

Nursing Care for Pregnant Women at Risk of Preterm Labor and Its Impact on Pregnancy Outcomes

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Abstract

Background: A baby born after 20 weeks of gestation but before 37 complete weeks is known as preterm labor (PTL). Approximately one million children die each year due to complications of preterm labor. Providing a range of nursing interventions to mothers with the goal of identifying and modifying social and biomedical risks to improve mother's health and reach desired pregnancy outcomes. The incidence of preterm labor, adverse pregnancy outcomes, and risk factors can all be decreased with adequate nursing care. **The aim** is to evaluate the impact of nursing care for pregnant women at risk of preterm labor on pregnancy outcomes. **Research Design:** A quasi-experimental research design was employed in this study. **Setting:** Minia University Hospital's antenatal care department served as the study's location for maternity and child care. Antenatal care department divided in to highly dependency unit (HDU) and antenatal care unit. **Tools of data collection consist of:** interviewing questionnaire, preterm labor assessment, life style & activity assessment and pregnancy outcomes assessment. **Results:** It showed that nursing intervention that provided to study group was effective to reduce incidence of preterm labor to 15.3% delivered at 34 < 37 weeks gestation but in control group preterm labor at 34 < 37 weeks gestation reached to 44.0% P – value =.003.there were a high statistical differences in improvements of the study group compared to control ones regarding fetal outcomes as birth weight, Apgar scores (1st min), admission to NICU, neonatal jaundice, hypoglycemia, respiratory distress syndrome (RDS),and the needed for resuscitation (p-value ≤ 0.001). **Conclusion:** there were highly statistically significant improvement in pregnancy outcomes among study group after applying of nursing care intervention compared to the control group (p - value ≤ 0.01). **Recommendation:** Nursing care to prevent preterm labor handout should be written in a clear, simplified, and comprehensive explanation in order to raise the awareness of pregnant women regarding these issues **Keywords:** Nursing Care, Preterm Labor, Pregnancy Outcomes

Introduction:

Delivery prior to 37 weeks gestation is known as preterm labor (PTL). 15 million newborns are born prematurely out of the 130 million babies born worldwide each year. Furthermore, preterm continues to be a key factor in newborn and infant mortality as well as morbidity, and it also plays a big role in long-term negative health consequence. (Hassan, et al, 2022). The pregnancy index's gestational age affects the recurrence of preterm labor and varies depending on the clinical subtype. Also, it has been shown that when the gestational age in the pregnancy index is shorter, there is a higher likelihood of PTL in the following pregnancy. Previous studies have demonstrated that 30% of preterm births are medically indicated, and 70% of preterm births happen spontaneously. (Kalengo, et al. 2020).

Signs and symptoms of preterm labor include the following: gentle cramps in the abdomen, with or without diarrhea, a change in type of vaginal discharge watery, bloody or with mucus, an increase in the amount of discharge; dull back pain, persistently low pelvic or lower abdominal pressure, uterine tightening or contractions that happen frequently and are frequently painless. Water breaks with a gush or trickle of fluid due to ruptured membranes. (ACOG, 2020). Clinical findings include the presence of consistent contractions and cervical dilatation of at least 2 cm, or the presence of regular

contractions and a change in cervical dilatation, effacement, or both, are often used to diagnose preterm labor. Less than 10% of women who are clinically diagnosed with preterm labor give birth within a week of the diagnosis. (Suman &Luther., 2023).

Maternal risk factors for preterm labor in the general population include a history of multiple miscarriages or abortions, smoking cigarettes or using illicit drugs, infections, particularly of the lower genital tract and amniotic fluid, and cardio-metabolic diseases like diabetes or hypertension. Preterm labor risk factors include twin pregnancies, intervals of less than six months, and a history of premature labor. Conceiving through in vitro fertilization is an additional risk factor in a subgroup of women undergoing assisted reproductive technologies (ART). The risk factors that raise the possibility of premature labor. (Li, J.; Zhang, X.; Shen& J.; et al., 2022). Preterm labor can also result from a number of other factors, including stress, infection, placental abruption, placenta previa, substance abuse, history of preterm birth or abortion, poor prenatal care, smoking, low body mass index, poor nutrition, fetal anomaly, fetal growth restriction, oligohydramnios, polyhydramnios, vaginal bleeding, and premature rupture of membranes (PROM). (Luther & Suman, 2023).

A higher risk of maternal cardiovascular death and morbidity has been linked to preterm labor complications; these events usually occur years after delivery due to unknown causes, whereas fetal preterm labor complications include poor neurodevelopmental outcomes, cognitive impairment, motor impairments, cerebral palsy, weak development, and loss of vision and hearing. The risk factors increased with decreasing gestational age. (Cnatingius *et al.*, 2021).

Preterm labor can be prevented by providing adequate and proper antenatal care. High-risk mothers should be advised to rest and refrain from sexual activity. Antibiotic therapy for women with bacterial vaginosis and Prophylactic cervical cerclage could reduce some mothers' risk of preterm delivery. The preterm labor complications, such as breathing difficulties, intracranial bleeds, and jaundice, account for 24% of neonatal deaths in Africa (Abd-Elhakam *et al.*, 2022).

Preconception care packages that include nutrition and education, especially for girls, family planning services (like birth spacing and adolescent-friendly services), and prevention of sexually transmitted infections (STIs) can help to prevent preterm labor. Antenatal care packages as primary prevention, screening and management of STI, diabetes and hypertension, behavioral changes for all women to reduce risks associated with lifestyle choices; and specialized care for women who are highly susceptible to preterm labor. Policy assistance, such as smoking cessation and pregnant women's employment safeguards (Abd-Elhakam, *et al.*, 2020)

Nurses promote healthy lifestyles in addition to giving direct care to a large number of patients, act as patient advocates, and provide health education. Nurses are the first healthcare staff members who meet pregnant women when they arrive for prenatal care and follow-up appointments. Therefore, identifying pregnant patients who may be at risk of premature labor, ensuring that these patients are receiving effective treatments, and educating patients on behavior, lifestyle, and self-care modifications are all critical roles performed by nurses in antenatal care. Early warning signs and symptoms of preterm labor should be explained by nurses to expectant mothers who are at risk so they can identify the problem on their own and be admitted to the hospital in time for treatment. Nurses should therefore help the patient's husband and family in helping the pregnant woman to trying to conceive with an increasing in a gestational age or to be continued to term delivery. (Bahri and colleagues, 2021).

Significance of the study:

Numerous complications are linked to preterm delivery and are responsible for 36.3% of recorded infant deaths (WHO, 2018). Less than 23 weeks has a nearly zero survival rate, 15% at 23 weeks, 55% at 24 weeks, and 80% at 25 weeks (Abdelrhman *et al.* 2019).

Preterm labor occurs most frequently between 34 and 36 weeks of pregnancy; in 2018, the rate of late preterm labor was 7.28%; rose to 7.46% in 2019. The rate of early preterm labor at less than 34 weeks' gestation also increased, rising from 2.75% in 2018 to 2.77% in 2019 (Hamilton *et al.*, 2020). PTL is characterized by regular cervical changes and uterine contractions that start before 37 weeks of pregnancy. Almost half of all PTL will result in a premature birth. Premature birth affects 90% of developing countries, with Africa and Asia accounting for 85%. Furthermore, 0.9 million

premature birth cases have been reported in Latin America (Mohammadi *et al.* 2023).

According to the Healthy Newborn Network, 13% of births in Egypt occurred before their due date in 2017. Preterm labor incidence in 2018 was 28%, per a study done at Beni-Suef General Hospital and Fayoum University Hospital (Algameel, *et al.* 2020). So, the current study is crucial because it focused our attention on the importance of following nursing care to prevent preterm labor. Because receiving the adequate nursing care can help in lowering risk factors, improving the health of premature babies and delaying delivery until the fetus is mature enough to be born.

Aims of study:

This study aimed to evaluate the impact of nursing care for pregnant women at risk of preterm labor on pregnancy outcomes.

Research hypothesis

- H1- Women who are at risk of preterm labor and receiving nursing care during pregnancy will reduce their adverse pregnancy outcomes & expect to deliver within the expected time of delivery.
- H2- Nursing care provided during pregnancy will improve women's knowledge about preterm labor.
- H3 -Nursing care provided to pregnant women will achieve healthy life style during pregnancy.
- H4- A significant association will be between pre-test knowledge scores and their selected socio demographic characteristics regarding nursing care for pregnant women at risk of preterm labor.

Subject & Methods:

Research Design: A pretest and posttest quasi-experimental research design was used to accomplish the aim of the current study.

Research Setting: The study was carried out at antenatal care department in the minia university hospital for maternity and child, that divided in to highly dependency unit (HDU) and antenatal care unit.

Sample:

For this study, Purposive sample was recruited. The study group's sample size was 72 cases, while the control group's sample size was 75 cases.

The criteria for inclusion:

High risk pregnant women with preterm labor signs and symptoms, gestational age between 20 to 24 weeks, any pregnant women had risk factors may contribute to preterm labor.

Data Collection Tools:

The researcher developed data for the study after an extensive literature review and similar studies conducted elsewhere. There were four tools included in the data collection tool.

(Tool I): Interviewing questionnaire: was developed by (Abdelrhman, S, 2019), and after the researcher reviewed relevant literature, made modifications. It was applied to evaluate and gather information for three main parts.

Part I: women's sociodemographic characteristics include (age, marital status, residences, the educational level, occupational status of mother and body mass index), in addition to patient telephone number and relative number for follow up.

Part II: obstetrical history (past and present) including: (last menstrual cycle, gestational age, expected date of delivery, gravidity, parity, abortions, mode of delivery, history of preterm labor, and history of obstetric issues. In addition, data about any medication taken such as (tocolytics drugs, corticosteroid, antibiotics or progesterone).

Part III: women's knowledge about preterm labor (pre and post-test) such as (definition, sign and symptoms, causes, risk factors, and prevention).

Scoring system:

The women's answers regarding to knowledge about preterm labor was the score and computed. Each correctly answered was given a score of one, while incorrect answer or don't know was given a score of zero. There was a total score of six. After the conversion of the total knowledge scores into a percent score, they were categorized into three groups: poor knowledge (< 60%), average knowledge (score between 60% and 75%), and good knowledge ($\geq 75\%$).

Tool II: Preterm Labor Assessment Tool, it was consisted of two parts (pre/posttest):

Part I: Risk factors for preterm labor including:

Problems related to the current pregnancy, such as anemia, pregnancy-induced hypertension, vaginal infections, gestational diabetes, and having any health problems throughout pregnancy. Psychological factors include fear, anxiety and stress. Sexual factors include the nature sexual intercourse after pregnancy, times and number.

Part II: Signs and Symptoms of preterm labor:

Uterine contractions characteristics (frequency, intensity, location, and duration of pain). symptoms of pelvic pressure (more frequent and painful urination). Characteristics of vaginal discharge (type, quantity, presence or absence of bloody show), as well as the state of the membrane (rupture or intact).

Tool III: Life style & activity assessment sheet (pre/posttest):

It's a Likert scale was used to assess life style and daily activity include diet, personal hygiene, rest, physical activities, exercise, smoking, relaxation exercise, stress management, admission requirement and violence.

Scoring system:

According to Likert scale women's response divided into (always taking (2) score sometimes taking (1) score and never taking (0) score for healthy habit but for unhealthy habit. women's response divided into (always taking (0) score sometimes taking (1) score and never taking (2) score. Life style & activity assessment sheet contain 25 questions, total score 50 score (<25

score indicates to unhealthy lifestyle, ≥ 25 score indicates to healthy life style).

Tool IV: Pregnancy Outcomes assessment tool:

Which include assessment for maternal outcomes (gestational weeks during labor, mode of delivery, maternal complication during labor, post-partum bleeding, maternal death, as well as Evaluation of neonatal outcomes, including birth weight, admission to the NICU, Apgar score, neonatal death, stillbirth, congenital anomalies, neonatal complications, need for resuscitation or had neonatal respiratory distress syndrome).

Supportive material:

A comprehensive literature review was updated by the researcher, and then the final result was made into a handout (booklet). It was written in a straightforward Arabic and accompanied by a variety of descriptive photographs to improve the women's awareness of nursing care to achieve healthy lifestyle and increase their knowledge to prevent preterm labor.

Validity and Reliability:

Five specialists in obstetrics and gynecology, as well as nursing professors, piloted the questionnaire to determine its ease of use, understanding, applicability, comprehensiveness, and clarity. Necessary modifications were done to the tools. To establish reliability, The tools' internal consistency was examined using Cronbach's alpha test of 0.797.

Pilot study:

The current study tools were evaluated in terms of their clarity, validity, and the amount of time required to be used in a pilot study that ran over the first two weeks (8 cases) from the beginning of data collection. Necessary adjustment was made after the pilot project findings were analyzed. The pilot sample was included into the primary sample for the investigation.

Data collection procedure:

The current study was conducted in three phases: the assessment phase (pretest), the implementation phase (implementing nursing care), the follow-up phase, and the evaluation phase (post-test).

1-An assessment phase: (pre-test)

- Participants women were recruited from Minia university hospital for maternity and child, after obtaining an official permission from the research ethical committee of faculty of Nursing, director of the hospital. The researcher starts first meeting with greet each woman, introduce herself, explain the study's aims, duration, and activities and taken oral consent. The researcher was interviewed each woman individually in both group and fill the assessment sheet as present in (tool I, II, III). The questionnaire took between 15 and 30 minutes to complete for each woman for both groups. The researcher met pregnant woman for data collection two days per/week (six months for data collection and three months for follow up).

2-An implementation phase: (implementing nursing care program)

-After assessing pretest knowledge about preterm labor, life style and daily activity. each pregnant woman in the study group received necessary nursing care according to her diagnosis and chief complain. In addition to screening expectant mothers who may give birth before their due date, ensuring that these mothers receive appropriate care and treatment.

Two sessions during the day for study group (1st session for general knowledge about preterm labor, 2nd session for counseling about lifestyle and daily activity and how to reach to healthy lifestyle to prevent preterm. Provide education to expectant mothers who might experience premature labor so they can recognize early warning signs and symptoms on their own and visit the hospital in time for treatment.

Each session lasted between 35 and 40 minutes, depending on the woman's response. Various teaching techniques and methods, including the lecture and discussion methods were used. Also, supportive materials for knowledge clarification which include booklets, paner and brochure to facilitate understanding its content and clarification. moreover, an illustrated Arabic booklet was distributed to every woman in the study group. face to face approach to accomplish the purposeful aim and give the women the chance to pose questions, have discussions, achieve a high degree of understanding.

In a session, women's learning was improved through the use of motivation and reinforcement. At the end of the sessions, (10 minute) was assigned for the pregnant women to make sure the women received the most benefits possible by asking any questions and getting feedback. However, only routine hospital care was provided to the control group. Nine months, from May 2022 to January 2023, were used to gather the data.

3- Evaluation phase:

For every woman, three times of evaluations were conducted:

- First time of evaluation (pretest) was conducted before giving nursing care through using tools I, II and tool III to assess pregnant women at risk for preterm labor. Second time evaluation (posttest) done at 32-34 weeks gestation of pregnancy for both groups by using (part III in tool I, tool II and tool III) to evaluate the improvement in sign and symptoms and modifiable risk factor of preterm labor and life style modification and activity. Third time evaluation (posttest) done immediately after labor by using (tool V) for both groups to evaluate the impact of nursing care on pregnancy outcomes.

Administrative design :

Prior to conducting the main study and the pilot study, official authorization and approval were granted by the dean of the Faculty of Nursing and the director of the Minia University Hospital for Maternity and Child. The nursing faculty's ethics committee approved the research idea.

Ethical consideration:

The study is officially approved after the pregnant women who are willing to participate are informed of its significance, goal, nature, and purpose. There are no health risks, privacy was respected during data collection, and participants have the right to decline from participation and/or withdraw from it at any time without giving a reason. The participants were assured that the strictest confidentiality would be maintained regarding all of their information.

Statistical analysis:

SPSS (22) and excel for figures were used to tabulate, computerize, analyze, and summarize the acquired data in order to test study hypotheses. When the P - value was less than or equal to 0.01, it was deemed highly significant and the significance level was P - value < 0.05. Independent t test, Fisher exact test and chi test used to find the relation between total level of knowledge and lifestyle pre and post application of nursing care. correlation test used to detect the association between nursing care , healthy lifestyle and pregnancy outcomes.

Results:

Table (1): The study sample's distribution related to their sociodemographic characteristics:

Sociodemographic characteristics	study group (n=72)		control group (n=75)		Sig. test	P - value
	No.	%	No.	%		
Age (years)						
20-24yrs	15	20.8	11	14.7	X2= 6.456	.694
25-29yrs	30	41.7	36	48.0		
30-35yrs	10	13.9	10	13.3		
> 35yrs	17	23.6	18	24.0		
Mean ± SD	29.1 ± 3.1 years		28.5± 3.6 years		t= 2.357	.734
Residence						
Urban	14	19.4	33	44.0	X2= 4.169	.083
Rural	58	80.6	42	56.0		
Educational level						
Illiterate	10	13.9	7	9.3	X2=5.861	.320
Primary	11	15.2	8	10.6		
Preparatory	18	25.0	17	22.7		
Secondary	28	38.9	28	37.3		
University	5	6.9	15	20.0		
Occupation						
House wife	50	69.4	56	74.7	X2= 0.481	.488
Working	22	30.6	19	25.3		

Table (1): shows the mean age of both groups was 29.1 ± 3.1 and 28.5 ± 3.6 years respectively, 80.6% of the study group and 56.0% of the control group were from rural area, also 69.4% of the study group and 74.7% of the control group were housewives. Concerning to their educational level among both groups (38.9 % and 37.3% respectively) had secondary education.

Table (2): Distribution of study and control group regarding to their associated risk factors for preterm labor.

The associated risk factors for preterm labor	study group (n=72)		control group (n=75)		x ²	P - value
	No.	%	No.	%		
Medical factors:						
Vaginal infection	15	20.8	16	21.3	.021	.884
Anemia	54	75.0	52	69.3	3.142	.076
Pregnancy induced -hypertension	28	38.9	23	30.7	.537	.464
Gestational diabetes	13	18.1	20	26.7	1.278	.258
Urinary tract infections	11	15.3	15	20.0	4.822	.028
Obstetrical factors						
Bleeding from abruptio placenta	25	34.7	19	25.3	.054	.817
Placenta previa	42	58.3	37	49.3	2.584	.108
PROM	22	30.6	15	20.0	.351	.554
Polyhydramnios	5	6.9	3	4.0	.230	.632
Oligohydramnios	10	13.9	12	16.0	.537	.226
Psychological factors						
Fear from delivery	59	81.9	50	66.7	.188	.665
Fear from motherhood responsibility	34	47.2	26	34.7	2.773	.096
Fear on baby	61	84.7	57	76.0	.148	.701
Feeling of Anxiety	59	81.9	59	78.7	3.074	.087
Exposing to violence or psychological stress						
Yes	33	45.8	34	45.4	.255	.614
No	39	54.2	41	54.6		
Types of violence						
Physical violence	14	42.4	14	41.1	.254	.614
Sexual violence	8	24.2	12	35.3		
Psychological violence	11	33.3	8	24.2		
Sexual Factors						
Number of coitus after pregnancy						
Stopped	8	11.1	9	12.0	1.364	.243
Once per week	29	40.3	35	46.7	1.341	.247
Twice per week	23	31.9	17	22.7	6.173	.078
More than twice per week	13	18.1	13	17.3	2.343	.935
After Signs of Preterm Labor, coitus is stopped						
Yes	19	26.4	15	20.0	3.051	.081
No	53	73.6	60	80.0	2.824	.091

Table 2: reveals that anemia and pregnancy induced hypertension (PIH) more common medical factors among both groups study group (75.0%,38.9% respectively) and control group (69.3%, 30.7% respectively). Regarding to obstetric factors, in control group was 26.7%. Bleeding from abruptio placenta, placenta previa and PROM more common among study (58.3%, 34.7%, 30.6%) and control group (49.3%,25.3%,20%). In Psychological factors, (84.7%, 81.9% respectively) among study group feeling fear on baby and from delivery, (76.0%, 66,7% respectively) in control group had fear on baby and fear from delivery. (81.9% 78.7% respectively) among study and control group had feeling of anxiety. (45.8%, 45.4% respectively). Regarding to exposed to stress or violence (45.8%, 45.4% respectively) among study ad control group exposed to stress or violence, (42.4%, 41.1% respectively) of them exposed to physical violence among both groups. In Sexual Factors, (40.3%, 46.7% respectively) had once sexual relation per week after pregnancy among both groups.

Table (3): Distribution of the total knowledge levels about preterm labor between both groups before & after intervention.

Total knowledge level	study group (n= 72)		control group (n= 75)		t-test	P - Value
	No	%	No	%		
Before -intervention						
Poor	54	75.0	41	54.7	3.431	.834
Average	16	22.2	29	38.7		
Good	2	2.8	5	6.7		
Mean ± SD	1.95 ± .578		1.28± .816			
After - intervention						
Poor	11	15.3	39	52.0	12.595	.000
Average	8	11.1	30	40.0		
Good	53	73.6	6	8.0		
Mean ± SD	4.86 ± .923		1.56 ± .642			

Table 3: shows that (75.0%) had poor knowledge of women among study group before nursing intervention but after nursing intervention there were improvement in their knowledge as (73.6%) had good knowledge. However, (54.7%, 52.0% respectively) among control group had poor knowledge before and after routine hospital care. There were highly statistical significance differences between both groups post intervention as P – value ≤ .01.

Table (4): Distribution of signs & symptoms of preterm labor among both groups after nursing care intervention.

Signs & Symptoms of preterm labor	study group (n=72)		Control group (n=75)		P - value
	Post test (After 8wks).		Post test (After 8wks)		
	N	%	N	%	
Uterine contraction characteristics					
Regularity					
Irregular	54	75.0	41	54.7	.001**
Regular	18	25.0	34	45.3	
Intensity					
Mild	57	79.2	18	24.0	.007**
Moderate	7	9.7	32	42.7	
Strong	8	11.1	25	33.3	
Frequency:					
5minutes	4	5.6	7	9.3	.005*
10minute	8	11.1	17	22.7	
15 minutes	8	11.1	25	33.3	
>15 minutes	56	77.7	26	34.7	
Site:					
Abdomen	57	79.2	48	64.0	.009*
Back	4	5.6	15	20.0	
Back and Abdomen	11	15.3	12	16.0	
Feeling of Pelvic pressure					
Yes	19	26.4	59	78.7	.000**
No	53	73.6	16	21.3	
Rupture amniotic membrane					
Yes	8	11.1	16	21.4	.008**
No	64	88.9	59	78.6	
Vaginal discharge characteristics:					
Yes	18	25.0	35	46.7	.000**
No	54	75.0	40	53.3	
If yes,					
Color:					
White	14	77.7	11	31.4	.030*
Colorless	4	23.3	24	68.6	
Odor:					
Bad odor	3	16.7	4	11.4	.281 ^{NS}
Odorless	15	83.3	31	88.6	

Table 4: Demonstrates that after nursing care intervention, there were statistically significant differences between the study and control group's preterm labor signs and symptoms as (P-value $\leq .01$).

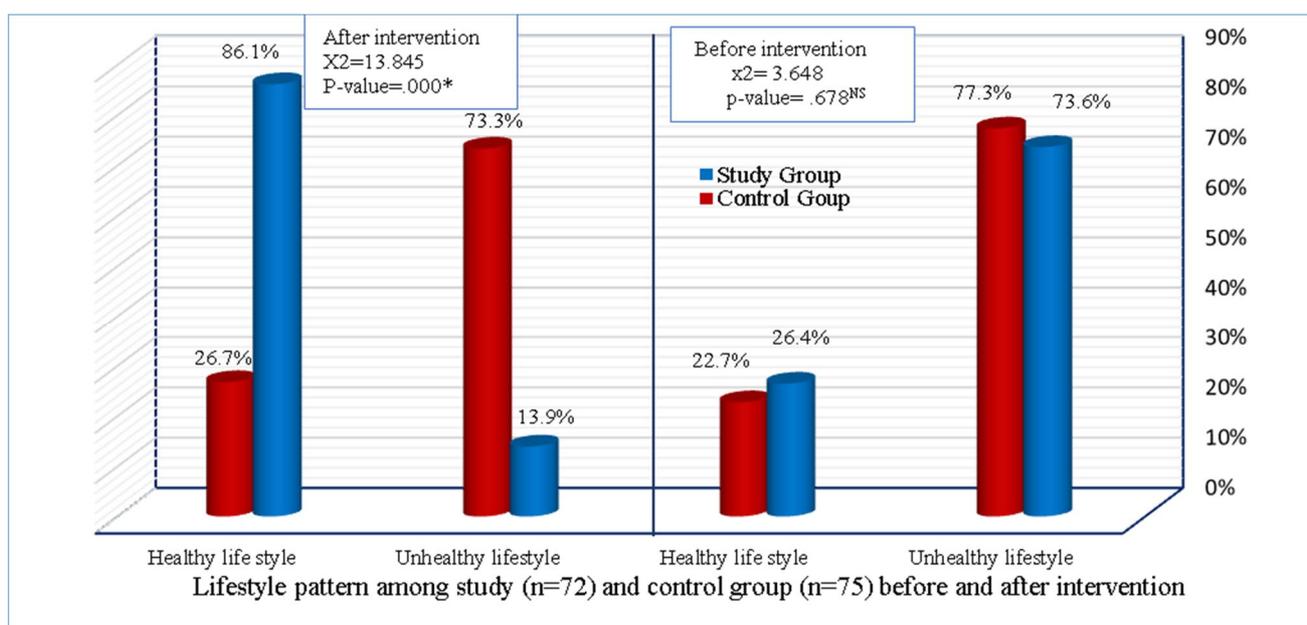


Figure (1): Distribution of the study and control groups related to total lifestyle pattern and activity before and after intervention

Figure (1): reveals that there were no statistically significant differences between the study and control groups related to total lifestyle pattern and activity before intervention as (p value 0.495). but there were statistical significance differences between the study and control groups after intervention (p value 0.000).

Table (5): Distribution of the women regarding to their pregnancy outcomes among both groups.

Maternal outcome	study group (n=72)		control group (n=75)		P - value
	N	%	N	%	
Gestational weeks during labor (incidence of preterm labor):					
34 - < 37 wks.	11	15.3	33	44.0	.003**
37- < 39 wks.	51	70.8	37	49.3	
39 - 42 wks.	10	13.9	5	6.7	
Mode of delivery					
Normal vaginal delivery	24	33.3	10	13.3	.000**
C.S	48	66.7	65	86.7	
Maternal complication during labor #:					
Bleeding during labor	3	4.2	16	21.3	.000**
Hypotension	5	6.9	15	20.0	.009**
Laceration or tear	3	4.2	8	10.7	.05*
Postpartum bleeding	1	1.4	7	9.3	0.4*
Puerperal sepsis	0	0.0	4	5.3	

#: refer to more than one answer

Table (5): shows that nursing care intervention that provided to study group was effective to reduce incidence of preterm labor to 15.3% delivered at 34 < 37 weeks gestation but in control group preterm labor at 34 < 37 weeks gestation reached to 44.0%. there were highly statistically significant differences between the study and control groups according to mode of delivery, maternal complication during labor and postpartum bleeding as P – value ≤ .01

Table (6): Distribution of women's regarding their neonatal outcomes among both groups.

Neonatal outcomes	study group (n=72)		control group (n=75)		P -value
	N	%	N	%	
Birth weight:					
< 2500g	6	8.3	22	29.3	.004**
≥ 2500g	66	91.7	53	70.7	
Admission to NICU:					
Yes	6	8.3	40	53.3	.000*
No	66	91.7	35	46.7	
Apgar score at 1minute:					
Normal	59	81.9	38	50.7	.001**
Abnormal	13	18.1	37	49.3	
Hypoglycemia	2	2.8	10	13.3	.000**
Neonatal jaundice	4	5.6	22	29.3	.002**
Respiratory distress syndrome (RDS)	4	5.6	26	34.7	.000**
Needed for resuscitation	1	1.4	10	13.3	.002**
Still birth	0	0.0	2	2.7	
Neonatal death	0	0.0	1	1.3	

Table (6): shows that after the implementation of nursing intervention, there were highly statistically significant differences on neonatal outcomes between the study and control groups as P – value ≤ .01.

Table (7): Correlation between total knowledge score and lifestyle pattern among both groups.

Item	Total knowledge score			
	Pre-intervention			
	study group		control group	
	r	P - value	r	P - value
Total Lifestyle pattern score	.136	.090	.100	.393
	Post-intervention			
	study group		control group	
	r	P - value	r	P - value
	.876	.000**	.114	.405

** the Correlation is significant at the 0.01 level (2-tailed).

Table (7): reveals that, after the intervention, there was a statistically significant positive correlation between the study group's overall knowledge score and overall lifestyle pattern score. as p value 0.000.

Table (8): Correlation between lifestyle pattern and maternal outcome among the study and control group.

Maternal Outcome	lifestyle pattern post intervention			
	study group		Control group	
	r	P - value	r	P - value
Gestational weeks during labor	.411	.000**	.011	.926
Mode of delivery	-.140-	.241	-.118-	.312
Bleeding during labor	-.220-	.051*	.010	.932
Hypotension	-.439-	.000**	-.160 -	.171
Laceration	-.245-	.038*	-.144 -	.219

** the Correlation is significant at the 0.01 level (2- tailed) * Correlation is significant at the 0.05 level (2-tailed).

Table (8): reveals that was a highly positive statistically significant correlation between lifestyle pattern among study group after intervention and gestational weeks during labor ($r=0.411$, p value.000) and there was negative statistical correlation between lifestyle pattern in study group after intervention and bleeding during labor, Hypotension and laceration ($r = -0.220$, $p = .051$, $r = -0.439$, p value.000, $r = -0.245$, p value.038).

Table (9): Correlation between total lifestyle pattern score and neonatal outcome among both groups.

Neonatal Outcome	Total lifestyle pattern score post intervention			
	Study group		Control group	
	r	P - value	r	P - value
Birth weight	.373	.001**	.144	.219
Admission to NICU	-.021-	.860	-.290-	.012*
Apgar score	.187	.115	.091	.436
Hypoglycemia	.106	.187	-.126-	.119
Neonatal jaundice	-.261-	.029*	-.287-	.018*
Respiratory distress syndrome	-.250-	.034*	.042	.718
Needed for resuscitation	-.028-	.327	-.125-	.128

** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level

Table (9): Demonstrates that after the intervention, there was a highly positive correlation between the study group's birth weight and the total life style pattern score, and there was negative statistically significant correlation between total life style pattern and neonatal jaundice and respiratory distress syndrome. In control group, there was negative statistical significate correlation between total life style pattern score and admission to NICU and neonatal jaundice.

Discussion:

Preterm labor, which starts before 37 weeks of pregnancy with uterine contractions and progresses to cervical dilatation and effacement, is the most common cause of premature birth. Preterm labor is dangerous because it results in the birth of a premature baby. Treatment for preterm labor focuses on risk assessment, screening, patient education, and the use of different regimens of tocolytic drugs. Education is provided to these mothers who adhere to lifestyle changes in order to extend their pregnancy to term. Preterm labor can be avoided with proper antenatal care. (Choudhary and colleagues, 2023)

Concerning the characteristics of the studied pregnant women revealed that nearly half among both groups of the pregnant women's age was between 25-29 years, while, more than three quarter in study group from rural area and more than half in control group from rural area. On the other hand, over two thirds of the pregnant women in both groups were housewife. According to Sabarenaa et al. (2020), these findings are supported whose research study "Diagnostic Performance and Discriminative Value of Serum Ferritin in Preterm Labor and PPRM" revealed that 37% of the study sample's age group were within the ages of 26 and 30. Furthermore, Hassan, A. M. (2022) conducted a study titled "Incidence of Preterm Infants, Indications of Admission, Risk Factors, and Discharge Outcome " which revealed that over half (52%) of pregnant mothers within the age range of 20 to 30 years old were employed, and over two thirds of pregnant women were housewives (75.7%).

Concerning to residence and occupation. These results inconsistent with Mohamed, H, et al. (2022) who study evaluation of the Incidence, Possible Risk Factors and Maternal & Neonatal Morbidity & Mortality in Cases of Preterm Labor at El Minya Maternity University Hospital and found that the majority of the women in the study were housewives (82%), more than two thirds came from rural areas (68.3%). This difference may be due to the difference of the inclusion criteria of studied population between two studies.

Concerning to educational level, the current study found that over one third of the pregnant women in both groups had completed secondary school. This result aligns

with a study by Shekho & Yalda (2022) titled preterm delivery: associated risk factors and neonatal outcomes in Duhok hospital for obstetrics and gynecology, which found that nearly one-third (30%) of the women in the study had completed secondary school. In addition, Hassan Nassar et al.'s (2020) study Risk Factors and Outcome of Preterm Labor in Pregnant Women Attending Zagazig Maternity University Hospital, found that 39.6% of the pregnant women in their study had completed secondary education.

Furthermore, according to Granés et al. (2023), the prematurity rate was 4.7% for those with low education, 3.7% for those with medium education, and 3.0% for those with higher education. Possible explanation for this similarity that low educational level usually accompanied with low awareness level about pregnancy care and follow unhealthy habit and lifestyle so may lead to preterm labor. Similar relationships between preterm labor and lower educational attainment have also been found in other studies. This shows that improved maternal education levels have a protective effect on the outcomes of births.

Regarding to the associated risk factors that lead to preterm labor. Related to medical problems, the current study found that anemia and PIH were more common medical factors among both groups. This result is reinforced by Gurung, et al. (2020), whose study the incidence, risk factors, and outcomes of preterm births in Nepal over course of 14 months. The researchers discovered a significant correlation between preterm labor and severe anemia during pregnancy. These results also corroborate the findings of Shekho & Yalda (2022), who discovered that PIH had a 2.3-fold higher chance of PL and that the risk of a preterm baby birth was 3.5 times higher in anemic women. This result indicated that these medical conditions cause harm to the health of pregnant mothers and the developing fetus that led to preterm labor.

Concerning to obstetrical factors, the current result revealed that antepartum hemorrhage (APH) and premature rupture of membrane (PROM) were common factors that lead to preterm labor among both groups. These findings agreed with those of Hassan, A. et al. (2022) and found that more common factors were PROM and APH that lead to preterm labor.

Related to Psychological factors, it was found that feeling of fear from delivery, fear on baby and feeling of anxiety were more common among both groups and near to half among both groups had exposed to psychological stress and violence. These findings agree with those of Abd El-Rhman et al. (2019) who study effect of Utilizing Nursing Care Guideline for Prevention of Preterm Labor and reported that Mothers who gave birth to preterm labor (PTL) were more than twice as likely to experience stress (66.7%, 75% respectively), fear (40%, 66.7% respectively), and anxiety (83%, 91.7% respectively) during pregnancy when compared to moms who had full-term births. These findings may contribute to that psychological factors participate in the occurrence of preterm labor as the studied women experienced anxiety from the fear thoughts about their fetus, life, and delivery which had indirect negative effect in the occurrence of preterm labor.

Regarding to exposing pregnant women to violence & stress, the current result reported that nearly half of women among both groups were exposed to violence & stress, more than one third of them among both groups had exposes to physical violence and around one third of them among both groups had exposed to psychological & sexual violence, and around to half among both group the common source of violence was husband. These findings are consistent with **Thompson, et al.'s (2022)** who study Effect of intimate partner violence in pregnancy on maternal and perinatal outcomes at the Korle Bu teaching hospital, Ghana and revealed that emotional violence was commonest (29.6%) and domestic violence was (31.1%), but the same author disagree with the current result which said that no sexual violence was reported among studied women. The current study results could encourage the implementation of optimized prenatal care programs and raise the awareness of intimate partner violence screening and brief advocacy. Potential for better antenatal care support or access to networks with better social support. Therefore, efforts to address maternal and newborn health need to include issues of violence against women.

Regarding to sexual factor, according to the current results, more than one third of both groups practice sexual relation after pregnancy once per week, and around to one quarter (26.4%, 20% respectively) among both groups stopped coitus after sign & symptoms of preterm labor appeared. **Abd El-Rahman et al. (2019)** disagrees with the current results who revealed that all women (100% in both groups) had their sexual relationships terminated when they showed signs and symptoms of preterm labor, and that more than three quarters (76.7%, 75%, respectively) of the women in the intervention and control group had sex once a week. Possible explanation that prostaglandins' direct effect in semen or as a result of orgasm can lead to the physical stimulation of the lower uterine segment, or endogenous release of oxytocin as a result of orgasm or from the direct action of prostaglandins in semen and cervical dilatation, uterine contractions, and labor duration were all significantly affected by prostaglandin hormone

Regarding to total women's knowledge levels about preterm labor, there was no statistical significant difference between the study and control group regarding to total knowledge level about preterm labor pre- intervention, compared to highly significant difference among both groups post intervention as (P -value < 0.001). It was explained that using effective learning methods and encouraging women to ask questions, participation and interactions along the intervention as well as the use of multimedia improve their

knowledge to achieve the study aims. So, educational programs appear to be fundamental in helping expectant mothers become more knowledgeable about preventing premature labor.

Abd-Elhakam et al. (2020), supported the current study's findings who reported that there was no statistically significant difference in knowledge between the study and control group prior to the program, but that there was a highly significant difference in knowledge about preventing preterm birth following the educational program. This further supports the findings of **Rahmani et al.'s (2023)** study Effectiveness of a Self-educational Module on Preterm Labor's Causes, Symptoms, and Prevention among Pregnant women in the OPD at particular hospitals in Kashmir, and found when pre- and post-test results were compared, it was evident that prenatal moms' knowledge had improved, with 30% of them having good knowledge and the remaining 70% having average knowledge.

According to women's total lifestyle and activity pattern score, there was no statistical significance difference before and after intervention of nursing care regarding total life style pattern and activity among the control group compared to the study group as there was significant improvements in all items of lifestyle pattern & activity after nursing care intervention (P – value ≤ .000). These results gave the attention toward the significant relation between lifestyle and risk of preterm labor.

These results align with the research conducted by **Abd El Rhman et al. (2019)**, who found that pregnant women's lifestyle and behaviors for preventing preterm labor pre and post utilizing of nursing care guideline among intervention group were highly statistically significant (p<0.001). Additionally, **Abd-Elhakam et al. (2020)** found no statistically significant difference between the study and control groups regarding the five main HBM constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers and cues) preprogram implementation. But after the program was implemented, there was a highly significant difference (p-values < 0.001) between the study and control groups for the five major HBM constructs. These finding can suggest to the development of tailored preterm birth prevention strategies.

The results of the current study showed that there were statistically significant differences in the maternal outcomes of their pregnancy between study and control groups after giving nursing care, moreover findings related to gestational weeks during labor revealed the majority of studied pregnant women delivered at term at 37-42 weeks gestation but in control group more than half delivered at term at gestational age 37-42 weeks of gestation.

These findings are consistent with **Wang et al.'s (2022)** study the Use of a Brief Antenatal Lifestyle Education Intervention to Reduce Preterm Birth, which found that 8.7% of women who attended the antenatal seminar had preterm birth. Also, **Rezaeean et al. (2020)** who study Effect of Prenatal Self-Care Based on Orem's Theory on Preterm Birth Occurrence in Women at Risk for Preterm Birth and revealed that there was a significant difference in the duration of pregnancy (p value 0.03) between the two groups. In other words, the duration of pregnancy was significantly longer in the intervention group. The similarity of these findings suggests that preterm labor risk and lifestyle have a substantial relationship.

Related to mode of delivery, the current study revealed that two third among study group and the majority of control group delivered C.S. (66.7%, 86.7% respectively). These finding disagree with **Sultana et al., (2023)** who studied Risk Factors and Foeto-Maternal Outcome in Preterm Labor and found that near to one third among case group delivered C.S (30%) compared to (16%) delivered C.S among control group.

Related to maternal complication during labor, it found that hypotension, bleeding (6.9%, 4.2%, respectively) in the study group. However, twenty percent from the control group had hypotension and bleeding during labor. These finding went inconsistent with (**Fernandez T et al, 2020**) in a study about experiences of maternity care among women at increased risk of preterm birth receiving midwifery continuity of care compared to women receiving standard care and found that 2.0% of studied women experienced intrapartum problems compared to 40.0% of the control group.

Regarding to postpartum complication, the current result revealed that only one case had PPH in the study group but 9.3% in the control group, and no cases of puerperal sepsis in the study group but 5.3% in the control group had puerperal sepsis. These results are in line with those of Omar, A. et al. (2022), who studied maternal risk factors associated with preterm births among pregnant women and reported (5%) of pregnant female had PPH after labor which include 1.0% from study group and (4.0%) from control group. These results inconsistent with **Sultana, et al., (2023)** and revealed that 4%o of cases had puerperal sepsis and 2% of control group had puerperal sepsis.

In relation to neonatal outcomes, related to neonatal birth weight, the majority of neonates that there in study group had ≥ 2500 g birth weight and more than two third of neonates that their mothers in control group had ≥ 2500 g birth weight. The current results disagree with **Shekho, A.H., & Yalda, M.A. (2022)** who revealed that the majority of neonates (96.0%) that their mothers in control group had ≥ 2500 g birth weight and only 5.5% of neonates that their mothers in study group had ≥ 2500 g birth weight.

In light of the current study's findings, over half of the neonate in the control group admitted to NICU but only 8.0% of the neonate of the study group that admitted to NICU. This disagrees with **Abdou, A. M. et al (2018)** who studied role of Vaginal Progesterone in Prevention of Preterm Labor in Women with Previous History of One or More Previous Preterm Births and showed that over one third (35.5%) of the neonates of the control group admitted to NICU and only 15.6% of the study group's neonate admitted to NICU.

Regarding to Apgar score at 1 minutes, the current result showed that over than three quarter of the neonate of the study group had normal Apgar score compared to over than half of neonate had normal Apgar score in control group. The current results disagree with **Shekho, A.H., & Yalda, M.A. (2022)** who found that at 1 minute, the majority of newborns in the control group (93.5%) had normal Apgar scores. However, the same author agrees with the findings of the current study, which show that 76% of the newborns in the study group had normal Apgar scores.

Regarding to neonatal complication, the current result revealed that 5.6% of neonates of study group had RDS and neonatal jaundice. however, over one-third of the newborns had RDS and over than one quarter had neonatal jaundice in the control group. only one of neonates of study group need for resuscitation and more than tenth of neonates of control

group need for resuscitation and only one neonatal death in control group. The current result disagrees with **Sultana et al., (2023)**, and found more than half (58%) of neonates of the case group develop complication but less than one quarter (24%) of the neonates in the control group develop complication. 18.0% of the cases and 2.0% of the controls both had stillbirths.4%neonatal death in the case group and 2% neonatal death in the control group. 2% of neonates had RDS in case group and 2% of neonates in control group had RDS. 90% of neonates of the case group need for resuscitation and 16% of neonates of the control group need for resuscitation.

The current study found there was a highly statistically significant positive correlation between total knowledge score and lifestyle pattern in the study group post-intervention (p value < 0.000), but there was no statistically significant relationship between the total knowledge score and total lifestyle pattern among both groups before the intervention. Possible explanation for this improvement is that women's interest in learning about the study topic may have contributed to it. This finding suggested that most pregnant women wanted and were able to educate and motivated to change unhealthy lifestyle to improve their pregnancy outcomes.

These findings are consistent with those of **Abd-Elhakam (2020)**, who found there was no statistically significant difference between the study group & the control group preprogram implementation, and that there was a positive statistically significant correlation between total knowledge and the total health belief model in the study group after program implementation.

Regarding to correlation between lifestyle pattern and maternal outcome among both groups, and shows there was a highly statistically positive correlation between lifestyle pattern among study group after intervention and gestational weeks during labor but there was negative statistical correlation between lifestyle pattern in study group after intervention and Bleeding during labor, Hypotension and laceration or tear. This agrees with **Teede and colleagues, 2022** who studied association of Antenatal Diet and Physical Activity Based Interventions with Gestational Weight Gain and Pregnancy Outcomes a Systematic Review and Meta-analysis and found that improvements in clinically prioritized mother outcomes are a positive correlation with the health benefits of pregnancy lifestyle interventions. Possible explanation that found that lifestyle interventions overall were associated with a reduced risk of total adverse maternal outcomes.

Regarding to correlation between lifestyle pattern score and neonatal outcome among both groups. The current study's findings demonstrated that after intervention, there was a highly statistically significant positive correlation between the total life style pattern score and the birth weight of the study group's neonate, but a statistically significant negative correlation between the total life style pattern score and the study group's RDS and neonatal jaundice. In the control group, the total life style pattern score and neonatal jaundice, and NICU admission were statistically correlated negatively. This agrees with **Teede and colleagues, 2022** who found that that physical activity-based lifestyle interventions and a structured diet during pregnancy were linked to a lower risk of preterm delivery, admission to intensive care for newborns, and overall poor outcomes for both mothers and newborns. The current results provide credence to the use of these

interventions in standard prenatal care and policy globally in order to preserve a healthy pregnancy and its consequences.

CONCLUSIONS

The present study findings concluded that:

Implementation of nursing care for pregnant women at risk of preterm labor was effective and showed significant improvements of the overall pregnant women's knowledge about preterm labor, achieve healthy life style and behaviors during pregnancy. As well as there were highly statistically significant differences in the study and control groups' signs and symptoms of preterm labor after nursing care intervention as $P - \text{value} \leq .000$. In addition, the incidence of preterm labor among the study group was (15.3%) compared to control group (44.0%) as $p \text{ value } 0.003$.

Recommendation:

The present study's findings suggest the following recommendations:

- Nursing care to prevent preterm labor handout should be written in a clear, simplified, and comprehensive explanation in order to raise the awareness of pregnant women regarding these issues.
- Maternity nurses should be aware with the importance of implementing nursing care program to high-risk cases of preterm labor and help in preventing it.
- Continuous educational program for nurses on prevention of preterm labor.
- Educating mothers on the importance of prenatal care and follow-up. Therefore, any problems can be identified early and treated.
- This study should be replicated with a larger sample size in different places to generalize its findings.

References:

1. Garg, S., Rustagi, R., Singh, M. M., & Engtipi, K. (2020). Effect of intimate partner violence on maternal and birth outcomes of pregnancy among antenatal clinic attendees in Delhi: a prospective observational study. *Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine*, 45(4), 501.
2. Abd El -Rhman S., Hassan S., Khedr N, 2019. Effect of Utilizing Nursing Care Guideline for Prevention of Preterm Labor IOSR Journal of Nursing and Health Science (IOSR-JNHS) e-ISSN: 2320-1959.p- ISSN: 2320-1940 Volume 8, Issue 2 Ser. II. (Mar. - Apr .2019), PP 60-70 www.iosrjournals.org DOI: 10.9790/1959-0802026070 www.iosrjournals.org 60.
3. Abd-Elhakam, E. M., Ramadan, E. A., El-Houfey, A. A., & Abd El haliem Said, S. (2020) Effect of an educational program based on health belief model on prevention of preterm birth among newly pregnant women. *International Journal of Management*, 11(10), 1029-1045.
4. Abdou, A. M. (2018). Role of vaginal progesterone in prevention of preterm labor in women with previous history of one or more previous preterm births. *Open Journal of Obstetrics and Gynecology*, 8(04), 329.
5. Algameel A, Elhawary M, Amin S, Abd-Elmenem M. Outcome of late preterm newborns in Upper Egypt. *Egyptian Pediatric Association Gazette* 2020; 68(1): 11. [<http://dx.doi.org/10.1186/s43054-020-00023-1>]
6. American College of Obstetricians and Gynecologists. (2020). Prelabor rupture of membranes (Practice Bulletin No. 217). *Obstetrics & Gynecology*, 135(3), e80–e97. <https://doi.org/10.1097/AOG.0000000000003700>.

7. Bahri Khomami, M., Walker, R., Kilpatrick, M., de Jersey, S., Skouteris, H., & Moran, L. J. (2021). The role of midwives and obstetrical nurses in the promotion of healthy lifestyle during pregnancy. *Therapeutic advances in reproductive health*, 15, 26334941211031866.
8. Choudhary, M. A., Sharma, M. E., Panthri, M. K., Motalikadesai, M. S., Patanwal, M. S., Ali, M. N. I., & Singh, M. R. (2023). Evaluate the effectiveness of a health instructional module on preterm labor knowledge and prevention among antenatal mothers in opd at a selected hospital at Jhansi, Uttar Pradesh. *Journal of Population Therapeutics and Clinical Pharmacology*, 30(17), 679-688.
9. Cnattingius S., Villamor E., Johansson S., Bonamy A., Persson M., Wikström A., Granath F., 2021. Maternal obesity and risk of preterm delivery. *JAMA*. 2021 Jun 12; 309(22):2362-70.
10. Fernandez Turienzo, C., Bick, D., Briley, A. L., Bollard, M., Coxon, K., Cross, P., Silverio, S. A., Singh, C., Seed, P. T., Tribe, R. M., Shennan, A. H., Sandall, J., & POPPIE Pilot Collaborative Group (2020). Midwifery continuity of care versus standard maternity care for women at increased risk of preterm birth: A hybrid implementation-effectiveness, randomised controlled pilot trial in the UK. *PLoS medicine*, 17(10), e1003350. <https://doi.org/10.1371/journal.pmed.1003350>
11. Gurung, A., Wrammert, J., Sunny, A. K., Gurung, R., Rana, N., Basaula, Y. N., ... & Kc, A. (2020). Incidence, risk factors and consequences of preterm birth—findings from a multi-centric observational study for 14 months in Nepal. *Archives of public health*, 78, 1-9.
12. Hamilton, B. E., Martin, J. A., & Osterman, M. J. K. (2020). Births: Provisional data for 2019. *Vital Statistics Rapid Release*, 8, 1–10. National Center for Health Statistics. <https://www.cdc.gov/nchs/data/vsrr/vsrr-8-508.pdf>
13. Hassan Nassar, H. A., Ali, A. E. S., Shazly, S., & Mansour, A. E. (2022). Risk Factors and Outcome of Pretrem Labor in Pregnant Women Attending Zagazig Maternity University Hospital. *Zagazig University Medical Journal*, 28(4), 686-693.
14. Hassan, A. M. (2022). Incidence of Preterm Infants, Indications of Admission, Risk Factors, and Discharge Outcome: A Retrospective Study. *The Open Nursing Journal*, 16(1).
15. Kalengo, N. H., Sanga, L. A., Philemon, R. N., Obure, J., & Mahande, M. J. (2020). Recurrence rate of preterm birth and associated factors among women who delivered at Kilimanjaro Christian Medical Centre in Northern Tanzania: a registry-based cohort study. *PLoS One*, 15(9), e0239037.
16. Li, J., Shen, J., Zhang, X., Peng, Y., Zhang, Q., Hu, L., ... & Hocher, B. (2022). Risk factors associated with preterm birth after IVF/ICSI. *Scientific Reports*, 12(1), 7944.
17. Mohamed, H. F., Mesabah, M., Haroun, H. M., & Mousa, S. R. (2022). Evaluation of the Incidence, Possible Risk Factors and Maternal & Neonatal Morbidity & Mortality in Cases of Preterm Labour at El Minya Maternity University Hospital. *Minia Journal of Medical Research*, 33(4).
18. Mohammadi S, Shojaei K, Maraghi E, Motaghi Z. The Effectiveness of Prenatal Care Programs on Reducing Preterm Birth in Socioeconomically Disadvantaged Women: A Systematic Review and Meta-Analysis. *Iran J Nurs Midwifery Res*. 2023 Jan 27;28(1):20-31. doi: 10.4103/ijnmr.ijnmr_57_22. PMID: 37250946; PMCID: PMC10215556.
19. Omar, A. I., Mohamed, A. D., Farah, M. G., Mahad, I. A., Mohamed, S. A., Dimbil, A. H., ... & Abdulkadir, U. A. (2022). Maternal risk factors associated with preterm births among pregnant women in Mogadishu, Somalia. *Children*, 9(10), 1518.
20. Rehamani, A., Sheikh, S. U., Wani, N., & Rasool, S. (2023). Effectiveness of a Self-educational Module on

- Preterm Labor's Causes, Symptoms, and Prevention among Pregnant women in the OPD at particular hospitals in Kashmir. *International Journal of Nursing Education and Research*, 11(1).
21. Rezaeean, S. M., Abedian, Z., Latifnejad-Roudsari, R., Mazloum, S. R., & Abbasi, Z. (2020). The effect of prenatal self-care based on orem's theory on preterm birth occurrence in women at risk for preterm birth. *Iranian journal of nursing and midwifery research*, 25(3), 242.
 22. Sabarenaa Tharini, N. (2020). *Diagnostic Performance and Discriminative Value of Serum Ferritin in Preterm Labour and PPRM* (Doctoral dissertation, Coimbatore Medical College, Coimbatore).
 23. Shekho, A. H., & Yalda, M. A. (2022). Preterm delivery: Associated risk factors and neonatal outcomes in Duhok hospital for obstetrics and gynecology. *Journal of Duhok University*, 25(2), 97-104.
 24. Sultana, D. T., Begum, D. R., Sweety, D. K., Khan, D. L. N., & Hossain, D. M. A. (2023). Risk Factors and Foeto-Maternal Outcome in Preterm Labour. *Sch Int J Obstet Gynec*, 6(6), 215-222.
 25. Suman V, Luther EE. Preterm Labor. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK536939/>
 26. Teede, H. J., Bailey, C., Moran, L. J., Khomami, M. B., Enticott, J., Ranasinha, S., ... & Harrison, C. L. (2022). Association of antenatal diet and physical activity-based interventions with gestational weight gain and pregnancy outcomes: a systematic review and meta-analysis. *JAMA internal medicine*, 182(2), 106-114.
 27. Thompson, N. N., Mumuni, K., Oppong, S. A., Sefogah, P. E., Nuamah, M. A., & Nkyekyer, K. (2023). Effect of intimate partner violence in pregnancy on maternal and perinatal outcomes at the Korle Bu teaching hospital, Ghana: An observational cross-sectional study. *International journal of gynaecology and obstetrics: the official organ of the International Federation of Gynaecology and Obstetrics*, 160(1), 297-305. <https://doi.org/10.1002/ijgo.14375>
 28. Wang, N., Lu, J., Zhao, Y., Wei, Y., Gamble, J., & Creedy, D. K. (2022). The Use of a Brief Antenatal Lifestyle Education Intervention to Reduce Preterm Birth: A Retrospective Cohort Study. *Nutrients*, 14(14), 2799.
 29. World Health Organization. (2018). Fact sheet on preterm birth. <https://www.who.int/news-room/fact->