



Al- Kindy College of Medicine

Scientific Research/University of Baghdad

Epidemiological study of premature neonates in Baghdad

*A research project submitted to the Family & Community Medicine department
in Al-Kindy College Of Medicine as a partial fulfillment of research module*

3rd stage

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

وَقُلْ رَبِّ زِدْنِي عِلْمًا

صدق الله العظيم



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ABSTRACT

❖ Background

Prematurity refers to neonates who are born before completing 37 weeks of gestation. Preterm neonates are at high risk for various complications and health issues because their organs and systems are not fully developed. The care of premature neonates often requires specialized medical attention and advanced technologies, such as neonatal intensive care units (NICUs) It is a global epidemic

❖ Objectives

Epidemiological characteristics assessment of the premature neonates found in the preterm neonates That were diagnosed in Baghdad/Iraq.

❖ Method

A retrospective analysis was conducted on the medical records of preterm neonates admitted to the Neonatal Intensive Care Unit (NICU) in Baghdad during the period from November 2022 to January 2023 who were diagnosed with prematurity. The variables that were assessed from the records of the preterm neonates included their gestational age, gender, birth weight, mortality, length of neonatal stay in the NICU and demographics.

❖ Result

A total of 115 preterm neonates were admitted to the hospital, resulting in a prevalence of 7.5%. Descriptive analysis of the data revealed that 55% of the neonates were male. The extremely preterm neonates, defined as those born at less than 28 weeks' gestation, comprised 6.01% of the total cohort, while the very preterm neonates, born between 28 and less than 32 weeks' gestation, comprised 30.4%. The extremely low-birth-weight (ELBW) neonates, weighing less than 1000 g, accounted for 6.08% of the total cohort, and a certain percentage of them were discharged. The overall mortality rate was 6.9%, with the mortality rate for male neonates being 53%.The survival rate at the time of discharge varied between 50-95.8% relative to gestational age.

❖ Conclusion

The appraisal prevalence of preterm neonates in Baghdad is undeviating or steady with Several other studies world wide.

❖ Key words

Birth weight, Discharge, Gestational age, Neonates, Prematurity, Survival rate.

Introduction :

Prematurity refers to neonates who are born before completing 37 weeks of gestation. Preterm neonates are at high risk for various complications and health issues because their organs and systems are not fully developed. (1)

The care of premature neonates often requires specialized medical attention and advanced technologies, such as neonatal intensive care units (NICUs) It is a global epidemic, Every year, roughly 15 million preterm births take place throughout the world (2)

Nearly 11.1% of all pregnancies worldwide result in preterm birth. (3)

Premature babies are more likely to develop complications due to their anatomic or functional immaturity.

A general finding about mortality and morbidity in very low birth weight neonates is that the risk of developing complications decreases as gestational age and birth weight increase. (4)

Advances in prenatal and neonatal critical care have significantly improved the survival of very low birth weight neonates over the past two decades.

Preterm birth accounts for 28% of all early neonatal deaths (deaths within the first 7 days of life) that are unrelated to congenital malformations (5) The majority of ICU admissions during the first few days after birth are caused by prematurity.

Quantifying the prevalence and short-term complications of prematurity is crucial because ICU costs are high. This will enable logical planning, allocation of the most common etiologies, and effective management.

According to a study from 2005, preterm birth costs the USA alone more than US\$ 26.2 billion in lost productivity, medical expenses, and educational costs. (6)

Although this entity has been the subject of published research on a global scale, there are few studies currently available on the prevalence of prematurity in Iraq.

Nearly all of the published studies from this area are older and have issues with small sample sizes or a lack of a clear focus on preterm neonates.

The significance of such research is underscored by the scarcity of accurate quantitative data On prematurity in Iraq. (7-8)

Aim of the study:

The purpose of this study is to assess the prevalence of prematurity in The preterm neonates who were admitted to Iraq retroactively.

Methodology :

A retrospective analysis was conducted on the medical records of preterm neonates admitted to the Neonatal Intensive Care Unit (NICU) in Baghdad during the period from November 2022 to January 2023 who were diagnosed with prematurity.

The variables that were assessed from the records of the preterm neonates included their gestational age, gender, birth weight, mortality, and duration of neonatal stay in the NICU. It was determined that a total of 123 preterm neonates were admitted to the NICU during the study period. However, eight patients were excluded from the study because they were either born at a gestational age of 23 weeks or less or had a birth weight of less than 400g. Therefore, the final number of patients selected for the study was 115.

As the sole inclusion criterion for the study, the definition of preterm birth by the World Health Organization (WHO) was used. Any birth occurring before the completion of 37 weeks of gestation or less than 259 days from the first day of the woman's last menstrual period (LMP) was considered preterm.(9)

The study excluded preterm neonates with a gestational age of 23 weeks or less, or neonates weighing less than 400g at birth(n=8), with GA determined based on the first day of the last menstrual period.

Upon receiving approval from the Institutional Review Board (IRB) at the University of Baghdad's Al-Kindy Medical College, we procured the data from hospital records and subsequently imported it into MS Excel for further manipulation and cleaning of the data. This process was carried out with strict adherence to ethical guidelines and regulations governing the use of patient records for research purposes.

The exported data was transferred to the Statistical Packages for Social Sciences (SPSS) software, developed by IBM (IBM Corp., Armonk, NY, USA), for statistical analysis.

For the purpose of identifying prior related studies, a comprehensive search strategy was implemented utilizing the PubMed database, covering the period from 2010 to present. To conduct the search, a combination of controlled vocabulary and keywords was utilized, specifically focusing on the topics of prematurity, preterm births, and prematurity in the Baghdad region. The resulting search outcomes were meticulously reviewed by our research team. In addition, the references of the included studies were manually searched to identify any additional relevant studies.

In order to carry out this investigation, premature birth was categorized based on the duration of gestation into three groups: extremely preterm (<28 weeks), very preterm (28 to <32 weeks), and moderate or late preterm (32 to <37 weeks of completed gestation). (10)

This classification was adopted in accordance with the best practice guidelines on the subject. The Centers for Disease Control definition 14 was used to classify birthweight into five categories: extremely low-birth-weight (ELBW) with birth weight <1000g, very low-birth-weight (VLBW) with birth weight ranging between 1000-1499g, low-birth-weight (LBW) with birth weight ranging between 1500-2499g, normal birth weight (NBW) with birth weight ranging between 2500-3999g, and high birth weight (HBW) with birth weight equal to or greater than 4000g.

Mortality was operationally defined as the occurrence of death due to prematurity or any of its attendant short-term complications during the hospitalization period. Small for gestational age was defined as birth weight falling below the 10th percentile for the corresponding gestational age.(11)

The statistical analysis Involved the utilization of simple descriptive techniques to quantify the study variables. The study figures and results were summarized using graphical representations such as bar charts and tabular presentations.

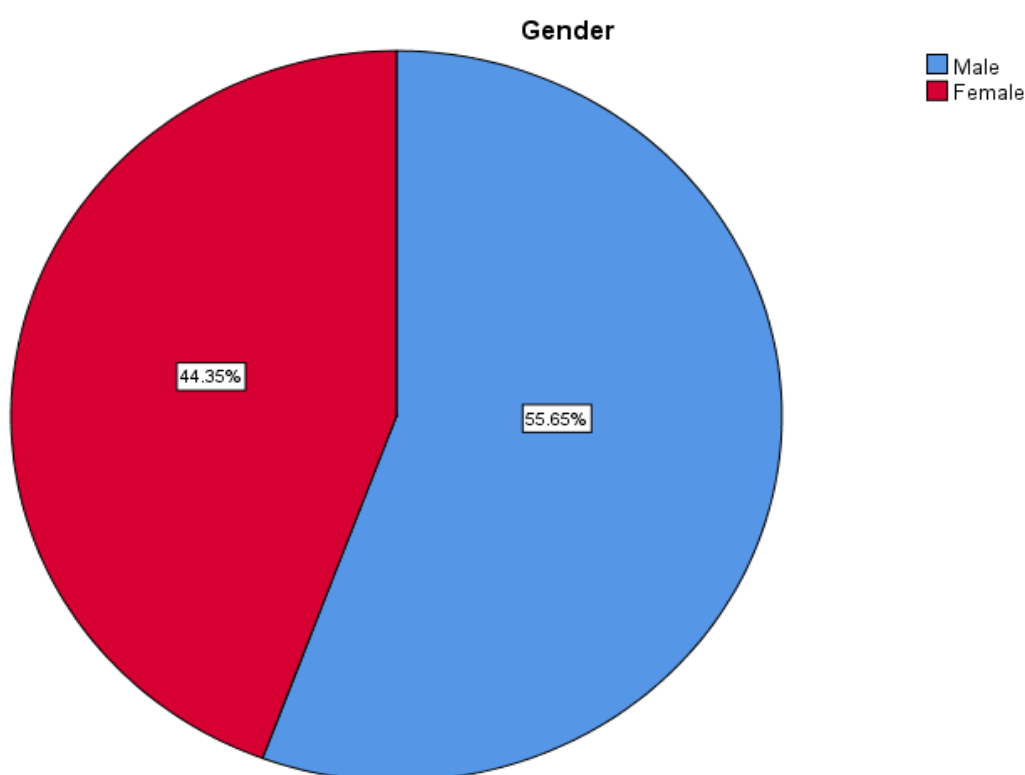
The characteristics of preterm neonates were compared based on both their gestational age and birth weight. The study's rate of preterm births was determined by including live birth numbers. For continuous variables, graphical and statistical methods were used to compare distributions.

Results:

After conducting a retrospective review of medical reports, it was determined that a total of 123 preterm neonates were admitted to the NICU during the study period. However, eight patients were excluded from the study because they were either born at a gestational age of 23 weeks or less or had a birth weight of less than 400g. Therefore, the final number of patients selected for the study was 115.

Figure 1

Displays the distribution and rate of preterm births depending on the gender.



Upon conducting a descriptive analysis of the demographic data of the preterm neonates, it was found that 64 of them were males (55.65%), and 51 of them were females (44.35%).

Table 1

Classification of the study population according to gestational age and birth weight.

Variables	n(%)
According to gestational age	
Extremely preterm (<28 weeks)	7(6.1)
Very preterm (28 to <32 weeks)	35(30.4)
Late preterm (32 to <37 weeks)	73(63.5)
According to birth weight (grams)	
Less than 1000 (ELBW)	7(6.08)
1000 to 1499 (VLBW)	38(33.04)
1500 to 2499 (LBW)	41(35.65)
2500 to 3999 (NBW)	28(24.3)
Equals to or more than 4000 (HBW)	1(0.86)
Total	115(100)
ELBW - extremely low-birth-weight, VLBW - very low-birth-weight, LBW-low-birth-weight, NBW - normal birth weight, HBW - high birth weight	

The study population consisted of 1,546 live births, with a total prevalence of preterm births at 7.5%. Among the study population, 15 neonates (7.6%) were classified as small for gestational age (SGA). As shown in table 1 The mean gestational age for the study population was 32 weeks and 4 days, while for extremely low birth weight (ELBW) neonates, the mean gestational age was 26 weeks and 3 days, with a range of 24-31 weeks. The mean birth weight of the total study population of preterm neonates was 1827.6g, while for ELBW neonates, the mean birth weight was 727.83g, with a range of 430g to 980g. The total number of ELBW neonates was n=7. Of these, 6.08% (n=7) were discharged from the NICU with a mean length of stay of 85.25 days (range: 57-188 days). The lowest birth weight of the discharged ELBW preterm neonates was 580g. The overall mortality rate was 6.9%. The mortality rate among male preterm neonates was 53%, while that among females was 47.2%.

Among neonates with birth weights <1000g, the mortality rate was 28.6%, while 8% of neonates with birth weights >1000g died prior to discharge. The survival rate per birth weight is presented in the table 2 below.

Table 2

Survival by birth weight classification, with scaled survival rates among ELBW neonates with 200 g increments.

Birth weight (grams)	Survival rate n (%)
below 999g (ELBW)	5/7(71.4)
below 599g	0/2(0.0)
600g to 799g	2/2(100)
800g to 999g	3/3 (100)
1000 to 1499 grams (VLBW)	35/38(92.1)
1500 to 2499 grams (LBW)	39/41(95.1)
2500 to 3999 grams (NBW)	27/28(96.4)
More than 3999 grams (HBW)	1/1(100)
Total	107/115(93.04)
ELBW - extremely low-birth-weight, VLBW - very low-birth-weight, LBW-low-birth-weight, NBW - normal birth weight, HBW - high birth weight	

The Table 3 below presents the survival rate per gestational age, which ranged from 50% to 95.8% for survival to discharge.

Table 3

Survival by gestational age, with scaled survival rates among extremely preterm neonates.

(age (weeks Gestational	(%) n Survival rate
(Extremely preterm (<28 weeks	(71.4)7/5
weeks' gestation 24	(50.0)2/1
weeks' gestation 25	(100)1/1
weeks' gestation 26	(100)1/1
weeks' gestation 27	(100)1/1
(Very preterm (28 to <32 weeks	(91.4)32/35
(preterm (32 to <37 weeks Late	(95.8)70/73
Total	(93.04)107/115

Discussion

The occurrence of preterm births has become a major public health concern worldwide, with approximately 11.1% of all pregnancies resulting in an estimated 14.9 million preterm neonates born in 2010. Among these preterm births, the majority (84%, or 12.5 million) occurred after 32 completed weeks of gestation.(3) This presents a significant challenge for the well-funded health, training, and social service sectors on a global scale. Unfortunately, prematurity now stands as the second leading cause of death in children under 5 years old and remains the single most significant risk factor for neonatal mortality and morbidity.(12)

Our study showed that 55.65% of the preterm neonates were males, which is consistent with the findings of most other studies (Results of other studies on this topic from New England, Aberdeen and Italy are within this range). (13) The reason for this male predominance, however, is not yet completely understood, but it is believed to be related to the effects of fetal sex hormones that may influence labor-inducing deliveries.(14) As our study focuses on the descriptive data of overall prematurity and low birth weight neonates, we are unable to compare our findings with any local studies. The estimated prevalence of prematurity in our study was approximately 7.5% during the study period. Upon conducting a comparison of our preterm births data with the preterm birth rates of the 10 countries with the highest prevalence of preterm births in 2010, as per the global estimates, we observed that our estimate of the preterm birth rate (7.5%) was significantly lower than the markedly high rates of preterm births reported by most of those nations, with the exception of China (7.1%).(3)Which can be listed as the second and based on the number of preterm births, and that is because of the high numbers of live births as compared with our study. In comparison to international statistics, our study demonstrated a higher proportion of preterm neonates across all gestational ages.

Specifically, the percentage of extremely preterm and very preterm neonates was 6.1% and 33.04%, respectively, as compared to international figures of 5.2% and 10.4%.(3) These findings suggest that there may be factors unique to our study population that contribute to a higher risk of preterm birth.

This phenomenon can be elucidated by the fact that our hospital serves as a referral center for high-risk cases and pregnancies, with 6.5% of our study population comprising external referrals post-delivery, predominantly represented by those with gestational periods of less than 32 weeks.

Furthermore, a substantial proportion of antenatal referrals pertain to high-risk pregnancies. The proportion of SGA neonates in our study population was (3.2%), which

exceeded the rates reported in the top 10 low-income and middle-income countries with the highest numbers of SGA neonates born in 2010 (ranging from 22.3% to 16%) found by lee et Al(15). This disparity can be attributed to our hospital's status as a referral center for high-risk pregnancies, with 7.6% of our preterm-SGA cases being referrals. Al-Alaiyan et al. (16) reported that Saudi very low birth weight (VLBW) neonates have a higher likelihood of being born as small for gestational age (SGA), which could be attributed to genetic

Factors, inadequate maternal nutrition, or suboptimal antenatal care and follow-up. In our study, out of the total preterm-SGA cases, (33.04%) were VLBW neonates, while another local study focusing exclusively on VLBW preterm neonates reported a rate of (30.2%) (17).

Globally, perinatal data from the National Institute of Child Health and Human Development (NICHD) Neonatal Research Network, spanning from January 1997 to December 2002, showed that the rate of preterm-SGA among very low birth weight (VLBW) neonates was (21%) (18). Our study found that (93.1%) of our study population survived until discharge. Among extremely low birth weight (ELBW) neonates, (6.08%) were discharged from the NICU, with an average length of stay of (85.25) days. Our study revealed that the mortality rate among male preterm neonates was (53%), whereas it was (47.2%) among female preterm neonates. These results indicate that females have a higher likelihood of surviving until discharge than males among extremely low birth weight (ELBW) neonates, which is consistent with the established consensus of the Neonatal Research Network (NRN) of The Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD) (19). Our study revealed that the lowest birth weight of the discharged extremely low birth weight (ELBW) preterm neonates was (580 g). Among neonates with birth weights below (1000 g), the mortality rate was (28.6%), whereas 5.21% of neonates with birth weights above (1000 g) died prior to discharge.

One of the strengths of this study is that we emphasized the survival rate of our population by 2 methods based on gestational age and birth weight. Based on birth weights, preterm neonates <1000 g were divided into 3 groups; those weighing 400-599g had a survival rate of 0.0% those weighing 600-799g had a survival rate 100%, and finally preterm neonates weighing 800-999g had a survival rate of 100%, Those weighing 1001-1100g had survival rate 80%, those weights 1101-1200g had survival rate 100%, those weighing 1201-1300g had survival rate 90%, those weighing 1301-1400g had survival rate 100%, those weighing 1401-1500g had survival rate 100% ,

almost 4 times improvement in chance of survival compared to those less than 600g National Institute of Child Health and Human Development Neonatal Research Network conducted a study to document the mortality and morbidity of neonates weighing between 501-1500 g at birth, based on gestational age, birth weight, and gender, during two time periods (1995-1996 and 1997-2002).

We compared our findings with those of the NICHD and observed a survival rate in preterm neonates by birthweight that was almost similar, except for neonates weighing 401-500 g. This difference in survival rate may be attributed to variances in study methodology or other factors.

We observed a continual increase in survival rates among preterm neonates, as demonstrated in Table 4 .

Table 4

Survival to discharge by birthweight in 100 grams increments.

Birth weight	Survival rate of neonates (%) in Baghdad - Al Elwya Hospital	NICHD Neonatal Research Network data Mean survival rate(%)
401g to 500g	0/1(0.0)	16
501g to 600g	0/1(0.0)	36
601g to 700g	1/1 (100)	61
701g to 800g	1/1 (100)	79
801g to 900g	2/2(100)	88
901g to 1000g	2/3(66.6)	92
1001g to 1100g	4/5(80.0)	92
1101g to 1200g	9/9(100)	94
1201g to 1300g	9/10(90)	96
1301g to 1400g	1/1 (100)	96
1401g to 1500g	11/11(100)	98
*Survival to discharge by birthweight in 100g increments among neonates born in National Institute of Child Health and Human Development (NICHD) Neonatal Research Network centers between Jan. 1, 1997, and Dec. 31, 2002, with center variability. ¹⁸		

This trend is attributed to the significant advancements in antenatal and neonatal intensive care concepts, including the implementation of strict policies and procedures, infection control measures, and the evolution of applied medical practices during the past two decades.

Additionally, the survival rate of preterm neonates varies by gestational age, depending on the specific population group. For instance, the survival rate of preterm neonates with a gestational age of 24 weeks was 50%, which was lower than the survival rate of preterm neonates with a gestational age of 27 weeks (100%).

A substantial increase in survival rate by gestational age was observed in preterm neonates of 28 weeks' gestation, with a survival rate of 91.4%. The survival rate from birth to discharge ranged from 50% to 95.8%, depending on gestational age. In comparison to the findings of three regional hospitals in the Kingdom, we discovered that our results on survival by gestational age were comparable with their results.

Limitation of study

The study was done in one hospital in Baghdad, so it does not cover a large Geographical area in Iraq and it has certain limitations that must be acknowledged. Firstly, the study enrolled a relatively small number of neonates. Secondly, since the study was conducted in a referral center that primarily deals with high-risk cases, the rates of prematurity and preterm-SGA observed in the study may be slightly exaggerated. However, efforts were made to separately analyze the results for both groups. Lastly, the study was conducted at a single center, which limits the generalizability of the results to all preterm neonates in Baghdad.

Conclusion

In conclusion, the present study provides estimates of the prevalence of preterm births in Baghdad and compares the epidemiological characteristics of prematurity with studies conducted in different regions across the globe. However, to determine the accurate prevalence and survival rates of prematurity in Baghdad, extensive retrospective and prospective studies at a national level are required.

Recommendation

Future studies including large sample size covering all the hospitals that have Premature neonates in Iraq are needed to accurately estimate the prevalence of Prematurity.

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