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PREVALENCE AND ASSOCIATED FACTORS OF PREMATURITY IN NEONATES ADMITTED TO THE MAIWAND TEACHING HOSPITAL: AN ANALYTIC CROSS-SECTIONAL STUDY

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Abstract

Background: Globally, around 2.5 million neonates die each year, and prematurity accounts for the main cause of such deaths. The majority cases of prematurity occur in Asian and African countries. Some factors may increase the risk of prematurity and are known as the associated factors of prematurity. Since there was a paucity of data regarding the prevalence and associated factors of prematurity in neonates admitted to the Neonatal Unit of Maiwand Teaching Hospital, such a study was conducted. This study aims to assess the prevalence and associated factors of prematurity in neonates admitted to the Neonatal Unit of Maiwand Teaching Hospital during 2021-2022.

Method: This was an analytic cross-sectional study. SPSS software and appropriate statistical tests were used to analyze the data.

Results: Totally, 121 neonates admitted to the Neonatal Unit of Maiwand Teaching Hospital were evaluated, of whom 61.2% were boys and 38.8% were girls. The mean gestational age of newborns was 35.4±3.3, while the mean maternal Body Mass Index (BMI) was 24.5±4. In newborn babies who were admitted, the prevalence of prematurity was found to be 48.8% (late preterm babies account for 24%) in this study. Maternal age less than 20 year was significantly associated with prematurity (AOR=4.8, P-value=0.027). Furthermore, there were statistically significant associations between maternal BMI less than 18.5 (AOR=9, P-value=0.047) and more than 30 (AOR=1.6, P-value=0.01) with prematurity.

Conclusion: The prevalence of neonates with gestational ages of less than 37 weeks was higher in the Neonatal Unit, and more cases were late preterm. Maternal age less than 20 years, BMI less than 18.5 and more than 30 were significantly associated with prematurity.

Keywords: Newborn, Prematurity, Prevalence and Risk Factors.

1. Introduction

Prematurity is defined as the birth of a newborn before the gestational age of 37 weeks. Based on the World Health Organization (WHO) report, around 15 million neonates are born preterm annually, with 81% of them occurring in Asian and African countries. [1] Within 184 countries around the world, the prevalence of prematurity increased from 9.8% in 2000 to 10.9% in 2014. In 2017, around 2.4–2.8 million newborn babies died. The neonatal mortality rate in our country was estimated at 37 deaths per 1000 live births in 2019. [2,3] Prematurity is the main cause of neonatal morbidity and mortality, and one million neonatal deaths were reported due to prematurity in 2015.[4,5] Poor socio-economic status, less maternal age, previous history of prematurity, multiple gestations, gestational hypertension, antepartum hemorrhage, premature rupture of membrane (PROM), and urinary tract infections are found to be the associated factors of prematurity.[6-9] Since there was no scientific information regarding the prevalence and associated factors of prematurity in neonates who are admitted to the Neonatal Unit, a study was conducted to evaluate the prevalence and associated factors of prematurity in neonates who are admitted to the Neonatal Unit of Maiwand Teaching Hospital.

Problem Statement: According to the reports of UNICEF and WHO, 35% of neonatal mortality is due to preterm birth in our country. [2,3] Preterm infants are facing many complications, including hypothermia, hypoglycemia, hypocalcemia, respiratory difficulties, intraventricular hemorrhage, hepatic immaturity, intestinal necrosis, feeding difficulties, and a patent ductus arteriosus. If not managed properly, these complications may lead to neonatal deaths. [4] Up to date, the prevalence and associated factors of prematurity in neonates who are admitted to the Neonatal Unit of the hospital have not been evaluated. Therefore, there is a scientific gap regarding the mentioned issue.

Rationale: By finding the prevalence and associated factors of prematurity in neonates who are admitted to the hospital, the scientific gap regarding this issue will be filled. The current study found the prevalence and associated factors of prematurity in neonates who were admitted to the Neonatal Unit of Maiwand Teaching Hospital. These findings will be good sources for future studies, as well as the newborn babies were scientifically evaluated, diagnosed, and managed during the study period.

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2. Review of Literature

Live neonate born before the 37th gestational age is called premature; the gestational age is calculated from the first day of the last menstrual period.[4,6] According to the gestational age of neonates, preterm babies are classified into four categories. The first category, or late preterm, includes newborn babies with gestational ages of 34–36 weeks. The second category, or moderate preterm, consists of neonates with gestational ages of 32–33 weeks. The third category, or very preterm, includes newborn babies with gestational ages of 28–3 weeks. Fourth category, or extremely preterm, consisting of neonates with gestational ages of less than 28 weeks. [4] The prevalence of prematurity in various countries is different. In addition, numerous associated factors, including maternal age less than 20 years or more than 30 years, multiple gestations (twice, triple, or more), lower or higher maternal BMI, and PROM, may increase the risk of prematurity and are known as risk factors for preterm birth. [4-6] Premature babies are facing many complications, including hypothermia, hypoglycemia, hypocalcemia, respiratory difficulties, intraventricular hemorrhage, hepatic immaturity, intestinal necrosis, feeding difficulties, and a patent ductus arteriosus. If not managed properly, these complications may lead to neonatal deaths.[4] Many studies have been accomplished regarding the prevalence and associated factors of prematurity in neonates who are admitted to hospitals in other countries, with the following results:

In 2020, Hanif et al. conducted a study with the participation of 1691 newborn babies in Lahore, Pakistan. The study found a prevalence of 21%, and the associated factors of prematurity were identified as maternal age less than 20 years or more than 35 years. [6]

In 2020, Taha et al. carried out a study including 1610 neonates at Zayed University, United Arab Emirates. The prevalence of prematurity was found to be 6.3%, and its associated factors were maternal BMI greater than 30 and maternal age less than 20 years or more than 30 years. [7]

In Iran, Shrifzada et al. conducted a study, including 130 term and 130 preterm neonates, in 2007. The study demonstrated that maternal BMI greater than 30, PROM, maternal age greater than 35 years and less than 20 years, and a lack of maternal antenatal care were associated factors of prematurity. [8]

Jahan et al. conducted a study at Shahid Sadoghi, Iran, in 2011. The prevalence of prematurity was detected at 5.1%, and its associated factors were maternal BMI greater than 30, oligohydramnios, urinary tract infection, and PROM.[9]

3. Method and Materials

Study design: This is an analytic cross-sectional study conducted at the Neonatal Unit of Maiwand Teaching Hospital during 2020–2021. The study population consisted of all neonates who were admitted to the Neonatal Unit during the mentioned period. The participants were divided into two groups (study and control) for the assessment of associated factors. The study group was preterm neonates (less than 37 weeks of gestation), and the control group was term newborn babies (37–43 weeks of gestation).

Sample size and sampling method: Epi Info 7 was used for the calculation of the sample size. With a confidence level of 95%, an alpha error of 5%, a power of 80%, and a percentage of 18% outcome in unexposed neonates, the sample size was 121 neonates. The newborn babies admitted to the Neonatal Unit were selected by the census method.

Inclusion and exclusion criteria: All neonates who were admitted to the Neonatal Unit and had ages of 1–28 days were included in this study. The neonates without a complete medical record and the consent of their parents were excluded from the study.

Variables and definitions:

- Gestational age: The gestational age of the neonate was calculated from the first day of the last maternal menstrual period. Babies with gestational ages of less than 37 weeks are accepted as preterm, while those with gestational ages of 37 weeks or more are accepted as term neonates. According to the gestational age of neonates, preterm babies were classified into four categories. The first category, or late preterm, includes newborn babies with gestational ages of 34–36 weeks. The second category, or moderate preterm, consists of neonates with gestational ages of 32–33 weeks. The third category, or very preterm, includes newborn babies with gestational ages of 28–3 weeks. The fourth category, or extremely preterm, consists of neonates with gestational ages of less than 28 weeks.
- Sex: Demonstrated as boy and girl.
- Age of neonates: Demonstrated in days.
- Birth weight: The weight of newborn babies during their first 24 hours of life is accepted as birth weight and demonstrated in grams (g). According to their birth weight, neonates are classified into four categories. The first category, or normal birth weight, includes newborn babies with a birth weight of 2500–4000 g. The second category, or low birth weight, consists of neonates with birth weights of 1500–2999 g. The third category, or very low birth weight, includes newborn babies with a birth weight of 1000–1499. The fourth category, or extremely low birth weight, consists of neonates with a birth weight of less than 1000 g.
- Maternal age in year, height in centimeter and weight in kilogram.

Material: Balance was used to weigh the neonates and mothers. Tape was used to determine the height of the mothers. Medical records of neonates, computer, SPSS, and Epi Info software were used as materials in this study.

Statistical analysis: Initially, raw data were collected and then entered into a SPSS worksheet. The statistical analysis was performed using SPSS software. The prevalence of prematurity was calculated as the proportion of the total number of preterm babies and the total number of neonates who were admitted during the study period. The participants were divided into two groups (study and control) for the assessment of associated factors. The study group was preterm, and the control group was term newborn babies. Since a 95% confidence interval was used, the results with a p-value of less than 0.05 were accepted as statistically significant findings. Binary logistic regression was used to find the adjusted odd ratio (AOR) for the analysis of factors with three or more categories.

4. Results

This analytic cross-sectional study, including 121 neonates, was conducted at the Neonatal Unit of Maiwand Teaching Hospital during 2020-2021. From all neonates, 74 (61.2%) were boys and 47 (38.8%) were girls. The neonatal and maternal demographic characteristics are shown in Table-1.

	Characteristic	Mean	SD
Newborn	**Age in day**	11	8
	Weight in gram	2560	883
	Gestational age with week	35.4	3.3
	Age in year	26.2	4.5
	Weight in Kg	60	10.1

Mother	**Height in cm**	155.5	8.9
	BMI	24.5	4

Table-1: Neonatal and maternal demographic characteristic.

Categories of neonates	Number	Percentage
Term (37-42w)	62	51.2
Preterm (Less than 37w)	59	48.8
Late preterm (34-36 w)	29	24
Moderate preterm (32-33w)	17	14
Early preterm (28-31w)	9	7.5
Extremely preterm (less than 28)	4	3.3

Table-2: Prevalence of prematurity in different categories of preterm neonates.

Maternal variables	Preterm neonates (n)	Term neonates (n)	AOR	P-value
Categories of mothers according to ages in year				
1- Less than 20y				
2- 20-30 y	5	2	4.8	0.027
3- More than 30y	43	48	0.8	0.11
	11	12	1	0.9
Categories of mothers according to BMI				
1- Less than 18.5				
2- 18.5-24.9	8	1	9	0.04
3- 25-29.9	28	33	0.9	0.02
4- 30 or more	14	26	0.35	0.27
	9	2	1.6	0.01

AOR=Adjusted Odd Ratio

Table-3: The factors associated with preterm neonates admitted to the Neonatal Unit.

As shown in Table 1, the mean gestational age of neonates is less than normal, while the mean maternal BMI is within normal. Based on Table 2, the prevalence of prematurity was 48.8%, with the majority of cases being late preterm. Table 3 demonstrates that the risk of preterm birth was higher in mothers younger than 20 years old. This finding is statistically significant. No association was found between the 20–30-year age of the mother and prematurity. Furthermore, there was a significant association between prematurity and a BMI less than 18.5 and more than 30. Binary logistic regression was used to find the AOR and p-value.

5. Discussion

This analytic cross-sectional study, including 121 neonates, was conducted at the Neonatal Unit of Maiwand Teaching Hospital during 2020–2021. The objectives were to find the prevalence and associated factors of prematurity. From all neonates, 74 (61.2%) were boys and 47 (38.8%) were girls. The mean gestational ages of neonates were less than normal, while the mean maternal BMI was within normal (Table 1). The prevalence of prematurity was 48.8%, with the majority of cases in late preterm (Table 2). The risk of preterm birth was higher in mothers younger than 20 years old. This finding is statistically significant. No association was found between the 20–30-year age of the mother and prematurity. Furthermore, there was a significant association between prematurity and a BMI less than 18.5 and more than 30. Binary logistic regression was used to find the AOR and p-value (Table 3). Hanif et al. conducted a study on neonates who were admitted to Haj Wiry University Hospital during 2020. [6] The study found a 21% prevalence rate of prematurity. [6] A study was conducted by Taha et al. at Zayed University in the United Arab Emirates. A prevalence rate of 6.3% was found in this study. [7] After comparison, the prevalence of prematurity is notably higher in neonates who were admitted to our society than in the mentioned two studies. A probable reason for this difference will be the higher associated complications and illnesses with preterm infants who were admitted to our society. The second explanation for this divergence will be the difference in the study samples.

Sharifzadeh et al. conducted a study entitled (To identify the risk factor for prematurity in Birjan district, Iran) during 2007 in Iran. Maternal age less than 20 years was found to be a risk factor for preterm birth. [8] An observational study was conducted by Esposito in 2022 in Italy to find the role of maternal age on the risk of preterm birth among singletons and multiples. The study found maternal age less than 20 years as a risk factor for preterm birth. [10] Maternal age less than 20 years was also associated with prematurity in our study. Therefore, this finding was similar to the studies of Sharifzadeh and Esposito. According to the study of Taha et al. conducted at Zayed University, United Arab Emirates, maternal BMI greater than 30 was associated with prematurity. [7] This finding is similar to the index study. Based on a systematic review accomplished by Han et al., a maternal BMI less than 18.5 was associated with preterm birth. This finding is also similar to our study.

6. Conclusion

This study found a 48.8% prevalence rate of prematurity in neonates who were admitted to the Neonatal Unit of Maiwand Teaching Hospital. The majority of cases were late preterm babies. Maternal age less than 20 years was significantly associated with prematurity. Furthermore, there were statistically significant associations between maternal BMI less than 18.5 and more than 30 to prematurity.

Suggestions

1. As the prevalence of prematurity in neonates was found to be high, preventive measures are highly required to decrease the incidence of preterm birth.

2. Since maternal age less than 20 years is associated with prematurity, antenatal care in this mother group should be increased.
3. A BMI less than 18.5 was associated with prematurity; therefore, better maternal nutrition is highly required to decrease preterm birth.

Accessibility and authors' contribution: There is a Neonatal Unit at the Maiwand Teaching Hospital, from which the participants were selected. Professor Mansoor Aslamzai analyzed the outcomes and prepared the draft of the manuscript. Teaching assistant Abdulhakim Mokhlis provided the clinical record, collected the data, and helped prepare the manuscript. Associate professor Mohammad Farouq Hamidi and associate professor Ahmad Wali Ataye provided resources and reviewed the manuscript. All authors approved the final report.

Ethical consideration: This study was approved by the Department of Neonatology and Research Committee, KUMS. Verbal consents from parents were taken for the participation of their babies.

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