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Nursing care for pregnant women at risk of preterm labor and its impact on their knowledge and lifestyle pattern

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Abstract

Background: Preterm labor is a critical public health problem. The management and prevention of preterm labor will commence upon the identification of women who are susceptible to this complication. In order to prevent preterm labor, the maternal lifestyle is thought to be a modifiable factor. Reduced risk of preterm labor was linked to a healthy prenatal lifestyle and several low-risk modifiable factors. The provision of nursing care delays the occurrence of preterm birth by preventing preterm labor until it reaches a stage of fetal development that can survive in the outside environment and improve the health of preterm babies.

The aim: Evaluate the impact of nursing care for pregnant women at risk of preterm labor on their knowledge and lifestyle pattern.

Research Design: The current study used a quasi-experimental research design.

Setting: The highly dependent unit (HDU) and antenatal care unit of Minia University Hospital for maternity and children.

Tools: The first tool is the Interviewing Questionnaire, and the second tool is the Preterm Labor Assessment Tool. The third tool is lifestyle & activity assessment.

Results: Implementation of nursing care improved women's knowledge effectively as (73.6%) had good knowledge among the study group post-intervention compared to 8.0% among the control group had good knowledge after routine hospital care. 86.1% of women achieved healthy lifestyle pattern and activity after nursing care in the study group compared to (26.7%) in the control group after routine hospital care.

Conclusion: There was a high statistical improvement in women's knowledge among the study group compared to the control group (p -value ≤ 0.001), and there was a high statistical significance improvement in women's lifestyle pattern and activity after implementation of nursing care among the study group compared to control group as (p -value ≤ 0.000).

Recommendation: Nursing care to prevent preterm labor handout should be written in a clear, concise, and thorough explanation to increase pregnant women's awareness of these issues.

Keywords: Nursing care, preterm labor, pregnancy outcomes

Introduction

Premature labor may result in long-term disability and perinatal death. It is one of the clinical events that has the potential to turn a normal pregnancy into one that is dangerous for the fetus and the mother. Labor that starts earlier than 37 complete weeks or occurs 259 days from the start of the preceding menstrual cycle is referred to as preterm labor. It can be identified by increased uterine irritability before 37 weeks of gestation, as well as cervical effacement and/or dilatation. The probability of a negative outcome is inversely correlated with the newborn baby's weight and gestational age. Preterm labor is the primary cause of perinatal morbidity and death globally, occurring in 5% to 10% of pregnancies^[1].

Preterm delivery in Egypt is estimated to be less than 10% of the general population. Various factors cause preterm labor, but all share a common pathway that increases the release of prostaglandins and cytokines from the cervix, myometrium, and fetal membranes.

Infection or inflammation, uterine hyperdistension (As in polyhydramnios and multiple pregnancy cases), or chorion-decidual hemorrhage (as in abruption cases) can all cause the release of prostaglandins [2].

Risk factors of preterm labor include demographic traits, behavioral factors, and other elements of obstetric history. A history of previous preterm labor, infections, smoking, poor nutritional status, maternal complications such as pregnancy complications (pre-eclampsia, antepartum hemorrhage, premature rupture of membrane), and uterine anomalies like cervical incompetence and uterine malformation, fetal complications like intrauterine death and placenta previa, and iatrogenic and idiopathic causes are the main risk factors for preterm labor include [4].

Preterm labor warning signs and symptoms include having four or more uterine contractions in an hour prior to 37 weeks of gestation. Cervical shortening and effacement are signs of true labor, not false labor. Additionally, heavy pelvic pressure, back or abdominal pain, or vaginal bleeding during the third trimester may be signs of an impending preterm labor. Infants born prematurely have an increased risk of cerebral palsy, developmental delays, hearing issues, and visual impairments. The earlier a baby is born, the higher the risks [4].

Antenatal care (ANC) comprises health promotion and education, prevention, and management of diseases related to or occurring concurrently with pregnancy, and risk assessment and screening. According to international guidelines, reducing the risk of maternal and perinatal mortality during the antenatal period involves regular medical care visits [5]. Enhancements in prenatal care quality, appropriate coordination, and comprehensive care during labor have the potential to lower the nation's rates of prematurity and, in turn, lower the rates of infant morbidity and mortality [6]. Nurses support women during Engaging in group prenatal care has the potential to enhance the quality of birth outcomes. It might be appropriate for health systems to encourage the uptake and sustainability of group prenatal care [7].

Prevention of preterm labor should include improving lifestyle pattern and behavior: Giving up smoking while pregnant reduces the risk of preterm labor. Behavioral interventions are useful in helping pregnant women quit smoking. Enhancing the treatment of maternal illnesses that are currently prevalent, such as diabetes, thyroid issues, and hypertension. Advise on a healthy diet and exercise regimen because being underweight or overweight raises the risk of complications such as small for gestational age, pre-eclampsia, and congenital abnormalities, all of which can lead to an extremely early birth. Before becoming pregnant, advise women to take folic acid, quit using recreational drugs, reduce the use of alcohol and caffeine, and make sure they are getting enough vitamin D [8].

Women who are at a higher risk should be screened for sexually transmitted infections (STIs) because they have been linked to premature labor. Because asymptomatic UTIs and pyelonephritis are linked to premature labor, mid-stream urine culture (MSU) should be taken into consideration during the early stages of pregnancy. Starting low-dose aspirin before 16 weeks of pregnancy lowers the risk of preterm labor, fetal growth restriction, and pre-eclampsia. Other methods of preventing preterm labor include cervical cerclage and vaginal progesterone [9].

Significance of the study

Prematurity continues to be a major factor in long-term negative health outcomes as well as neonatal and infant mortality and morbidity. It is thought to have contributed to about 900,000 deaths of children under five years in 2019. Current, affordable interventions could prevent seventy-five percent of these deaths. In 2020, the number of babies born preterm (Before 37 full weeks of gestation) was estimated to be 13.4 million [10].

About 123.13% of preterm infants born in Egypt between 32 and less than 37 weeks of gestation have been documented. This statistic may indicate a higher annual neonatal intensive care unit (NICU) admission rate. According to a study by Algameel in Upper Egypt, 28% of the newborns under study were in late preterm labor [11].

According to ACOG [12], preterm birth is estimated for 136,900 neonates, and 8,100 neonates' death from preterm delivery complications in Egypt. Surviving preterm infants may struggle to adjust to adulthood because medical disabilities, learning challenges, and behavioral and psychological problems are becoming more common [13].

In the past, intravenous tocolytic drug therapies were used to treat preterm labor mothers in hospitals. However, using different tocolytic medication regimens, risk screening, assessment, and patient education are the main focuses of preterm labor treatment. Consequently, nurses are essential in helping these moms follow lifestyle modifications and raise women's knowledge and awareness about extending pregnancy towards term gestation by providing health education and home care. Reducing the risk of preterm labor requires good prenatal care. High-risk mothers should receive advice on resting in bed and refraining from sexual activity [14].

Aim of the study

The current study aimed to evaluate the impact of nursing care on pregnant women at risk of preterm labor on their knowledge and lifestyle pattern.

Research hypothesis

H₁: Nursing care provided during pregnancy will improve women's knowledge about preterm labor.

H₂: Nursing care provided to pregnant women will help them achieve a healthy lifestyle during pregnancy.

H₃: Pre-test knowledge scores and the selected sociodemographic traits related to nursing care for expectant mothers at risk of preterm labor will be significantly correlated.

Subject and Methods

Research Design: This study used a quasi-experimental research design pre-test and post-test to fulfill the aim of this study.

Research setting

The study was conducted on maternity and Child Minia University Hospital (MCMUH) in the antenatal care department, divided into the highly dependent unit (HDU) and an antenatal care unit.

Sample

A purposive sample was recruited for the current study. For the study group, there were 72 cases for the control group, there were 75 cases.

Inclusion criteria

High-risk pregnant women who exhibit preterm labor signs and symptoms, a gestational age of 20 to 24 weeks, or any pregnant woman who has risk factors may be at risk for preterm labor.

Data Collection Tools

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

Tool I: (Interviewing Questionnaire): It was developed by Abdelrhman^[15], and after the researcher reviewed relevant literature, made modifications. It was applied to evaluate and gather information related to three main parts.

Part I: Sociodemographic traits of women, such as age and marital status, residence, 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, corticosteroids, antibiotics, or progesterone).

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

Scoring System

The women's answers regarding knowledge about preterm labor were scored and computed. Each correct answer was given a score of one, while an 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 I: The Preterm Labor Assessment Tool was developed by Abdelrhman (15) and made modifications after the researcher reviewed relevant literature: It consisted of two parts (Pre/post-test).

Part II: Risk factors for preterm labor include: Problems related to the current pregnancy, such as anemia, pregnancy-induced hypertension, vaginal infections, gestational diabetes, and experiencing any health issues while pregnant. Psychological factors include fear, anxiety, and stress. Sexual factors include the nature of sexual intercourse after pregnancy, times, and number.

Part III: Signs and symptoms of preterm labor: Uterine contraction characteristics (Frequency, intensity, location, and duration of pain). Pelvic pressure symptoms (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 IV: Lifestyle & activity assessment sheet (pre/post-test): After reviewing relevant literature, the researcher developed it.

A Likert scale was utilized to evaluate lifestyle and daily activity, including dietary habits, personal hygiene, sleeping patterns, physical activity, relaxation exercise, smoking, stress management, admission requirements, and violence.

Scoring system

According to the Likert scale, women's responses are divided into (Always taking (2) score, sometimes taking (1) score, and never taking (0) score for healthy habits but for unhealthy habits. Women's response is divided into (always taking (0) score, sometimes taking (1) score, and never taking (2) score. The lifestyle & activity assessment sheet contains 25 questions, total score 50 scores (< 25 score indicates an unhealthy lifestyle, ≥ 25 score indicates a healthy lifestyle).

Supportive material

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

Validity and Reliability

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

Pilot study

The current study tools were evaluated regarding clarity, validity, and the time required for a pilot study carried out in the first two weeks (8 cases) from the beginning of data collection. The necessary adjustment was carried out after the pilot project findings were analyzed. A pilot sample was included in the primary sample for the investigation.

Data Collection Procedure

Three phases were used to achieve the current study: the assessment phase (pre-test), the implementation phase (implementing nursing care), the follow-up phase, and the evaluation phase (Post-test).

An assessment phase (Pre-test)

Participants women were recruited from Minia University Hospital for maternity and child after obtaining official permission from the research ethical committee of the faculty of Nursing director of the hospital. The researcher starts the first meeting by greeting each woman, introducing herself, explaining the study's aims, duration, and activities, and taking oral consent. The researcher interviewed each woman individually in both groups and filled out the assessment sheet as presented in (Tools I, II, and III). The questionnaire took between 15 and 30 minutes to complete for each woman in both groups. The researcher met pregnant women for data collection two days per/week (Six months for data collection and three months for follow-up).

Implementation phase (Implementing nursing care program)

After assessing pre-test knowledge about preterm labor, lifestyle, and daily activity. Each pregnant woman in the study group received necessary nursing care according to her diagnosis and chief complaint. In addition to screening expectant mothers who may give birth before their due date, ensure that these mothers receive appropriate care and treatment.

Two sessions during the day for the 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 are at risk of preterm 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 were used, including the lecture and discussion. Also, supportive materials for knowledge clarification include booklets, banners, and brochures 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 proposed goal and allow the women to ask questions, have discussions and acquire an elevated level of knowledge.

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

Evaluation phase

Two-time of evaluations were done for each woman: The first time of evaluation (Pre-test) was done before giving nursing care using tools (I, II, and tool III) to assess pregnant women at risk for preterm labor. Second-time evaluation (Post-test) was 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 their knowledge, signs, and symptoms and modifiable risk factor of preterm labor and lifestyle modification and activity.

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 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 can decline participation and/or withdraw from it 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 were used to find the relation between total level of knowledge and lifestyle pre and post-application of nursing care. Correlation tests detect the association between nursing care and a healthy lifestyle.

I. Results

Table 1: Distribution of the studied sample according 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						
Housewife	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 the rural area. Also, 69.4% of the study group and 74.7% of the control group were housewives. Concerning their educational level, both groups (38.9% and 37.3% respectively) had secondary education.

Table 2: Study and control groups distribution according to their antenatal care visits during pregnancy.

Antenatal Care (ANC) visits during pregnancy	Study group (N=72)		Control group (N=75)		P-Value
	No.	%	No.	%	
Frequency of antenatal care visits					
≤ 4 visits	50	69.4	60	80.0	.063
> 4 visits	22	30.6	15	20.0	
Time of first ANC visit					
First trimester	38	52.8	42	56.0	.027*
Second trimester	34	47.2	31	41.3	
Third trimester	0	0	2	2.7	

Table 2 Illustrates that (69.4%) of the study group and (80.0%) of the control group had less than or equal to 4 ANC visits, also, (52.8% 56% respectively) among both groups had their first ANC visit was at the first trimester.

Table 3: Distribution of the total knowledge levels about preterm labor among both groups before and 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			

** Highly statistically significant at p-value ≤ 0.01

Table 3 Shows (75.0%) had poor knowledge of women in the study group before the nursing intervention, but after the nursing intervention, there were improvements in their knowledge, as (73.6%) had good knowledge. However, the

control group (54.7% and 52.0%, respectively) had poor knowledge before and after routine hospital care. There were highly statistically significant differences among the study and control group post-intervention as p-value ≤ 0.000.

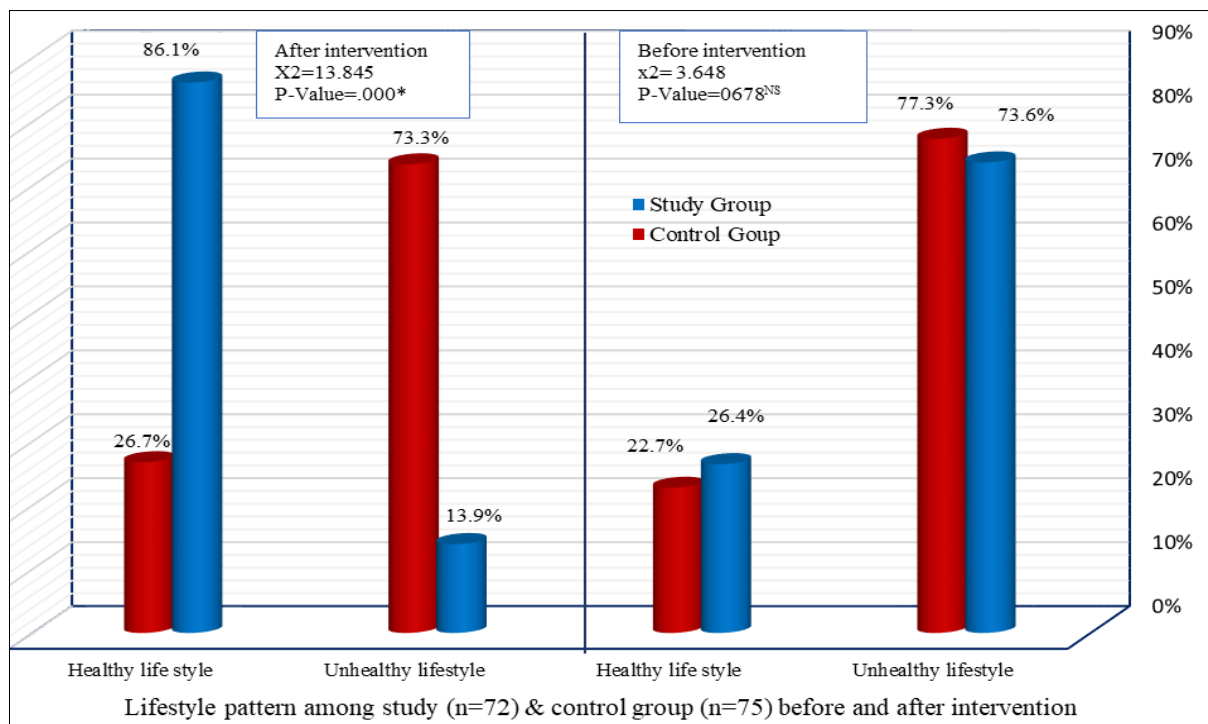


Fig 1: Study and control groups distribution related to total lifestyle pattern and activity before and after intervention

Figure 1 shows that, prior to the intervention, there were no statistically significant differences in the study and control groups' overall lifestyle patterns or levels of activity (p-

value 0.495). However, post the intervention, there were statistically significant differences between the study and control groups (p-value 0.000).

Table 4: Relation between total knowledge level about preterm labor and sociodemographic characteristics among the study and control groups before nursing care intervention.

Sociodemographic characteristics	Total Knowledge level before nursing care intervention.					
	Study group (N=72)			Control group (N=75)		
	Poor (N=54)	Average (N=16)	Good (N=2)	Poor (N=41)	Average (N=29)	Good (N=5)
Age (years)						
20-24yrs	15	0	0	9	1	1
25-29yrs	19	11	0	19	17	0
30-35yrs	9	0	1	6	4	0
> 35yrs	11	5	1	7	7	4
Fisher's exact test (p-value)	15.081 (.004) **			13.490 (0.018) *		
Residence						
Urban	9	4	1	19	12	2
Rural	45	12	1	22	17	3
Fisher's exact test (p-value)	2.327 (.293)			.300 (.933)		

Educational level						
Illiterate	7	3	0	4	0	0
Primary	10	1	0	3	6	2
Preparatory	16	2	0	10	7	0
Secondary	17	9	2	16	11	1
University	4	1	0	8	5	2
Fisher's exact test (p-value)	8.348 (.618)			12.305 (.180)		
Occupation						
Housewife	40	10	0	30	23	3
Working	14	6	2	11	6	2
Fisher's exact test (p-value)	4.713 (.069)			1.528 (.466)		

* Statistically significant at p-value ≤ 0.05 ** Statistically significant at p-value ≤ 0.01.

Table 4 Displays a statistically significant difference (p<0.05) between the two groups' total knowledge levels

about preterm labor and their age p-value (.004, 0.018 respectively) before nursing care intervention.

Table 5: Relation between study and control groups' lifestyle patterns and sociodemographic characteristics before and after nursing intervention.

Sociodemographic characteristics	Lifestyle pattern before-intervention				Lifestyle pattern after-intervention			
	Study group (N=72)		Control group (N=72)		Study group (N=72)		Control group (N=72)	
	Unhealthy (N=53)	Healthy (N=19)	Unhealthy (N=58)	Healthy (N=17)	Unhealthy (N=10)	Healthy (N=62)	Unhealthy (N=55)	Healthy (N=20)
	N	N	N	N	N	N	N	N
Age (years)								
20-24yrs	9	6	8	3	2	13	8	3
25-29yrs	24	6	28	8	6	24	25	11
30-35yrs	8	2	7	3	1	9	8	2
> 35yrs	12	5	15	3	1	16	14	4
Fisher's exact test (p-value)	2.350 (.499) ^{NS}		1.978 (.822) ^{NS}		11.736 (.016) [*]		.675 (.923) ^{NS}	
Residence								
Urban	8	6	20	13	4	10	24	9
Rural	45	13	38	4	6	52	31	11
Fisher's exact test (p-value)	2.256 (.175) ^{NS}		7.133 (.223) ^{NS}		3.133 (.077) ^{NS}		9.408 (.049) [*]	
Educational level								
Illiterate	7	3	4	0	0	10	2	2
Primary	6	5	11	0	1	10	10	1
Preparatory	17	1	13	4	5	13	14	3
Secondary	19	9	20	8	3	25	16	12
University	4	1	10	5	1	4	13	2
Fisher's exact test (p-value)	7.692 (.139) ^{NS}		4.637 (.429) ^{NS}		5.447 (.024) [*]		7.862 (.125) ^{NS}	
Occupation								
Housewife	39	11	42	14	9	41	38	18
Working	14	8	16	3	1	21	17	2
Fisher's exact test (p-value)	1.623 (.203) ^{NS}		.687 (.407) ^{NS}		1.148 (.284) ^{NS}		6.633 (.078) ^{NS}	

Table 5 Illustrates no statistically significant differences between lifestyle patterns and sociodemographic characteristics among both groups before intervention. However post-intervention, there was a statistically significant between the lifestyle pattern of the study and their Sociodemographic characteristics on age and educational level p-value (0.016, 0.024 respectively). In the **II**. control group on residence p-value (0.049)

Table 6 Illustrates the correlation between total knowledge score & total lifestyle pattern score among both groups. Among the study group, there was a highly significant positive correlation (p-value ≤ 0.000) between the total knowledge score and the total lifestyle pattern after the intervention.

Table 6: Correlation between total knowledge score and total lifestyle pattern score among both groups.

Items	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).

III. Discussion

Concerning the characteristics of the studied pregnant women, it revealed that nearly half of both groups of pregnant women's age was 25-29 years, while more than three quarters in the study group were from rural areas and more than half in the control group from rural areas. On the other hand, over two-thirds of pregnant women in both groups were housewives. These findings are supported by Sabarenaa *et al.* [16], who studied Diagnostic Performance and Discriminative Value of Serum Ferritin in Preterm Labor and PPRM and revealed that 37% of the study sample's age group was between the ages of 26 and 30. Furthermore, Hassan [17] 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 the pregnant women were housewives (75.7%).

Concerning the residence and occupation. These results are inconsistent with Mohamed *et al.* [18], who studied the evaluation of the Incidence, Possible Risk Factors, and Maternal and neonatal Morbidity and mortality in Cases of Preterm Labor at El Minya Maternity University Hospital and found the majority of the women among study were housewives (82%). More than two-thirds came from rural areas (68.3%). This difference may be related to the difference in the study population's inclusion criteria between the two studies.

Regarding educational level, the current study found that over one-third of pregnant women in both groups had completed secondary school. This result is in line with a study by Shekho & Yalda [19] 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 *et al.* [20] 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.* [21], study Maternal educational level and preterm birth found that the prematurity rate was 4.7% for women with low educational attainment, 3.7% among those with medium education, and 3.0% among those with higher education level. A possible explanation for this similarity is that a low educational level is usually accompanied by a low awareness level about pregnancy care and following unhealthy habits and lifestyles, which may lead to preterm labor. This shows that improved maternal education levels have a protective effect on the outcomes of births.

Regarding antenatal care visits during pregnancy, the current result found that most of both groups had four antenatal care visits or less than four visits, and more than half had ANC visits in the first trimester. This result agrees with Fetene *et al.* [22], who studied factors associated with preterm birth among mothers who gave birth at public Hospitals in Sudama regional state, Southeast Ethiopia, and reported that more than two-thirds (69.9%) among study groups and more than three quarter (87%) among control group had four or less ANC visits and more than half among study group (50.6%) and near to half among control group (43.6%) had first ANC visits at first trimester.

Additionally, Muhumed *et al.* [23] studied preterm birth and associated factors among mothers who gave birth in Fafen Zone Public Hospitals, Somali Regional State, Eastern Ethiopia, revealing that 81% of participants had fewer than four visits. Also, Regasa *et al.* [24], who studied Predictors of preterm birth in Western Ethiopia, found that women who had less than three visits were more likely to give birth prematurely than those who had three or more visits. A possible explanation is that women who receive regular prenatal care and follow-up may be better able to identify, address, and manage any obstetric problems. This result means that most pregnant women do not comply with antenatal care visits, which increases the risk of complications during pregnancy and labor. So, the results suggested the importance of antenatal care visits that aim to

maintain a healthy pregnancy & improve pregnancy outcomes, and reduce the risk of preterm labor.

Regarding total women's knowledge levels about preterm labor, there was no statistically significant difference among the study and control groups regarding total knowledge level about preterm labor pre-intervention, compared to a highly significant difference among both groups after intervention as (p -value < 0.001). It was explained that using effective learning methods, encouraging women to ask questions, participation, and interactions along the intervention, and using multimedia improve their knowledge to achieve the study aims. So, educational programs are fundamental in helping expectant mothers become more knowledgeable about preventing premature labor.

Abd-Elhakam *et al.* [4] provided support for the current study, which studies the Effect of an educational program based on a health belief model on the prevention of preterm birth among newly pregnant women and found that while there was no statistically significant difference in knowledge between the study and control group prior to the program, there was a highly significant difference in knowledge after the program. This further supports the findings of Rahmani *et al.* [25] study on the 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 found when pre-and post-test results were compared, it showed that prenatal moms' knowledge had improved post-test with 30% of them having good knowledge. The remaining 70% have average knowledge.

Women's total lifestyle and activity pattern score shows no statistical significance difference before and post-intervention of nursing care regarding total lifestyle 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 \leq 0.000). These results gave the attention toward the significant relation between lifestyle and risk of preterm labor.

These findings are consistent with those of Abd El Rhman *et al.* [15], who studied the Effect of Utilizing Nursing Care Guidelines for the Prevention of Preterm Labor, and 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). Furthermore, before program implementation, Abd-Elhakam *et al.* [4] discovered no statistically significant difference in the five main HBM constructs (perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and cues) between the study and control groups. However, after the program was implemented, there was a highly significant difference (p -values < 0.001) between the study and control group for the five major HBM constructs. These results may lead to the creation of tailored preterm birth prevention strategies.

According to the current study, before the intervention, there was a statistically significant correlation between both groups' ages and their total level of knowledge regarding preterm labor (p -value.004, 0.018 respectively). These results disagree with Choudhary *et al.* [14], who evaluated the Effectiveness of a health instructional module on preterm labor knowledge and prevention among antenatal mothers in OPD at A Selected Hospital in Jhansi, Uttar Pradesh found no significant relationship between the antenatal mothers' age and total knowledge level about preterm labor.

Regarding the relation between the total lifestyle pattern score among the study and control group and their sociodemographic characteristics post-intervention, the results of the current study showed a statistically significant correlation between the total lifestyle pattern score of the study group and the age group and educational level as p-value (0.016, 0.024 respectively). There was a statistical significance relationship between total lifestyle pattern score and residence in the control group at p-value (.049). This could be because more educated women and those who their age > 25 years old are more interested in learning about healthy lifestyles and believe that getting prenatal care is easier and helpful.

These findings conflict with those of Choudhary *et al.* [14], who found no significant relationship between the practice scores and the antenatal mothers' ages. However, the same author agreed with the current results regarding the relationship between total lifestyle pattern score and residence and educational level, noting a significant relationship (p-value ≤ 0.05) between the antenatal mothers' residence and educational status and their practice score for preventing premature labor.

In addition, Dropińska *et al.* [27], who study "What is the state of knowledge on preterm birth?" found that the women's general knowledge and lifestyle regarding PL were not significantly impacted by their age, place of residence, educational level, or professional activity.

According to the current results, a highly significant positive correlation was found between total knowledge score and lifestyle pattern among the study group post-nursing care implementation (p-value < 0.000). However, there was no statistically significant relationship between total knowledge score and lifestyle pattern among both groups in the pre-intervention phase.

These results are in line with those of Abd-Elhakam *et al.* [4], who found that there was no statistically significant difference between the study group and control group prior to program 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. A possible explanation for this improvement might be women's desire and interest to learn and improve their knowledge about the study topic. This finding suggested that most pregnant women wanted and were able to be educated and motivated to change unhealthy lifestyles to improve their pregnancy outcomes.

Conclusions

The present study findings concluded that

Implementation of nursing care for pregnant women at risk of preterm labor was effective. It showed significant improvements in pregnant women's knowledge about preterm labor and achieving healthy lifestyles and behaviors during pregnancy. As well as there were highly statistically significant differences in the study and the control groups' signs and symptoms of preterm labor post-nursing care intervention as p-value $\leq .000$. In addition, the incidence of preterm labor in the study group was (15.3%) compared to the control group (44.0%) as p-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 of the importance of implementing a nursing care program for high-risk cases of preterm labor and help in preventing it.
- Continuous educational program for nurses on prevention of preterm labor.
- Raising mothers' awareness of the value of prenatal care and monitoring. So, 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.

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