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Original Article

Prevalence, Risk Factors, and Outcomes of Neonatal Jaundice in Newborns Admitted to the Neonatal Unit at Zawia Medical Center (2018).

Hibah N. Alkhuwaylidi*, Fathia A.M. Murabet.
Department of Pediatrics, Faculty of Medicine, University of Zawia, Libya.
Corresponding Author, Hibah N. Alkhuwaylidi1:Email: hi.alkhuwaylidi@zu.edu.ly

Abstract

Background: Neonatal jaundice is a major contributor to neonatal morbidity and mortality worldwide. Several risk factors including prematurity, neonatal sepsis, birth asphyxia, and blood group incompatibility have been associated with its occurrence. **Objectives:** To determine the prevalence, risk factors, and outcomes of neonatal jaundice among newborns admitted to the neonatal unit at Zawia Medical Center, Libya. **Methods**: A hospital-based retrospective cross-sectional study was conducted by reviewing the medical records of neonates admitted with neonatal jaundice from January to December 2018. Data regarding demographic characteristics, risk factors, bilirubin levels, treatment, and outcomes were collected and analyzed using SPSS version 16. **Results:** Among 902 neonatal admissions, 123 cases of neonatal jaundice were identified, giving a prevalence of 13.6%. The mean serum bilirubin level was 8.8 ± 3.3 mg/dL, and the mean age at presentation was 34.8 ± 20.7 hours. Prematurity (56.1%), neonatal sepsis (47.2%), and birth asphyxia (44.7%) were the leading associated factors. ABO incompatibility was identified in 19.7% of cases, while 3.5% were associated with Rh incompatibility. Most neonates recovered and were discharged (73.6%), whereas mortality occurred in 16.5%. **Conclusion:** Neonatal jaundice remains a common cause of neonatal morbidity in Zawia Medical Center. Prematurity, sepsis, and birth asphyxia were the most frequent associated factors. Early identification of high-risk neonates and timely management may improve neonatal outcomes.

Keywords: Neonatal jaundice, hyperbilirubinemia, newborns, prematurity, sepsis, Libya.

Introduction

Neonatal jaundice is one of the most common clinical conditions affecting newborn infants during the neonatal period. It is characterized by yellow discoloration of the skin, sclera, and mucous membranes resulting from bilirubin deposition [1]. Jaundice occurs in approximately 60% of term neonates and 80% of preterm neonates during the first week of life [2]. Although neonatal jaundice is usually benign and self-limiting, severe hyperbilirubinemia may result in bilirubin encephalopathy and kernicterus, which are associated with permanent neurological damage and mortality [3] .Bilirubin metabolism undergoes significant physiological changes during the neonatal period. Increased bilirubin production, immature hepatic conjugation, and enhanced enterohepatic circulation contribute to the development of hyperbilirubinemia in newborns [4]. Several maternal and neonatal risk factors have been associated with neonatal jaundice, including prematurity, neonatal sepsis, birth asphyxia, ABO and Rh incompatibility, maternal diabetes mellitus, and maternal hypertension [5, 6]. Premature neonates are particularly vulnerable to hyperbilirubinemia because of immature liver enzyme activity and increased red blood cell turnover [7]. In addition, neonatal infections and hypoxic events may impair bilirubin metabolism and increase the risk of severe jaundice [8]. Early recognition and management are essential to prevent complications associated with bilirubin neurotoxicity. Neonatal jaundice remains a significant public health problem in developing countries due to limited healthcare resources, delayed diagnosis, and inadequate follow-up systems [9]. Despite its clinical importance, local epidemiological data regarding neonatal jaundice in western Libya remain limited. This study aimed to determine the prevalence, risk factors, and outcomes of neonatal jaundice among newborns admitted to the neonatal unit at Zawia Medical Center during 2018.

Materials and Methods

Study Design: This was a hospital-based retrospective descriptive cross-sectional study.

Study Setting: The study was conducted at Zawia Medical Center, a tertiary teaching hospital affiliated with the Faculty of Medicine, University of Zawia, Libya. The neonatal unit consists of neonatal intensive care and special care baby units with approximately 25 incubators.

Study Period: Data were collected from January 1, 2018 to December 31, 2018.

Study Population: A total of 902 neonates were admitted to the neonatal unit during the study period. Among them, 123 neonates diagnosed with neonatal jaundice were included in the study.

Data Collection: Medical records of neonates with neonatal jaundice were reviewed using a predesigned data collection sheet. Collected variables included:

- Demographic data
- Gestational age

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- Birth weight
- Sex
- Mode of delivery
- Blood group of neonates and mothers
- Age at onset of jaundice
- Serum bilirubin level
- Risk factors
- Treatment modalities
- Outcomes

Diagnostic Criteria: The diagnosis of neonatal jaundice was established clinically and confirmed by total serum bilirubin measurement according to gestational age-specific nomograms.

Operational Definitions:

Prematurity: Birth before completion of 37 weeks of gestation.

ABO incompatibility: Neonates with blood group A, B, or AB born to mothers with blood group O with evidence of hemolysis.

Birth Asphyxia: Diagnosed according to Sarnat staging.

Data Analysis: Data were analyzed using Statistical Package for Social Sciences (SPSS) version 16. Continuous variables were expressed as mean ± standard deviation (SD), while categorical variables were presented as frequencies and percentages. Pearson correlation coefficient and chi-square tests were used when appropriate. A P-value <0.05 was considered statistically significant.

Ethical Considerations: Ethical approval was obtained from the institutional ethical committee of Zawia Medical Center.

Study Limitations: The retrospective design limited the availability of some laboratory investigations such as G6PD assay and direct Coombs test. Missing data in some medical records also represented a limitation.

Results

Prevalence of Neonatal Jaundice

During the study period, a total of 902 neonates were admitted to the neonatal unit at Zawia Medical Center. Among them, 123 neonates were diagnosed with neonatal jaundice, giving a prevalence of 13.6%.

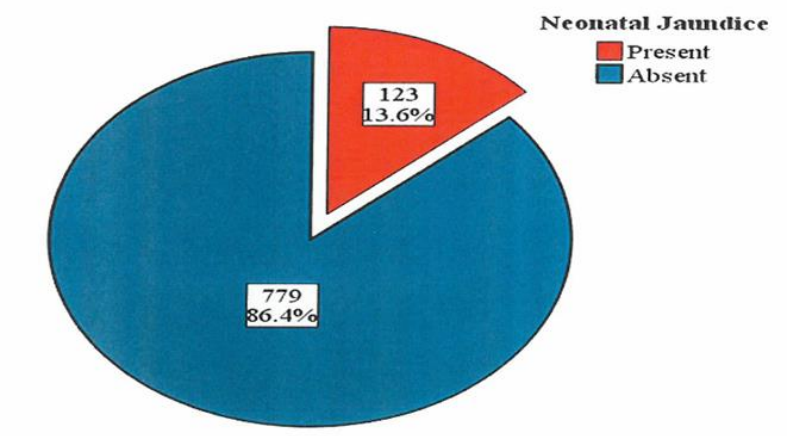

Figure 1. Prevalence of neonatal jaundice among admitted neonates at Zawia Medical Center, 2018.

Gender Distribution

Among the 123 neonates with jaundice, 63 (51.2%) were males and 60 (48.8%) were females, with a male-to-female ratio of approximately 1:1.

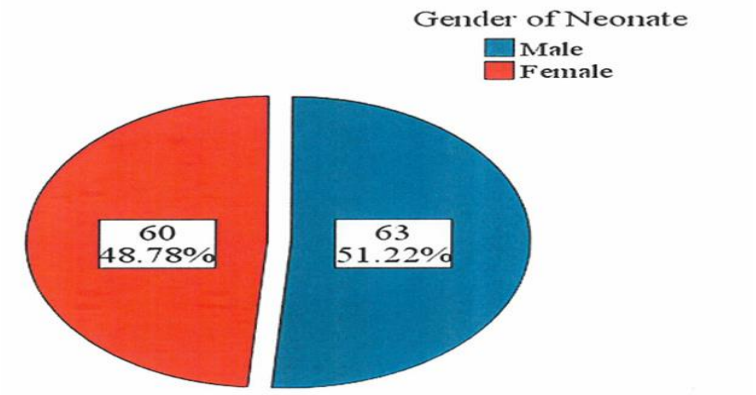

Figure 2. Gender distribution of neonates with jaundice at Zawia Medical Center, 2018.

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Birth Weight Distribution

Birth weight among neonates with jaundice ranged from 0.7 kg to 5.8 kg, with a mean birth weight of 2.5 ± 0.9 kg.

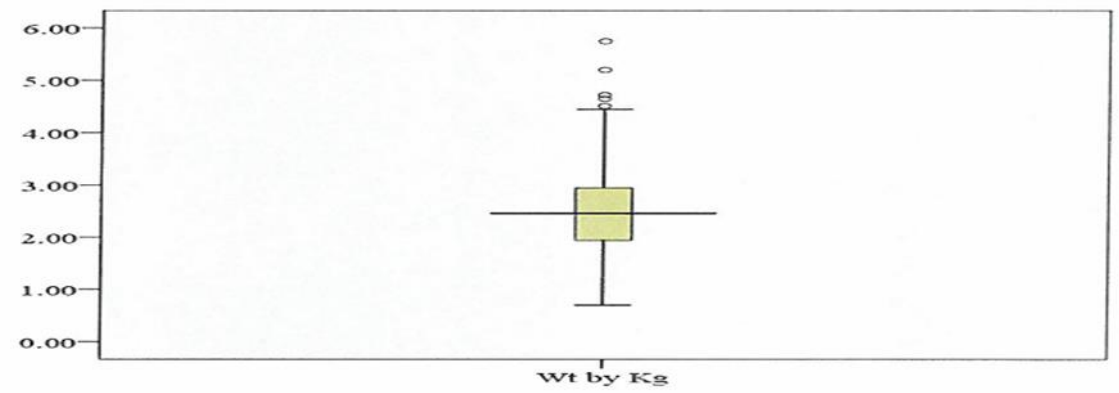

Figure 3. Distribution of birth weight among neonates with jaundice at Zawia Medical Center, 2018.

Low Birth Weight Status

Low birth weight (<2.5 kg) was observed in 63 neonates (51.2%), while 60 neonates (48.8%) had birth weights ≥2.5 kg.

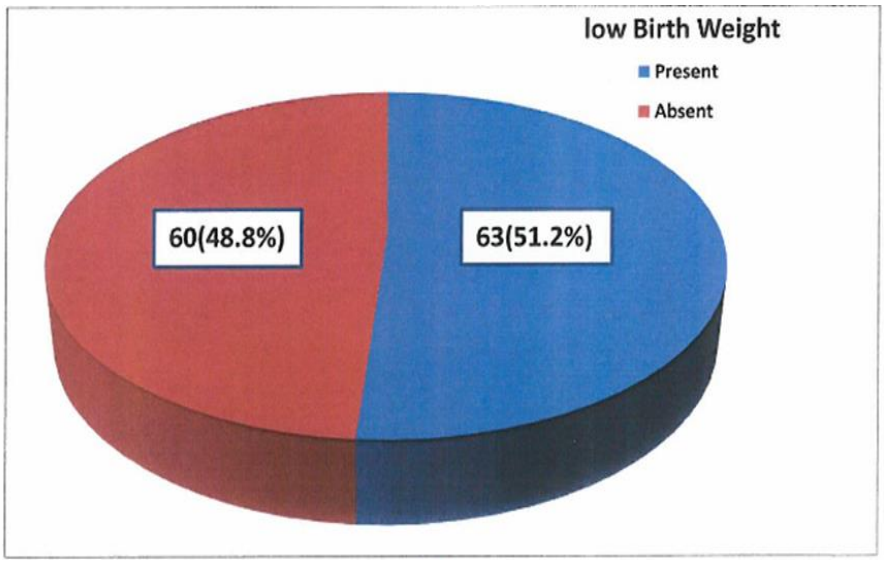

Figure 4. Distribution of low birth weight status among neonates with jaundice at Zawia Medical Center, 2018.

Gestational Age Distribution

Gestational age ranged from 26 to 42 weeks, with a mean gestational age of 35.0 ± 3.2 weeks.

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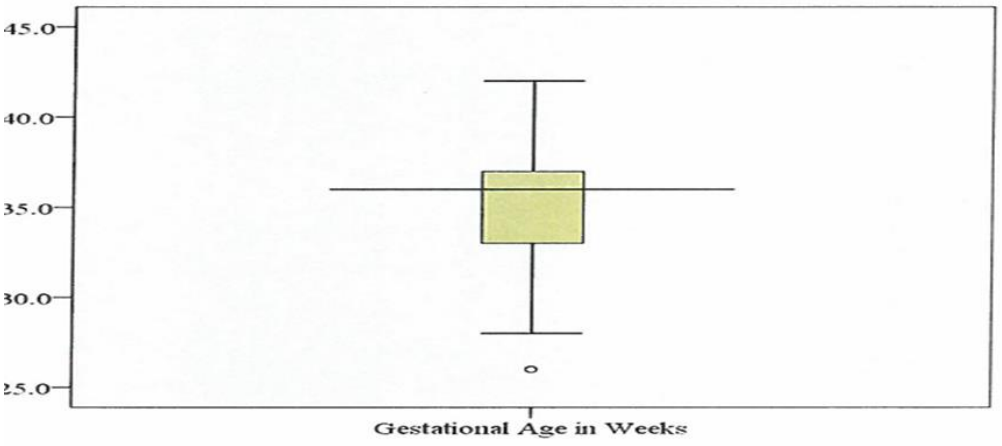

Figure 5. Gestational age distribution among neonates with jaundice at Zawia Medical Center, 2018.

Blood Group Distribution Among Neonates and Mothers

Blood group O positive was the most common blood group among both neonates and mothers, accounting for 44.7% and 48%, respectively.

Table 1. Blood group distribution among neonates with jaundice and their mothers at Zawia Medical Center, 2018.

Blood group	Neonate		Mother	
	No.	%	No.	%
O +ve	55	44.7	59	48
A +ve	29	23.6	31	25.2
B +ve	15	12.2	7	5.7
A –ve	6	4.9	6	4.9
O –ve	6	4.9	5	4.1
AB –kve	5	4.1	7	3.3
B –ve	2	1.6	3	2.4
No data	2	4.1	8	6.5
Total	123	100	123	100

Mode of Delivery

Cesarean section accounted for 84 deliveries (68.3%), while 39 neonates (31.7%) were delivered vaginally.

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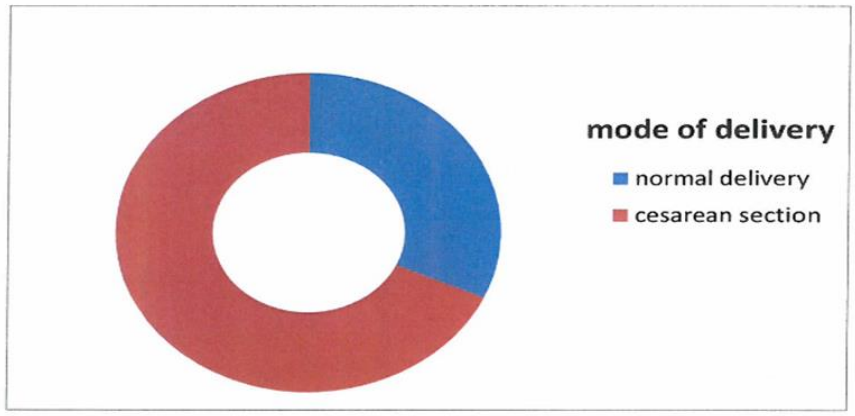

Figure 6. Mode of delivery among neonates with jaundice at Zawia Medical Center, 2018.

Serum Bilirubin Level According to Gender

Among male neonates, serum bilirubin levels ranged from 5.0 to 16.5 mg/dL, with a mean level of 9.0 ± 3.3 mg/dL. Among female neonates, serum bilirubin levels ranged from 5.1 to 21.5 mg/dL, with a mean level of 8.6 ± 3.2 mg/dL.

There was no statistically significant difference between males and females regarding serum bilirubin levels (P = 0.56).

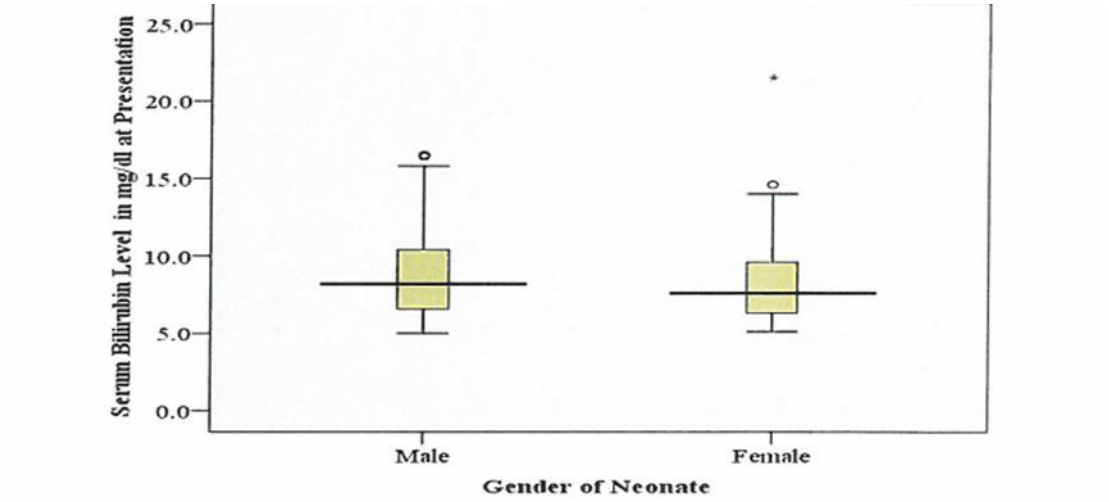

Figure 7. Serum bilirubin level according to gender among neonates with jaundice at Zawia Medical Center, 2018.

Age of Onset of Jaundice in Hours

The age of onset of neonatal jaundice ranged from 4 to 118 hours, with a mean age of 34.8 ± 20.7 hours.

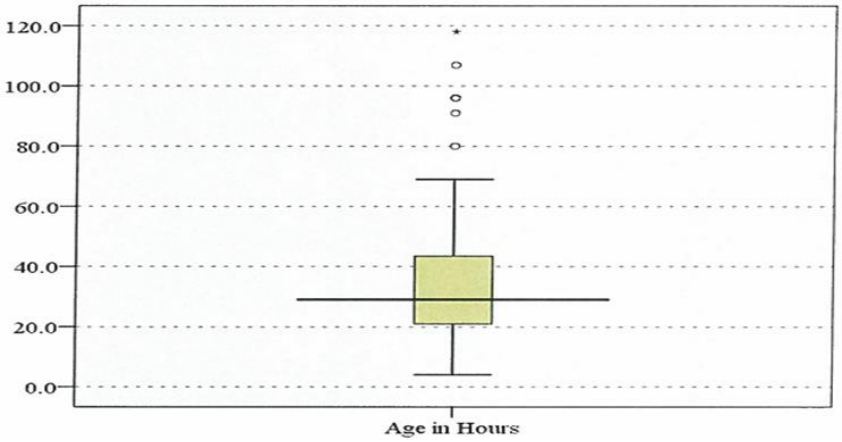

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Figure 8. Age of onset of neonatal jaundice in hours among neonates at Zawia Medical Center, 2018.

Age of Onset of Jaundice in Days

The highest frequency of jaundice onset occurred during the first and second days of life, accounting for 40.7% and 41.5% of cases, respectively.

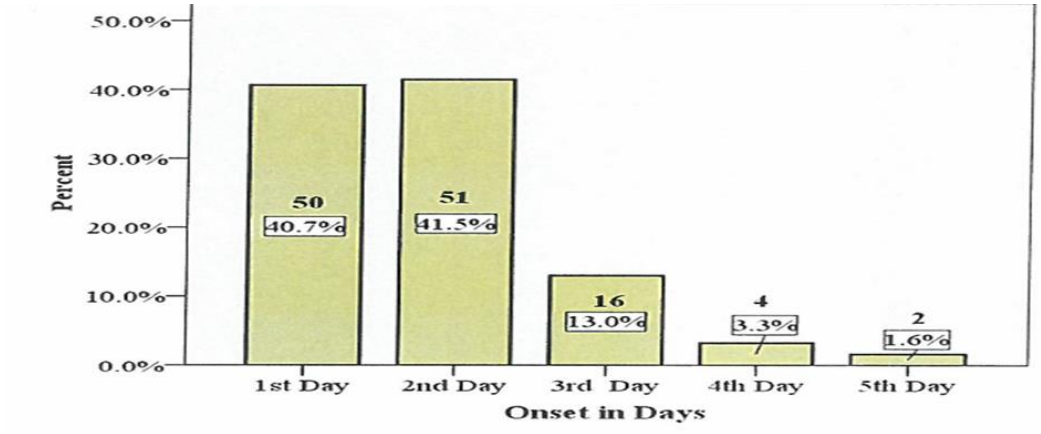

Figure 9. Age of onset of neonatal jaundice in days among neonates at Zawia Medical Center, 2018.

Serum Bilirubin Level at Presentation

Serum bilirubin levels ranged from 5.0 to 21.5 mg/dL, with a mean level of 8.8 ± 3.3 mg/dL.

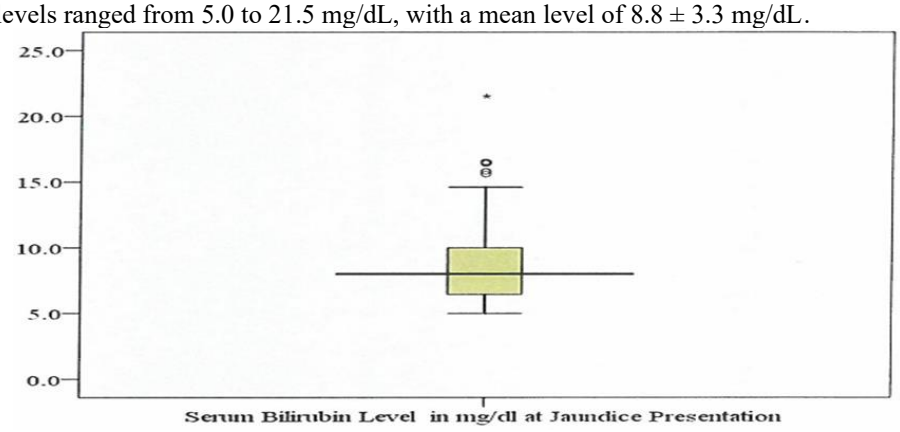

Figure 10. Serum bilirubin level at presentation among neonates with jaundice at Zawia Medical Center, 2018.

Correlation between Age of Onset and Serum Bilirubin Level

A statistically significant positive correlation was observed between age of onset of jaundice and serum bilirubin level ($r = 0.46$, $P < 0.001$).

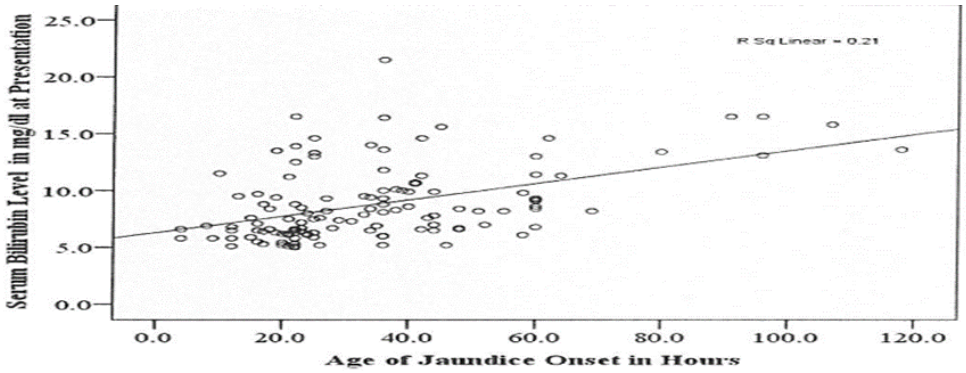

Figure 11. Correlation between age of onset of jaundice and serum bilirubin level among neonates at Zawia Medical Center, 2018.

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Treatment Modalities

Phototherapy alone was used in 69 neonates (56.1%). Combined phototherapy and intravenous albumin therapy were used in 44 neonates (35.8%), while exchange blood transfusion was required in 9 neonates (7.3%).

Table 2. Treatment modalities used among neonates with jaundice at Zawia Medical Center, 2018.

Type of intervention	No	%
Phototherapy	69	56.1
Phototherapy& Human albumin	44	35.8
Phototherapy& Human albumin& EBT	9	7.3
Without intervention	1	0.8
Total	123	100

Neonatal Sepsis Among Cases

Neonatal sepsis was identified in 58 neonates (47.2%), while 65 neonates (52.8%) had no evidence of sepsis. There was no statistically significant difference between male and female neonates regarding the presence of sepsis (P = 0.916).

Table 3. Distribution of neonatal sepsis according to gender among neonates with jaundice at Zawia Medical Center, 2018.

Sepsis	**Gender**					**Total**	
	Male			**female**			
	No.	**%**	**No.**		**%**	**No.**	**%**
Present	30	47.6	28		46.7	58	47.2
Absent	33	52.4	32		53.3	65	52.8
Total	63	100	60		100	123	100

Outcomes of Neonates with Jaundice

Most neonates recovered and were discharged in good condition (73.6%). Mortality occurred in 16.5% of cases, while 9.9% were discharged against medical advice.

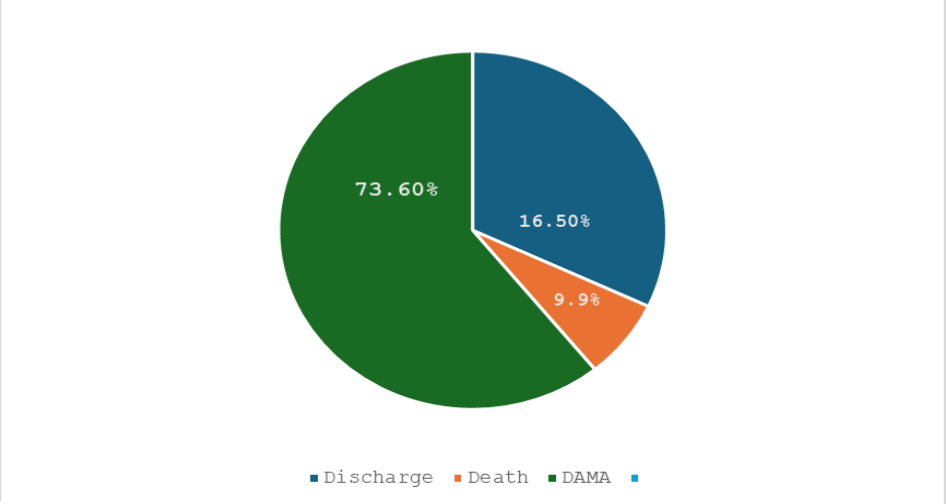

Figure 12. Outcomes of neonates with jaundice at Zawia Medical Center, 2018.

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Discussion

The prevalence of neonatal jaundice in the present study was 13.6%, which is comparable to several regional and international studies [10, 11]. However, the prevalence was lower than that reported in studies conducted in Benghazi and some African countries [12]. Differences in prevalence rates may be related to variations in study design, neonatal care practices, and population characteristics.

Male neonates represented slightly more than half of the study population, although no statistically significant gender difference was observed. Similar findings were reported in studies conducted in India and Nigeria [13, 14].

Prematurity was identified as the leading associated factor for neonatal jaundice in this study. Premature neonates are more susceptible to hyperbilirubinemia because of immature hepatic conjugation systems and increased red blood cell breakdown [15]. Similar findings were reported by Zabeen et al. and other investigators [16].

Neonatal sepsis was present in 47.2% of jaundiced neonates. Sepsis may impair bilirubin metabolism through hemolysis and hepatic dysfunction, thereby increasing serum bilirubin levels [17]. The frequency of sepsis in our study was higher than that reported in some previous studies [18].

Birth asphyxia was another major associated factor identified in this study. Hypoxic injury may interfere with hepatic bilirubin metabolism and contribute to severe hyperbilirubinemia [19].

ABO incompatibility accounted for 19.7% of cases, while Rh incompatibility was identified in 3.5%. The lower rate of Rh incompatibility may be attributed to routine administration of anti-D immunoglobulin during pregnancy.

Maternal diabetes, hypertension, and infection were also identified as contributing factors. Previous studies have demonstrated increased risk of neonatal jaundice among infants born to diabetic and hypertensive mothers [20, 21].

Phototherapy was the most commonly used treatment modality, consistent with current international recommendations [22]. Exchange blood transfusion was required in a relatively small proportion of cases.

The mortality rate in this study was higher than rates reported in some other studies [23, 24]. Most deaths were associated with severe prematurity, sepsis, and birth asphyxia rather than jaundice alone.

Conclusion

Neonatal jaundice remains a common cause of neonatal morbidity among newborns admitted to Zawia Medical Center. Prematurity, neonatal sepsis, and birth asphyxia were the most frequently associated factors.

Early identification of high-risk neonates, appropriate monitoring of bilirubin levels, and timely intervention are essential to reduce complications and improve neonatal outcomes.

Recommendation

1. Establish standardized protocols for early identification of neonates at risk of hyperbilirubinemia.
2. Promote parental education regarding neonatal jaundice and warning signs.
3. Strengthen antenatal and intrapartum care to reduce preventable risk factors.
4. Improve infection control measures within neonatal units.
5. Provide laboratory investigations such as direct Coombs test and G6PD assay.
6. Conduct multicenter studies in Libya to evaluate the epidemiology of neonatal jaundice.
7. Establish post-discharge follow-up systems for neonates at risk of severe hyperbilirubinemia.

Authors' Contribution

Hibah N. Alkhuwaylidi and Fathia A.M. Murabet contributed to study conception, design, data collection, analysis, interpretation, manuscript drafting, and final approval of the manuscript.

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Conflict of interest

The authors declare no conflict of interest.

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