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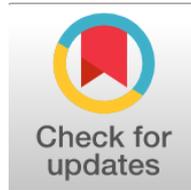
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## The Association between Maternal Risk Factors and Preterm Birth Outcomes in Mosul Maternity Hospitals: A Cross-Sectional Study: Hubungan antara Faktor Risiko Ibu dan Hasil Kelahiran Prematur di Rumah Sakit Bersalin Mosul: Studi Potong Lintang

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### Abstract

**General Background:** Preterm birth remains a major global obstetric concern and a leading contributor to neonatal morbidity and mortality, particularly in low- and middle-income countries. **Specific Background:** In Mosul maternity hospitals, maternal health conditions and obstetric characteristics may contribute to variations in gestational age and neonatal birth weight. **Knowledge Gap:** Limited local evidence exists regarding the association between maternal risk factors and neonatal outcomes among women delivering preterm in Mosul city hospitals. **Aims:** This study aimed to describe maternal characteristics, identify risk factors of preterm birth, and determine the relationship between these factors, gestational age at birth, and neonatal birth weight. **Results:** In a cross-sectional sample of 234 women, the mean gestational age was 31.42 weeks and the mean interpregnancy interval was 17.88 months. Excessive uterine activity (82.1%), vaginal infection (65.0%), and urinary and genital tract infections (59.0%) were the most prevalent conditions. Statistical analysis demonstrated highly significant associations between maternal risk factors and both gestational age and birth weight ( $p < 0.05$ ). Short interpregnancy intervals were significantly related to lower gestational age categories and increased proportions of low, very low, and extremely low birth weight neonates. **Novelty:** This study provides hospital-based empirical evidence from Mosul linking specific maternal conditions and birth spacing patterns with prematurity outcomes. **Implications:** Routine infection screening, management of uterine activity, and counseling on appropriate birth spacing are essential strategies to reduce adverse neonatal outcomes in maternity care settings.

**Keywords:** Preterm Birth, Maternal Risk Factors, Interpregnancy Interval, Neonatal Outcomes, Birth Weight

### Key Findings Highlights:

Excessive contractions and reproductive tract infections were highly prevalent among participants.

Significant statistical relationships were identified between maternal conditions and newborn measurements.

Short birth spacing corresponded with higher proportions of very early delivery and reduced neonatal mass.

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## Background

Preterm birth is still one of the most significant issues in obstetrics globally and is a major source of newborn illness, mortality, and childhood impairment (Rao et al., 2018).

Preterm birth (PTB) is the term used to describe any birth that occurs before 37 full weeks of gestation. Ten percent of these are considered iatrogenic, or initiated by the clinician (early induction or cesarean section for reasons related to the mother or fetus) (Fernandez Turienzo et al., 2020).

Preterm birth can be further divided into four categories: very preterm (less than 32 weeks), moderately preterm (32 to 34 full weeks), and extremely preterm (less than 28 weeks gestation). The terms "low birth weight less than 2500 g," "very low birth weight 1500 g," and "extremely low birth weight less than 1000 g" can also be used to characterize PTB (Baidaa A. Abdul-Rahman et al., 2018)

Almost 15 million of the approximately 130 million babies born each year are preterm, accounting for more than one in every ten births worldwide. Nevertheless, more than a million of these premature babies pass away in their first few days of life. Globally, preterm birth rates vary greatly; developing nations with low to middling incomes have the highest rates, whereas Northern Europe and Japan have the lowest rates (Omar et al., 2022)

While preterm birth accounts for 7-11 percent of pregnancies, it is the primary cause of 85 percent of newborn fatalities in infants with normal development and no congenital defects. Roughly 15 million preterm births occur out of the 130 million babies born worldwide each year. Preterm infants (less than 37 weeks) and extremely preterm infants (less than 32 weeks) have mortality rates that are 15 times and 75 times greater, respectively, than those of term neonates (Sifer et al., 2019)

The neonatal stage accounts for two thirds of all deaths that transpire within the first year of life. More than half take place in the first 24 hours following delivery, demonstrating how dangerous this period is for a newborn (Hockenberry et al., 2019).

Currently, mortality in the first four weeks of life accounts for 24-56 percent of all deaths in children under five, with the first week accounting for 75 percent of these deaths. Preterm birth accounts for around 35% of the 4 million newborn fatalities that occur annually, making prematurity the primary direct cause of neonatal mortality. These deaths occur primarily in low-income nations. Compared to newborns born at term, prematurely born children who survive the first few months of life have longer childhoods and experience delays in both growth and development (Juil et al., 2022)

Approximately 75% of preterm births occur spontaneously and have a complex aetiology. More than half of spontaneous preterm births (SPBs) have no known cause, although the risk factors for these births appear to vary depending on gestational age as well as social and environmental factors. Prematurity is most strongly predicted by a prior SPB. Further factors that have been linked to an increased risk of preterm births include the occurrence of infections during pregnancy, structural abnormalities of the uterus, particularly cervical insufficiency, a number of lifestyle conditions and habits (stress, strenuous work, standing work, alcohol and illicit drug consumption), young or advanced maternal age, short interpregnancy interval and low body mass index, and uterine over-distention with multiple pregnancies (Cobo et al., 2020)

Nurses assess a mother's health and labor indicators, collect specimens, measure contractions, and examine the fetus's size, maturity, and discomfort. They take action to control or prevent premature labor, provide medication, and monitor for adverse effects. They offer mental and physical assistance, ensure adequate water, and educate clients and their families (Perry et al., 2022)

### *The Importance of the study*

Pregnant women should consult their healthcare practitioner about potential risks of premature birth, which can be reduced through early and consistent prenatal care. Premature babies are at higher risk for long-term health issues, developmental delays, and cerebral palsy, with severity varying based on gestational age (Hoskote et al., 2022)

Premature birth rates vary globally, with developing countries having a higher prevalence (12%) compared to developed countries (9%). About 15 million babies are born preterm each year, with 81.1% occurring in Asia and sub-Saharan Africa (Adugna, 2022). Premature birth mortality and morbidity rates vary by region, and understanding risk factors is crucial for finding solutions. This study aims to identify these factors and reduce prematurity mortality and morbidity in Mosul city hospitals.

### *Objective of the study:*

1. To describe the demographic characteristics of study sample.
2. To identify risk factors and neonatal outcomes of preterm birth.
3. To find-out of relationship between the associated factor of premature with study results.

## Methodology

### *Administration Arrangements:*

The Nineveh Health Directorate and the nursing college's clinical science of nursing section provided formal administrative approval for the project before any data were collected. A thorough research design, a description of the suggested technique and data collecting, and gaining the required ethical approvals were all required steps in the approval procedure. Data collection started following the approved protocol as soon as administrative approval was given.

### *Design of the study:*

To accomplish the current study's objective, a quantitative technique using a descriptive, cross-sectional study design was used during the (from the 17th of November, 2022 to the 30th of March, 2023).

### *Sample and sampling:*

The study's sample was drawn from the Mosul hospitals using a straightforward random sampling technique. A total of (234) people were chosen, with (123) coming from the Al-Batool Teaching Hospital, (59) from the Al-Salam Teaching Hospital, and (52) from the Al-Khansa Teaching Hospital.

### *Setting of the study:*

The information was gathered from the obstetric units of three hospitals in Mosul, which is located in the northwest of the country in the core of the Nineveh Governorate, the second-largest city in Iraq (Al-Batool Teaching Hospital, Al-Khansa Teaching Hospital, and Al-Salam Teaching Hospital).

### *Data collection tools:*

The data was collected using the structured interviewing questionnaire that was composed of four parts. In the first part, the researcher posed questions concerning the demographics of the study participants such as age, marital status, level of education, their place of residence, job occupation, relationship between spouses, their height and weight, smoking habits, and whether they use any supplements. The second section included nine questions that concerned obstetrics history by the pregnant women. Part three contained 22 questions regarding the maternal risk factors of preterm birth. The fourth section was concerned with the categorization of the prematurity and delivery outcomes. The data collection tool was translated into Arabic to be used in the collection of data using the English language version.

### *Validity of the study:*

To ensure that the study tool is valid, ten specialists in different fields of nursing were chosen to evaluate it. Their ideas, opinions, and recommendations were included in the final version of the tool of the study.

### *Reliability of the study:*

To establish the reliability of the instrument, Cronbach Alpha on a set of respondents was used to test the instrument. The outcomes of the test were also analyzed with the help of appropriate statistical methods to test the consistency and reliability of the tool. Cronbachs Alpha reliability score was 0.82 which means that the instrument is very reliable and consistent.

### *Statistical analysis:*

To explain and analyze the study's findings, SPSS version 27 was used to analyze the data. Many statistical tests, both inferential and descriptive, were used to assess the statistical data. The data was interpreted and conclusions were drawn from using the test findings.

## Results

Variables	Minimum	Maximum	Mean	Std. Deviation
Age	15	42	26.35	6.341
Age at marriage	13	35	19.73	4.668
Height in cm	130	178	161.40	6.256
Weight in kg	46	128	69.78	13.148
Current gestation age (weeks)	21	37	31.42	4.156
Interpregnancy interval (months)	0	132	17.88	24.071
The number of multigravidas	0	15	2.67	2.947
The number of previous abortions	0	3	0.43	0.811
Address	Variables	Rural	Frequency	Percentage
		Urban	126	53.8
Educational level		illiterate	108	46.2
			44	18.8

	Primary	90	38.5
	Secondary school	76	32.5
	Institute and above	24	10.3
Occupation	Housewife	186	79.5
	Student	36	15.4
	Employed	12	5.1
Kinship between spouses	Relative	98	41.9
	Not relative	136	58.1
Smoking	Nonsmoker	140	59.8
	Passive smoker	86	36.8
	Active smoker	8	3.4
Antenatal care visits	No	94	40.2
	Yes	140	59.8
Gravidity	Primigravida	88	37.6
	Multigravida	146	62.4
Parity	Primiparous	88	37.6
	Multiparous	146	62.4
Mode of delivery	Cesarean section	42	17.9
	Normal vaginal delivery	192	82.1
Previous premature birth	No	202	86.3
	Yes	32	13.7
Previous Abortion	No	170	72.6
	Yes	64	27.4

Table 1. *Table 1: Description of Maternal characteristics*

this table shows that the mean age of study participants was 26.35 years, with a mean age at marriage of 19.73 years. they gave birth at a gestational age of 31.42 weeks and had an interpregnancy interval of 17.88 months. The majority of the individuals were multiparous and had undergone a normal vaginal delivery. Additionally, a significant proportion of the sample had no history of previous preterm birth.

No.	Items	Frequency		Percentage	
		No	Yes	No	Yes
1.	Physically strenuous work.	114	120	48.7	51.3
2.	Short stature.	218	16	93.2	6.8
3.	Neonatal anomalies.	206	28	88.0	12.0
4.	Infections of the urinary and genital tracts.	96	138	41.0	59.0
5.	Polyhydramnios.	206	28	88.0	12.0
6.	Oligohydramnios.	204	30	87.2	12.8
7.	Shortened cervix (<160 mm before 28 weeks gestation).	28	74	68.4	31.6
8.	Cervical anomaly.	224	10	95.7	4.3
9.	Cervical injury.	226	8	96.6	3.4
10.	Uterine anomaly.	218	16	93.2	6.8
11.	Uterine fibroid.	228	6	97.4	2.6
12.	Excessive uterine activity (contractions).	42	192	17.9	82.1
13.	Preterm premature rupture of the membranes.	122	112	52.1	47.9
14.	Thyroid disease.	224	10	95.7	4.3
15.	Diabetes mellitus.	220	14	94.0	6.0
16.	Hypertension.	192	42	82.1	17.9
17.	Anemia.	130	104	55.6	44.4
18.	Vaginal infection.	82	152	35.0	65.0
19.	Elevated D-dimer.	224	10	95.7	4.3
20.	Another medical disorder.	232	2	99.1	0.9

Table 2. *Table 2: Description of risk factors associated with prematurity*

This table shows that 120 mothers reported having physically strenuous work (51.3%), while 138 reported having infections of the urinary and genital tracts (59.0%). Moreover, 192 mothers had excessive uterine activity (82.1%), and 152 individuals had a vaginal infection (65.0%).

Variables	Sum of Squares	df	Mean Square	F	Sig.
Gestational Age Between Groups	29.064	11	2.642	3.870	0.000*
at birth Within Groups	151.552	222	0.683		