to the eye clinic for examination, from the five mothers with gonococcal infection. It could be presumed that the transmission rate of gonococcal infection from mother to child was zero. However, it must be pointed out that only one of the five babies born of the infected mothers was brought to the clinic for follow up.

(c) Incidence of ophthalmia neonatorum:

30 new born babies were seen at follow up and 25 babies had conjuctivitis. The remaining 5 babies were normal. From these results, the proportion of babies with conjuctivitis was

83.3%. If the incidence is calculated based on the total number of 125 children born of the mothers studied, the incidence of ophthalmia neonatorum in this study is found to be 20%.

Staphylococcus aureus was isolated in the majority of cases, 14 (56%), from those who had conjuctivitis. *Streptococcus pnaumoniae* was isolated in one case (4%) and in two babies (8%) *Staphylococcus albus* was isolated. No new born baby had gonococcal conjuctivitis. In 8 babies (32%) no bacteria was grown. Of the 5 babies born of the five mothers with maternal gonococcal infection, only one baby was brought to the eye clinic for evaluation and this child had conjuctivitis due to *Staphylococcus aureus*. Table 6 below shows the incidence and aetiology of ophthalmia neonatorum

Table 6: The incidence and aetiology of ophthalmia neonatorum

Type of Bacteria	Number cases	Incindence per 100 live births	Proportion of. all cases with with ophthalmia
Staph aureus	14	11.2	56%
Staph albus	2	1.6	8%
Strepto pnaumoniae	1	0.8	4%
No bacterial	8	6.4	32%
TOTAL	25	20.0	100%

(d) Results of cultures from normal babies (The control group)

Five normal babies (with no conjuctivitis) were brought for examination and had conjuctival swabs taken. Three babies (60%) grew *Staphylococcus aureus* and 2 (40%) grew *Staphylococcus albus*. The aim was to find out whether organisms isolated from babies with conjuctivitis occurred significantly more frequent than in the control group. This was not possible because the size of the control group was very small.

(e) Sensitivity of organisms to antibiotics:

(i) *Neisseria gonorrhoeae:*

Gonococcal organisms isolated from one woman (20%) out of the 5 women with maternal gonococcal infection turned out to be resistant to penicillin. Otherwise organisms from all the women were senisitive to tetracycline, erythromycin, co-trimaxazole and gentamycin.

(ii) *Staphylococcus aureus*:

Among 17 specimen of *Staphylococcus aureus* tested for antibiotic sensitivity, 16 (94%) were resistant to pencillin, 13 (76.5%) were resistant to tetracycline and (6%) was resistant to chloramphenical. All were sensitive to sulfonamide, cloxacillin and erythromycin.

(iii) *Streptococcus pneumoniae*:

There was one neonate with conjuctivitis due to *Streptococcus pneumoniae*. The organisms were resistant to tetracycline, but sensitive to penicillin, chloramphenicol, cloxacillin and erythromycin.

(2) Clinical features:

All the babies examined presented with a mild to moderate conjuctivitis and no baby recquired admission to hospital. In most cases, there was hyperemia of the conjuctivae and mucoid discharge. In many mild cases, the mothers reported that the discharge was only present in the morning on waking up. Purulent discharge was not as marked as in the typical gonococcal conjuctivitis. Conjuctival and eye lid oedema were variable but again these were mild. Corneal perforation and extraocular infection was not observed. It was not possible from the clinical features alone to tell the aetiological diagnosis.

(3) Results of Treatment

Chloramphenical eye drops 0.5% were used in most cases because it was always available at the eye clinic and could be provided freely to the patients. Later on it was the preferred treatment because of (a) the continued availability and (b) the culture results showed that most staphylococcal

organisms were sensitive to the drug. One child was brought twice to the eye clinic because the first treatment with chloramphenical eye drops was not successful. The child was later treated successfully with tetracycline eye ointment although the organisms isolated in both instances were *Staphylococcus aureus*: sensitive to chloramphenical but resistant to tetracycline. It was thought that the underlying causative organism of the conjuctivitis may have been an agent other than the isolated *Staphylococcus aureus*.

DISCUSSION

1. The incidence of ophthalmia neoratorum: The incidence of ophthalmia neoratorum at Muhimbili Medical Centre (MMC) in Dar es salaaam, is very high. The incidence of 20% (200 per 1000 live births) obtained from this study probably reflects the minimum value. The true incidence is probably much higher because, 76% of the babies did not turn up for follow up at the eye clinic.

The high incidence of ophthalmia neonatorum recorded in Dar es Salaam is in agreement with reports from other developing countries[2,3,8,16]. In these countries the incidences range from 20% to 35% (200 to 350 per 1000 live briths), much higher than the incidence recorded in developed countries[13,18,19,21]. There fore ophthalmia neonatorum is a major public health problem in these countries including Tanzania. However, in Tanzania, longer serveys are necessary in order to determine the full scope of the problem.

2. The Aetiology of ophthalmia neonatorum

(a) Bacteria:

This study has shown that bacteria are the main cause of neonatal conjuctivities. Amongst bacteria the most important organism was *Staphylococcus aureus*. This organism was isolated in 56% of the patients with ophthalmia.

Staphylococcus albus and *Streptococcus pneumoniae* were seen in 8% and 4% of the cases respectively. In 8 babies (32%) no organisms were isolated. Our findings are in complete agreement with studies done in Uganda and agreement with stu in Uganda and the Gambia[2,6]. As in our cases *Staphylococcus aureus* has been the major pathogen in ophthalmia neonatorum accounting for 36.2% in Uganda and 60% in Gambia. The role of *Staphylococcus albus* in our cases remains unclear. Several studies[15,19,21,41,42,43] have conclusively established that the organism is part of the normal flora of the conjuctiva at birth. There fore its isolation in our cases would seem to suggest that (a) under certain circumstances the organism assumes pathogenic characteristics or (b) that the ophthalmia was due to an unisolable pathogen and thus the *staphylococcal albus* was a contaminant. Only further studies could clarifly these questions in our enviroment.

Gonococcal ophthalmia neonatorum was not seen in this study. But since only one of the five babies (born of the mothers with gonococcal infection) was brought for follow up, it is possible that there were some babies with gonococcal conjuctivitis who did not come to the eye clinic. These babies may have attended other medical clinics elsewhere. Gonococcal ophthalmia neonatorum is still important in developing countries[2,3,4] but is rare in the developed world[13,17,18,19] may be because of the use of ocular prophylaxis soon after birth.

(b) Chlamydia:

The question of sterile cultures (32%) in this study from clinically definite cases of ophthalmia, raises the possibility of oraganisms other than bacteria. Studies from neighbouring countires[3,16] have shown that *Chlamydia trachomatis* is an important cause of ophthalmia in new borns, accounting for 10% to 35% of cases. These data suggest that some of our "sterile" cultures could have harboured chlamydial organisms. The lack of facilities in the centre precluded investigations for chlamydia.

(c) The control group:

Only 5 normal babies were brought for follow up examination. It was the design of this study that the uninfected babies would form a control group in the sense that their isolates would reflect the expected normal flora for the new borns. The number of the normal babies was however too small to give meaningful statistics. It is our experience that mothers with normal babies tend to be reluctant to bring their babies for examination due to other social factors.

3. Maternal intrapartum infection and transmission rate to babies:

The prevalence of intrapartum gonococcal infection was 4% i.e there were 5 gonococcal positive women amongst 125 women who had had cervical swabs taken for gonococcal investigation

during labour. The ages of the women with cervical gonococcal infection ranged from 17 years to 33 years and three of them (60%) were not married. It is well known that in Dar es Salaam unmarried young adults are more prone to gonococcal infection because they are sexually very active[44].

The finding of a prevalence of 4% of gonococcal infection among mothers falls within the known average prevalence in Africa 5-15%[1]. For example in Kenya[3] the prevalence is 6.6%.

One woman had a positive Gram stain showing Gram negative intracellular diplococci (suggestive of gonococci) but on culture, no organisms were grown. This could be a result of taking antibiotics for other complaints leading to a suppression of the gonococcal cervical infection[45].

The transmission rate of gonococcal infection from mother to child was found to be zero. This should not be taken as the conclusive figure because 4 babies (80%) among five, who were predisposed to maternal gonococcal infection did not turn up for examination. It is not possible in the maternity department to let all mothers stay in the ward for at least a week after delivery because of lack of beds and over congestion. Doctors are compelled to discharge the mothers and their babies 24 hours after delivery or even sooner, unless the mother or the baby has specific problems which need hospitalization. Extended admission of mothers and their babies in the maternity ward, would have been the most

reliable method of following them up. This would have given accurate figures of transmission rate of infection from mother to baby. One study in Kenya showed the transmission rate of gonococcal infection from mother to baby was 42%[3].

4. Sensitivity to antibiotics and Recommendations for therapy.

94% of staphylococcal organisms were resistant to penicillin and 76.5% were resistant to tetracycline. However the organisms were 100% sensitive to erythromycin and 94% sensitive to chloramphenicol. These results suggests that penicillin and tetracycline are not suitable for treating conjuctivitis due to *Staphylococcus areus*. On the other hand, since *Staphylococcus aureus* was the commonest organism causing ophthalmia in the study and since erythromycin and chloramphenical are cheap and easily available, these drugs are recommended for treating non-gonococcal, non-chlamydial neonatal conjuctivitis. The World Health Organisation recommends tetracycline and erythromycin eye ointments[1].

One baby with conjuctivitis did not respond to chloramphenicol eye drops in two occasions, although the isolated staphylococcal organisms were sensitive to the drug in vitro. Later the baby responded to tetracycline eye ointment 1% although the isolated Staphylococcus aureus was resistant to tetracycline in vitro. This suggested that there might have been other organisms e.g. chlamydia causing the conjuctivitis. Such organisms would respond to tetracycline.

In 1984, Sangawe and Mtanda[44] reported the absence of penicillin resistant *N.gonorrhoae* in a study of adult gonococcal ophthalmia in Dar es Salaam. Later on, Sangawe and Mhalu (1986) reported on a successful regimen using crystalline penicillin eye drops (100,000) units/ml) applied at intervals of 15 minutes to the eyes to treat penicillin resistant *Neisseria gonorrhoeae* in the same place. They also reported a high incidence (40%) of penicillinase producing *N. gonorrhoeae* (PPNG) among patients with gonococcal genital infections[9]. In our study one woman (20%) with gonococcal organisms was resistant to penicillin. It is evident from the study that the problem of penicillin resistant gonococci is still there and there is a high risk of these organisms causing ophathalmia neonatorum which can not be treated by the cheapest and most widely available antibiotic: the penicillin.

5. Prophylaxis:

At present, prophylaxis of ophthalmia neonatorum using ocular preparations is not being done at MMC in Dar es Salaam. This study has shown that there is a need of neonatal ocular prophylaxis. The prevalence of maternal gonococcal infection is high (4%) and the chances of having other STD's such as chlamydial infection are also high[1,3]. But it should be expected, with a high prevalence of gonococcal infection , that of chlamydia will be high as well[1,3]. The transmission rate of both infections from mother to child is known to be 25% - 50%[1,3,46], and this would result in a large number of

babies being infected at birth. Ocular prophylaxis to prevent neonatal conjuctivitis is there fore mandatory in MMC-Dar es Salaam. And on the basis of bacteriology and sensitivity results the recommended drugs would be erythromycin and chloramphenicol eye drops.

Screening of pregnant mothers as done in this study is possible in big hospitals, but it is expensive, time consuming and demands extra staff. What can be done easily, is to investigate and treat all mothers presenting with vaginal discharge at the antenatal clinics. At the level of health centers, screening is practically impossible because of lack of adequate trained staff and lack of laboratory facilities. What can be done is to treat empirically all pregnant women presenting with genital discharge using a combination of high dose intramuscular penicillin (4.8 mu) and oral erythromycin. Both these drugs are cheap and widely available and would cover both gonococcal and chlamydial organisms.

Health workers should be educated regarding the commonest and important organisms causing neonatal conjuctivitis. Moreover they should be informed that proper and early treatment will result in the intervention of the disease process and prevent subsequent visual loss. *Staphylococcus aureus* is the commonest organism and the drugs of choice are erythromycin and/or chloramphenicol eye drops.

CONCLUSION AND RECOMMENDATIONS

This study has shown that (i) the incidence of ophthalmia neonatorum in Dar es Salaam, is very high, 20% (200 per 1000 live births) and (ii) the prevalence of gonococcal cervical infection in mothers during labour is also high, 4%.

The commonest organism causing neonatal conjuctivities is *Staphylococcus aureus* and it is sensitive to chloramphenicol and erythromycin in vitro.

20% of gonococcal isolates in women are resistant to penicillin and therefore penicillin resistant gonococcal ophthalmia should be expected in new borns.

It is recommended that either chloramphenicol eye drops 0.5% to 1.0% or erythromycin eye drops, be used for treating and preventing ophthalmia neonatorum in Dar es Salaam.

It is also recommended that all pregnant mothers presenting with vaginal discharge at the antenatal clinics should be investigated and treated adequately.

SUMMARY

A prospective study was conducted on 125 pregnant mothers admitted for labour in Muhimbili Medical Centre to determine the prevalence of intrapartum gonococcal cervical infection and then later on their babies were followed up to determine the incidence of bacterial ophthalmia neonatorum. During the follow up the clinical presentation of the neonates with conjuctivitis was observed, the aetiologies investigated and the treatment evaluated. At the end of the study, recommendations were made for treating and preventing the ophthalmia in our community.

The prevalence of intrapartum gonococcal cervical infection was found to be 4%. The incidence of ophthalmia neonatorum was 20% (200 per 1000 live births), and the commonest organism isolated was Staphylococcus aureus (56% of the cases). Neonatal conjuctivitis due to other bacteria was rare *Streptococcus pneumoniae* occured in 4% of the case. Negative cultures accounted for 32% and contaminants due to *Staphylococcus albus* occured in 8%. Gonococcal ophthalmia neonatorum was not seen in this study.

Most of the babies presented with mild to moderate conjuctivities. Corneal perforation and extraocular infections were not observed. Treatment results were uneventful and no child developed corneal opacities due to ophthalmia neonatorum.

Sensitivity tests done on the organisms showed that most of the *Staphylococcus aureus* bacteria were sensitive to erythromycin 100%) and chloramphenicol (94%), while 96% of the isolates were resistant to penicillin and 76.5% were resistant to tetracycline. These results show that erythromycin and chloramphenicol eye drops are the appropiate drugs for treating neonatal conjuctivitis caused by *Staphylococcus aureus* and that penicillin and tetracycline are not.

Most of the babies were treated with chloramphenicol eye drops 0.5% and erythromycin eye drops because they were available from the eye clinic and could be issued freely to the patients. More over the sensitivity results showed the organisms were sensitive to these drugs too. However, one baby was successfully treated with tetracycline eye ointment after failing with chloramphenicol, and the underlying organism was presumed to be chlamydia.

20% of the gonococcal isolates in mothers were resistant to pencillin and penicillin resistant ophthalmia neonatorum should be expected.

It is recommended that chloramphenicol eye drops and/or erythromycin eye drops should be used for treating non-gonococcal, non-chlamydial neonatal conjuctivities. And the same drugs should be used for ocular prophylaxis.

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