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Epidemiological and Clinical Profile of Neonatal Conjunctivitis: A Case Study from the University Clinics of Lubumbashi

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ABSTRACT

Objective: *To assess the epidemiological profile of newborns diagnosed with neonatal conjunctivitis in our setting.*

Patients and Methods: *This retrospective descriptive study analyzed 900 medical records of newborns hospitalized in the neonatology department of the University Clinics of Lubumbashi from January 1, 2017, to December 31, 2018 (24 months). The variables studied in newborns included sex, gestational age, APGAR score, day of onset of ocular symptoms, laterality of conjunctival involvement, clinical manifestations, associated pathologies, use of the Credé prophylaxis method, and the type of treatment administered. For mothers, we considered age, antenatal care (ANC) attendance, history of infections during pregnancy, and duration of labor. The diagnosis was clinical, based on the presence of conjunctival hyperemia, edema, and purulent discharge.*

Results: *Among the 900 births recorded, 42 newborns (4.67%) developed neonatal conjunctivitis. The mothers' ages ranged from 17 to 42 years, with a mean of 30.5 ± 6.15 years; 54.79% were between 30 and 39 years old. Antenatal care was attended by 85.71% of mothers (36 out of 42). A history of urogenital infection in the third trimester of pregnancy was reported in 52.38% of cases. Bilateral conjunctival involvement was observed in 90.48% of affected newborns, with purulent discharge in 85.71%, typically appearing on the second day of life (36.59%). None of the newborns received prophylactic treatment. Gentamycin was the most commonly used antibiotic, administered to 88.10% of affected newborns.*

Conclusion: *Neonatal conjunctivitis remains a relatively uncommon condition in our setting. Early antibiotic treatment is essential to prevent complications. Strengthening adherence to prenatal consultations and ensuring systematic application of the Credé prophylaxis method could significantly reduce its incidence.*

Keywords

Epidemiology, Neonatal conjunctivitis, Newborn, Lubumbashi.

Introduction

Neonatal conjunctivitis, or ophthalmia neonatorum, is defined as conjunctival inflammation occurring within the first 28 days of life [1]. Its prevalence varies between 1% and 12% among newborns [2]. The condition may have bacterial, viral, or chemical etiologies, with a generally benign prognosis. However, cases caused by *Neisseria gonorrhoeae* can lead to severe complications if not promptly managed.

The most frequently identified bacterial pathogens include *Chlamydia trachomatis* (2%–40%), *Neisseria gonorrhoeae* (<1%), and other bacteria such as *Staphylococcus aureus, Streptococcus epidermidis, Streptococcus pneumoniae, Moraxella catarrhalis*, and *Haemophilus influenzae* (30%–50%). Additionally, less than 1% of cases are attributed to the herpes simplex virus [2-4].

Before the introduction of ocular prophylaxis at birth with silver nitrate by Credé in 1881, the incidence of neonatal conjunctivitis was significantly higher [3-5]. Since then, systematic ocular prophylaxis for newborns has contributed to a substantial decline in both incidence and associated complications [2,4,5].

In high-income countries, neonatal conjunctivitis has become a rare and generally mild condition due to improved hygiene and standardized preventive measures. In contrast, in low-resource settings, where hygiene conditions and access to prophylaxis are inadequate, neonatal conjunctivitis remains a significant public health concern [6].

In our context, the Credé method is widely used for the prevention of neonatal conjunctivitis. Diagnosis is primarily clinical, with paraclinical investigations reserved for complicated cases, and management remains relatively straightforward. This study aims to assess the epidemiological and clinical characteristics of neonatal conjunctivitis in our setting.

Patients and Methods

This study is a descriptive retrospective analysis conducted over a period of 24 months, from January 1, 2017, to December 31, 2018, at the neonatology department of the University Clinics of Lubumbashi. A total of 900 medical records of hospitalized newborns were reviewed to assess the epidemiological and clinical profile of neonatal conjunctivitis in this setting.

The study examined several neonatal characteristics, including sex, gestational age, APGAR score, the day of onset of ocular symptoms, the laterality of conjunctival involvement (unilateral or bilateral), clinical manifestations, the presence of associated comorbidities, the administration of prophylaxis using the Credé method, and the specific antimicrobial agent used for treatment. Additionally, maternal factors were analyzed, such as maternal age, antenatal care (ANC) follow-up, history of infections during pregnancy, and duration of labor.

The diagnosis of neonatal conjunctivitis was established clinically, based on the presence of conjunctival hyperemia, bulbar conjunctival edema, and purulent secretions. In our context, paraclinical investigations, such as microbiological cultures or polymerase chain reaction (PCR) tests, were rarely performed and were only considered in cases presenting with severe or atypical manifestations.

For data management and analysis, we utilized various software tools: Microsoft Word 2013 was employed for manuscript preparation, the design of data collection sheets, and the creation of tables. Epi Info 7.2.0.1 was used for data encoding, statistical analysis, and computation of frequencies and proportions. Additionally, Microsoft Excel 2013 facilitated the generation of graphical representations to enhance data visualization and interpretation.

This methodological approach aimed to provide a comprehensive overview of neonatal conjunctivitis within this hospital setting, identifying potential risk factors and evaluating adherence to preventive measures such as the Credé method. The findings from this study may contribute to improving neonatal care protocols and reinforcing preventive strategies against neonatal conjunctivitis.

Results

Prevalence of Neonatal Conjunctivitis

Among the 900 recorded births, 42 newborns were diagnosed with neonatal conjunctivitis, representing a prevalence of 4.67% in our study population.

Maternal Characteristics and Pregnancy Progression

As illustrated in Figure 1, the mean maternal age was 30.5 ± 6.15 years, with ages ranging from 17 to 42 years. More than half of the mothers (54.79%) were between 30 and 39 years old, indicating that the majority of cases occurred in this age group.

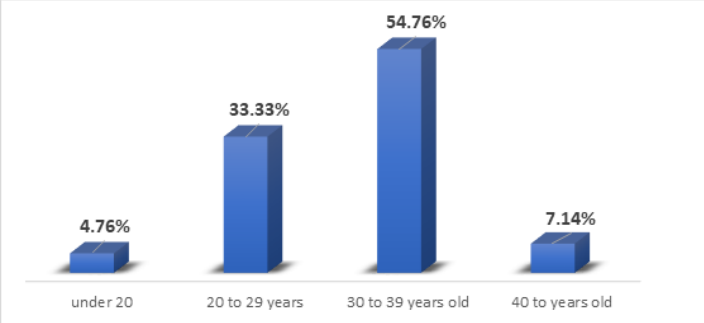

Figure 1: Distribution of Mothers According to Age Groups.

Figure 2 illustrates that 26.19% of the mothers resided in the Municipality of Lubumbashi, while 19.05% lived in the Municipality of Kampemba.

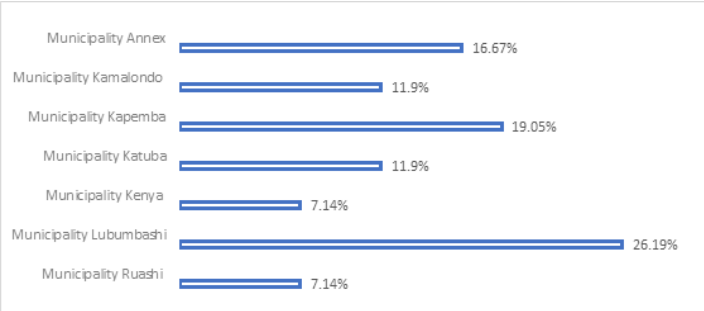

Figure 2: Distribution of Patients According to the Mothers' Municipality of Residence.

Figure 3 illustrates that 85.71% of the mothers (36 out of 42) attended antenatal care (ANC) visits during pregnancy, highlighting a relatively high level of prenatal follow-up in this study population.

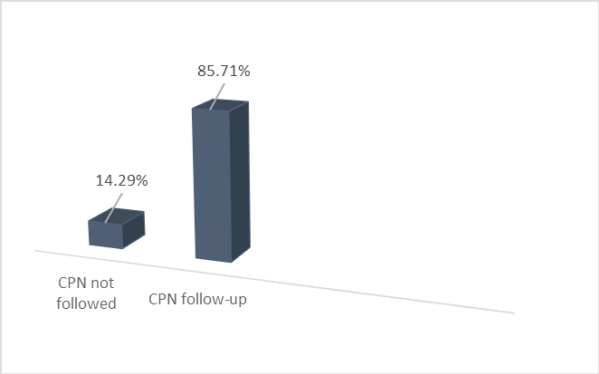

Figure 3: Distribution of Patients According to ANC Follow-Up.

Figure 4 indicates that 52.38% of mothers whose newborns developed neonatal conjunctivitis had experienced a urogenital infection during the third trimester of pregnancy, suggesting a potential association between maternal infections and the occurrence of neonatal conjunctivitis.

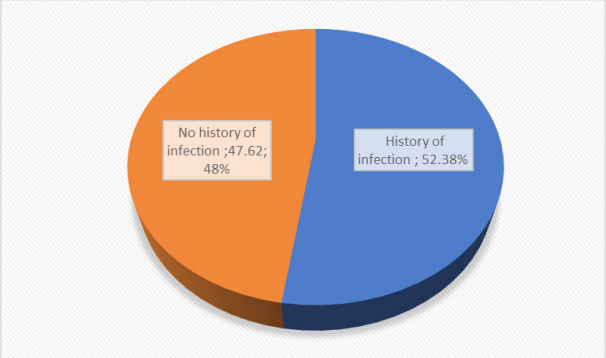

Figure 4: Distribution of Patients Based on History of Urogenital Infection During Gestation.

Table 1 presents key data on labor and delivery characteristics. The mean duration of labor was 9.65 ± 5 hours. Among the 42 newborns, 37 (88.10%) were delivered vaginally. Amniotomy occurred spontaneously in 70% of cases. The amniotic fluid was clear in 73.81% of cases, indicating a generally normal fetal environment. Additionally, the mean time between membrane rupture and birth was 13 ± 8 hours, with a minimum of 1 hour and a maximum of 72 hours, suggesting variability in labor duration and potential risk factors for neonatal infections.

Table 1: Labor Characteristics.

Parturition Data	Variations
Duration of labour	
Average	9.65 hours
Minimum	5 hours
Maximum	29 hours
Mode	8 hours
Route of delivery	
Vaginal delivery	88.10%
Cesarean section	11.90%
Rupture of membranes	
Spontaneous	70%
Artificial	10%
Appearance of amniotic fluid	
Clear	73.81%
Meconium	7.14%
Not determined	19.05%
Time between membrane rupture and rupture	
Average	13 hours
Minimum	1 hour
Maximum	72 hours
Mode	4 hours

Data Relating to the Newborn

Figure 5 illustrates the distribution of neonatal conjunctivitis cases by sex, showing an equal proportion between the two sexes. Male and female newborns each accounted for 50% of cases, resulting in a sex ratio of 1:1.

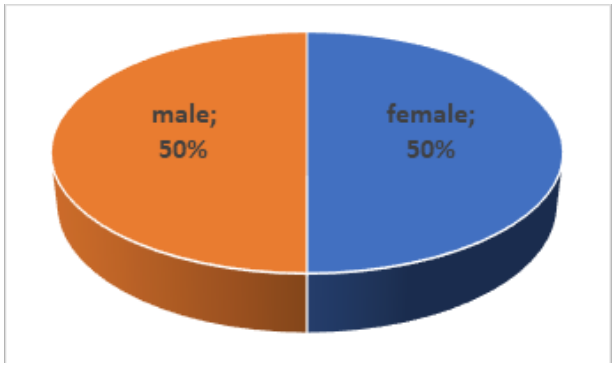

Figure 5: Sex Distribution of Newborns.

Figure 6 illustrates that term infants constituted the majority of cases (87.80%), while preterm infants accounted for 9.76%, and very preterm infants represented 2.44% of the newborns.

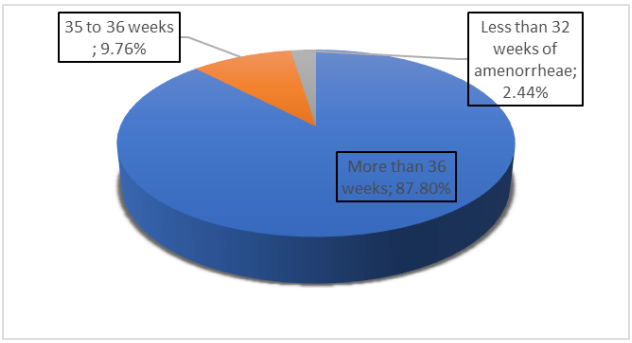

Figure 6: Distribution of Patients by Gestational Age.

The figure above indicates that 38 newborns (90.48%) had a good APGAR score, suggesting favorable neonatal adaptation at birth. Figure 8 reveals that the majority of newborns were eutrophic (76.19%), while 11.90% were classified as macrosomic, indicating a notable proportion of newborns with higher-than-average birth weight.

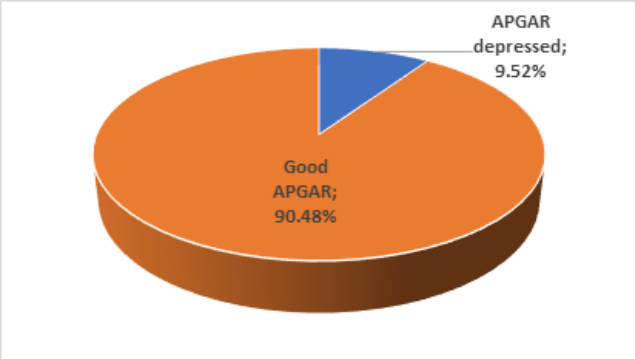

Figure 7: Distribution of Patients by APGAR score.

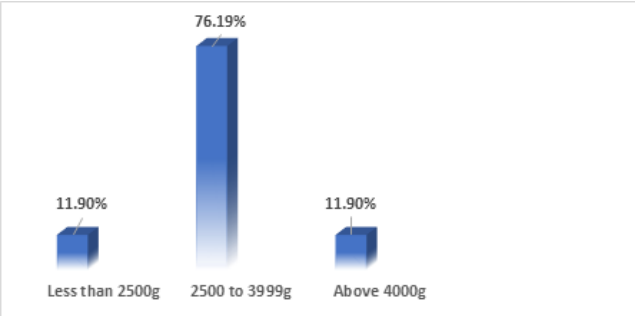

Figure 8: Distribution of Newborns by Birth Weight.

Clinical Data

The following section presents data regarding the onset of conjunctivitis symptoms, clinical characteristics, and associated pathologies in newborns.

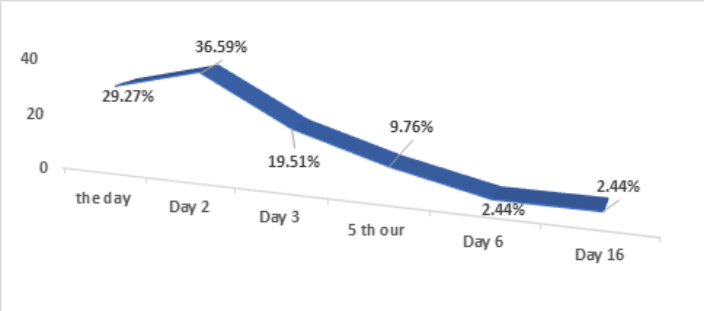

Figure 9: Distribution of Patients According to the Day of Onset of Symptoms.

Figure 9 illustrates that **neonatal conjunctivitis** most commonly appeared on **day 2 of life** (**36.59%**), followed by **day 1** (**29.27%**) and **day 3** (**19.51%**) of life. This pattern indicates that the majority of cases occurred within the first three days after birth.

Figure 10 illustrates those 38 newborns, or 90.48%, presented with bilateral conjunctivitis.

Table 2 shows that neonatal conjunctivitis was manifested by purulent secretions in 36 newborns (85.71%).

Table 2 shows that 23.81% of the newborns did not have any associated pathologies, while sepsis was associated with neonatal conjunctivitis in 19.05% of the newborns.

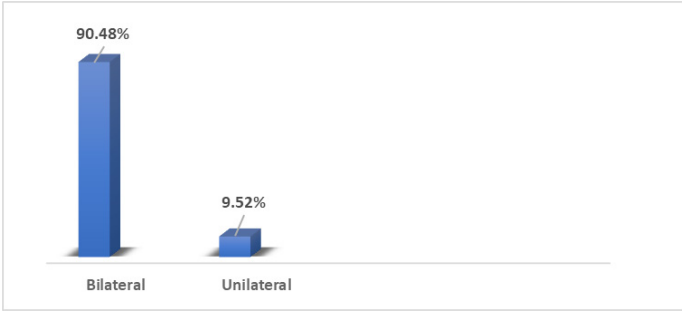

Figure 10: Distribution of patients according to the laterality of conjunctival involvement.

Table 2: Distribution of patients according to clinical manifestations.

Manifestation	Number of ases	Percentage
Purulent secretions	36	85.71
Conjunctival hyperhermia	3	7.14
Purulent secretion and conjunctival hyperhermia	1	2.28
Chemosis	1	2.28
Eyelid edema	1	2.28
Total	42	100

Table 3: Distribution of patients according to associated pathologies.

Associated	Pathology Number	Percentage
Jaundice	6	14.25
Sepsis	8	19.05
Rhinitis	5	11.9
Prematurity	4	9.52
Hypotrophy	4	9.52
Macrosomia	5	11.9
No associated pathology	10	23.81
Total	42	100

Management-related data

Figure 11 shows that half of the newborns with conjunctivitis did not receive preventive treatment with the Crédé method.

Table 4 shows that gentamycin was used in 88.10% of the newborns.

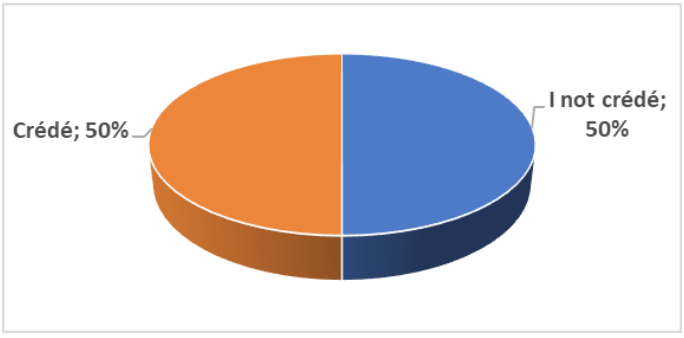

Figure 11: Distribution of patients according to prevention by the Crédé method.

Table 4: Distribution of patients according to the molecule used.

Molecule Used	Number	Percentage
Argyrol	2	4.76
Chloramphenicol	1	2.38
Gentamycin	37	88.1
Gentamycin and argyrol	1	2.38
Physiological saline	1	2.38
Total	42	100

Table 5 shows that no ophthalmology consultations were noted for newborns with conjunctivitis during our study period. The mean hospital stay was 7.03 ± 4.12 days. Of the 42 newborns, 41 were cured, and only one died due to prematurity.

Table 5: Distribution of patients according to the evolution.

Evolution	
Stay:	
Medium	7.03 ± 4.12 days
Minimum	2 days
Maximum	20 days
Fashion	3 days
Exit	
Healed	41 (97.62%)
Died	1(2.38%)

Discussion

Frequency of Neonatal Conjunctivitis

In our study, we identified 42 cases of neonatal conjunctivitis among 900 newborns, corresponding to a frequency of 4.67%. This rate falls within the range reported by the Canadian Paediatric Society [7], which varies between 1% and 12%. In developing countries, the frequency ranges from 0.5% to 33% according to various studies [8,9]. Our findings are similar to those of Vonor et al. [10] in Togo, who reported a frequency of 4.4%, although their diagnosis was based on the presence of at least two clinical signs, whereas we diagnosed the condition based on a single clinical sign, such as purulent secretions, conjunctival hyperemia, chemosis, or eyelid edema. Zue-Ndong [11] reported a higher frequency of 9% in Gabon, and Ayéna et al. [12] found an 8% frequency in a study conducted in the Kozah prefecture of Togo in 2012. These figures are higher than our observed rate. Overall, neonatal conjunctivitis is a common condition in newborns. While the frequency varies across studies, it remains relatively low in our setting.

Data Relating to the Mother and Pregnancy progression

Regarding maternal characteristics, the average age of the mothers was 30.5 ± 6.15 years, with the predominant age group being 30 to 39 years, representing 54.79% of cases. This age group is the most common for childbirth in our setting, reflecting broader demographic trends in our environment. The majority of mothers whose children developed neonatal conjunctivitis came from the commune of Lubumbashi (54.79%), followed by Kampemba (19.05%). This distribution can be attributed to the fact that the majority of women giving birth at the University Clinics of Lubumbashi are from these two communes, with Lubumbashi being the central hub due to the presence of the university hospitals.

In terms of risk factors, 14.29% of newborns whose mothers did not receive adequate antenatal care (ANC) developed neonatal conjunctivitis. This is significantly lower than the 44% found by Vonor et al. [7] in Togo, a difference likely due to the distinct study populations: our study was conducted in an urban setting where ANC follow-up is more common, whereas Vonor's study was in a rural area with lower ANC adherence.

Additionally, over half of the mothers (52.38%) of affected newborns had a urogenital infection during the third trimester of pregnancy. This stands as a significant risk factor, in contrast to the 31.4% reported by Vonor et al. [10], whose population had lower rates of ANC follow-up and, consequently, fewer diagnosed pregnancy-related pathologies. Our study population, being closely monitored during pregnancy, had more identified risk factors, including urogenital infections.

The most common mode of delivery was vaginal (88.10%), which aligns with the 98.7% vaginal delivery rate reported by Vonor et al. [10]. Vaginal delivery exposes the newborn to the maternal genital flora, increasing the likelihood of neonatal conjunctivitis. In contrast, cesarean delivery does not present this exposure. The average duration of labor in our study was within the normal range, at 9 ± 5 hours. However, the average time between rupture of membranes and delivery was 13 ± 8 hours, which represents an extended exposure of the newborn to potential pathogens in the maternal genital tract, likely contributing to the development of conjunctivitis. We could not find specific literature regarding the impact of this prolonged rupture of membranes on neonatal conjunctivitis.

Ranjit et al. [13], in a study conducted in Malawi, identified several other risk factors for neonatal conjunctivitis, including premature rupture of membranes, maternal infections during labor, sexually transmitted infections, home births, and inhalation of amniotic fluid by the newborn. These factors further highlight the multifactorial nature of neonatal conjunctivitis and the importance of early detection and management of maternal infections.

Data Relating to the Newborn

In terms of sex distribution, the sex ratio was 1:1, which aligns closely with the 1.01 ratio reported by Vonor et al. [10]. However, Koumare B. et al. [14] reported a sex ratio of 1.72, indicating a male predominance. Our findings suggest an equal distribution between male and female newborns, implying that sex is not a predisposing factor for the development of neonatal conjunctivitis in our study.

Prematurity was not a significant risk factor, as 87.80% of the infants who developed neonatal conjunctivitis were born at term. Additionally, 76.19% of the affected newborns had a birth weight between 2500g and 3999g, indicating that neither hypotrophy nor macrosomia predisposed the newborns to conjunctivitis. Only 9.52% of the newborns had a low APGAR score, suggesting that difficulties in adapting to extrauterine life were not significant risk

factors for the development of neonatal conjunctivitis.

Based on these findings, the cohort of newborns developing neonatal conjunctivitis predominantly consisted of full-term infants with normal birth weight, healthy APGAR scores, and an equal distribution between males and females. Clinically, symptoms of neonatal conjunctivitis typically appeared on the second day of life in 36.59% of cases. Both eyes were affected in 90.48% of the newborns. The predominant clinical sign was the presence of purulent secretions, observed in 85.71% of cases. This contrasts with Vonor et al. [10], who reported conjunctival hyperemia in 13.8% of cases, whereas purulent secretions were observed in only 3.8%, with 78% of their cases showing no ophthalmic signs. This discrepancy may be attributed to differences in the examination process, as our study's clinical assessment was performed by pediatricians rather than ophthalmologists, potentially leading to missed details.

In our study, the purulent discharge likely indicated a bacterial origin of the conjunctivitis, possibly caused by organisms such as *Staphylococcus* or *Streptococcus*. However, due to the lack of bacteriological investigations, this diagnosis was based solely on clinical presentation.

Neonatal conjunctivitis in our study was frequently (19.05%) associated with neonatal sepsis, which is often acquired perinatally, particularly during the passage through the genital tract, leading to simultaneous infection of the eyes. Additionally, neonatal jaundice was observed in 14.29% of cases, though 23.81% of newborns had isolated conjunctivitis. This isolated form may be attributed to poor hygiene practices by the mother and/or caregivers when handling the newborn's eyes prior to onset of symptoms.

Data Related to Management

Regarding prevention, 21 newborns received an instillation of 1% argyrol at birth, accounting for 50% of the study population. This is somewhat lower than the 78.6% reported by Vonor et al. [10], where newborns received eye drops or ointment, with an additional 15.7% benefiting from breast milk as a preventive measure. A potential explanation for this difference could be that some mothers in our study may have been unaware whether their newborns received prevention through the Credé method, which could account for the discrepancy observed. For curative treatment, gentamycin was the most frequently used antimicrobial agent, prescribed to 88.10% of the affected newborns, followed by 1% argyrol in 4.76% of cases. In contrast, Montaine J. [15], in a 2016 study in France, found that only 24.5% of newborns with conjunctivitis received treatment. In their cohort, the most commonly used medication was rifamycin (77%), followed by tobramycin (15%). The difference in treatment protocols between our study and that of Montaine may be attributed to variations in medical practices, as well as the limited availability of certain medications in our setting due to socioeconomic constraints.

Since bacteriological testing was not performed in our study, treatment was administered based on the general guidelines for neonatal conjunctivitis. These guidelines suggest that conjunctivitis caused by *Neisseria gonorrhoeae* typically presents by the second day of life, while *Chlamydia trachomatis* conjunctivitis usually appears between the 5th and 14th day of life [16]. Consequently, treatment was initiated systematically for all newborns exhibiting conjunctivitis symptoms. The choice of gentamycin was guided by its effectiveness against both *Neisseria gonorrhoeae* and *Chlamydia trachomatis*, which are common pathogens for neonatal conjunctivitis. The variation in treatment protocols between our study and that of Vonor et al. [10] is explained by differences in hospital practices and the accessibility of certain medications. Vonor's study, for instance, involved bacteriological testing to tailor treatment to the specific pathogen identified, which may have contributed to the faster resolution observed in their cohort.

In our study, no ophthalmology consultations were conducted. All management and follow-up were handled by pediatricians, who determined that specialized ophthalmological consultations were not necessary for the cases observed. This approach reflects the practical constraints of our healthcare setting, as we found no literature supporting the need for such consultations in the absence of severe complications.

Regarding the course of the disease, the average length of hospital stay was 7.03 ± 4.12 days, indicating that neonatal conjunctivitis contributed to prolonging the stay in the neonatal unit. This contrasts with Vonor et al. [10], who reported a favorable outcome by the third day of treatment. This difference may stem from the distinct treatment protocols used in the two studies. In our study, treatment was guided by the neonatal conjunctivitis calendar, which stipulates that *Neisseria gonorrhoeae* conjunctivitis is typically encountered from the second day of life, as seen in 36.59% of our cases, and *Chlamydia trachomatis* conjunctivitis occurs between the 5th and 14th day [16]. Thus, the use of gentamycin, which is effective against both pathogens, was deemed appropriate. In contrast, Vonor et al. [10] tailored their treatment based on bacteriological results, enabling them to administer targeted therapy and achieve a quicker resolution of symptoms.

Of the 42 newborns with neonatal conjunctivitis, 41 recovered fully, while one died as a result of prematurity. This highlights that while neonatal conjunctivitis itself is not fatal, it can lead to serious complications, including blindness, if not managed appropriately. Timely and adequate treatment is crucial in preventing these outcomes.

Conclusion

Neonatal conjunctivitis, although relatively uncommon in our environment, remains a significant concern due to its potential to cause complications, including blindness if left untreated. Early initiation of appropriate topical antibiotic treatment is essential to prevent these adverse outcomes. Moreover, adherence to prenatal care schedules and the implementation of the Credé maneuver at birth are crucial preventive measures that can significantly reduce the incidence of neonatal conjunctivitis. Strengthening awareness

and ensuring consistent application of these practices could greatly enhance neonatal health outcomes and reduce the burden of this preventable condition in our setting.

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