Effect of Antenatal Sessions on Postnatal Knowledge and Practices Regarding Neonatal Jaundice among High-risk Primigravidas

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Abstract

Background: To decrease neonatal morbidity and mortality, it is important to increase awareness about neonatal jaundice in high-risk primigravidas and develop a practical approach toward this. This study **aimed** to examine the effect of antenatal sessions on postnatal knowledge and practices regarding neonatal jaundice among high-risk primigravidas. **Study design:** A quasi-experimental, comparative study was utilized. **Setting:** The study was performed at Antenatal Clinics of Obstetrics and Gynecological Specialty Center at Mansoura University Hospital, Egypt. **Subjects:** The study included a purposive sample of 122 high-risk primigravid women. **Tools:** Data were collected using a structured interview schedule and women reported knowledge and practices regarding neonatal jaundice. **Results:** The mean knowledge and postnatal practice scores were significantly increased in the study group and decreased in the control group. **Conclusion:** Holding antenatal sessions about neonatal jaundice for high-risk primigravidas were effective in instilling satisfactory knowledge and adequate practical skills about postnatal care for babies exhibiting neonatal jaundice. **Recommendations:** Maternity, pediatric, and community nurses should be encouraged to take an active role in conducting antenatal sessions suitable for high-risk primigravidas regarding neonatal health problems.

Keywords: Antenatal Sessions, High-risk Primigravidas, Postnatal Knowledge, Neonatal Jaundice.

Introduction

Pregnancy is a maturational crisis, especially for primigravid women who are inexperienced; this affects both maternal and fetal wellbeing **(Ayu, Rachmawati, & Ungsianik, 2019)**. High-risk pregnancy (HRP) is a major public health challenge, and addressing this is an objective of the World Health Organization (WHO) Sustainable Development Goals 3 **(WHO, 2019)**. HRP is defined as any unexpected medical or obstetric condition associated with pregnancy with an actual or potential hazard to the health or wellbeing of the mother or fetus, and its management requires the combined efforts of medical and nursing healthcare professionals **(Lowdermilk, Perry, Cashion, Alden, & Olshansky, 2020)**.

Globally, more than 20 million women are considered to have HRP, with >99% occurring in developing countries, more frequently among rural women and adolescents **(Alkema et al., 2016; WHO, 2019)**. Women who experience HRP potentially face physical, psychological, and socioeconomic concerns due to the nature of treatment and the need for close monitoring through prenatal and the postnatal period, which may require hospitalization. Accordingly, these women should adapt their lifestyles accordingly to achieve the best perinatal outcomes **(Badakhsh, Hastings-Tolsma, Firouzkohi, Amirshahi, & Hashemi, 2020)**.

The risk factors for HRP include maternal age, hypertension, diabetes mellitus (DM), preeclampsia, vaginal bleeding, blood type incompatibilities, preterm delivery, cesarean section (CS), and delivery problems; these also play a critical role in the incidence of neonatal jaundice (NJ) **(Tavakolizadeh, Izadi, Seirafi, Khedmat, & Mojtahedi, 2018)**. In addition,

birth in the first pregnancy and prolonged labor are also maternal risk factors for NJ and are significantly associated with high bilirubin levels. Identifying the maternal and neonatal risk factors for hyperbilirubinemia is vital in the effective management of neonates and should be a fundamental policy in maternity care services **(Adoba et al, 2018; Boskabadi, Rakhshanizadeh, & Zakerihamidi, 2020)**.

An Egyptian study conducted by **Abdelhady, Howeedy, and Abdelsalam (2015)** found that pregnancy-associated morbidities such as anemia, gestational DM, and hypertension were significantly associated with the development of HRP. For all pregnant women, they recommended the use of proper screening techniques to identify risk factors for HRP, as well as antenatal education sessions with special emphasis on compliance toward antenatal care (ANC) with early and regular follow-up.

The **WHO (2016)** recommended that every pregnant woman and newborn should receive quality health care throughout the pregnancy, childbirth, and postpartum period. ANC is also important in providing opportunities to communicate with and support pregnant women in a respectful way. Women's positive experiences during ANC and childbirth can create the foundations for healthy motherhood. Furthermore, the process of adaptation to motherhood would reassure parent's doubts and feelings of inadequacy in light of the demands of newborn care **(Viana Cardoso Dantas et al, 2016)**. Antenatal preparation sessions are crucial for pregnant women during ANC visits to address different aspects related to pregnancy, delivery, and infant care. Organized educational activities should also be facilitated by maternity care providers **(Al-Ateeq & Al-Rusaiess, 2015)**.

Neonatal jaundice is characterized by yellowish color of the skin and sclera. It is highly prevalent in newborns and is a major cause of neonatal mortality. It is a major public health problem worldwide, which is present in 50%–60% of full-term and 80% of preterm newborns. NJ accounts for 13.5% of all hospital admissions, making it the third most common cause of hospital admissions for neonates **(Huq, Hossain, Haque, & Tarafder, 2017)**. It is also a primary reason of avoidable brain damage, physical and mental disabilities, and early losses among newborns in several communities **(Shehu, Shehu, & Onuwe, 2019)**. NJ commonly manifests 48 h after birth, requiring readmission and clinical evaluation. Among the estimated 85% of live births that develop NJ, most resolve spontaneously within 3–5 days. However, a proportion develop extreme hyperbilirubinemia resulting in neurodevelopmental complications if improperly managed **(Slusher et al, 2017)**.

Being poorly informed about NJ and its causes may adversely affect the activities of mothers in the recognition of NJ, resulting in a delay in seeking medical care. To avoid this, maternity care nurses should educate pregnant women during antenatal visits by conducting antenatal sessions about NJ **(Zhang et al, 2015)**. **Khudhair (2016)** also recommended that nurses should provide expectant mothers with printed and oral education about NJ, assess their level of understanding, and discourage practices that are not useful.

The nursing management of newborns with hyperbilirubinemia requires routine physical assessment at regular intervals as well as educating mothers about signs of jaundice, because any clinical symptoms will probably appear at home. Mothers are taught that jaundice is evaluated by observing the skin color from head to toe and the color of the sclerae and mucous membranes. Applying direct pressure to the skin, especially over bony prominences such as the tip of the nose, causes blanching and allows the yellow color to be more prominent. In addition, mothers are advised to introduce breastfeeding early and frequently without water supplementation because breastfeeding during the initial days of life has a significant influence on the improvement of NJ. Mothers should also be empowered to bring the newborn for follow-up visits to evaluate feeding, elimination patterns, and jaundice **(Hockenberry & Wilson, 2019; Murray, Mckinney, Holub, & Jones, 2019)**.

Significance of the study

The **WHO (2020)** reported that 2.4 million neonates worldwide died in the first month of life in 2019. There are approximately 6,700 newborn deaths every day. Sub-Saharan Africa

had the highest neonatal mortality rate in 2019, at 27 deaths per 1,000 live births. In fact, neonates born in sub-Saharan Africa are 10 times more likely to die in the first month than those born in high-income countries. Furthermore, 481,000 infants worldwide, >75% of whom are from low- and middle-income countries, are estimated to develop extreme hyperbilirubinemia each year, causing 114,000 deaths and leaving >63,000 survivors with long-term complications **(Olusanya, Kaplan, & Hansen, 2018; Mir, Van Der Geest, & Been, 2019)**. Specifically, Africa has the highest incidence of severe NJ, at 667.8 per 10,000 live births, followed by the Southeast Asian, Eastern Mediterranean, Western Pacific, American, and European regions **(Slusher et al, 2017)**.

Egypt, along with other middle- and low-income countries, has most cases of severe hyperbilirubinemia and kernicterus all over the world **(Mostafa et al., 2019)**. There is no cure for kernicterus, but it is preventable if jaundice is recognized early and effective therapy is started promptly **(Egube, Ofili, Isara, & Onakewhor, 2013)**. High-risk primigravidas should have increased awareness and be taught practical approaches for recognizing NJ, identifying danger signs early, and responding properly in such situations. Doing so would hopefully prevent kernicterus and the neurologic complications caused by severe neonatal hyperbilirubinemia, thus decreasing neonatal morbidity and mortality rates **(Adoba et al, 2018)**. Moreover, a Saudi Arabian cross-sectional study by **Alfouwais et al. (2018)** found that, among 4413 expectant mothers, 64.2% reported that the best way to educate about NJ is providing brochures during antenatal follow-up visits.

Nowadays, because of early discharge of mothers and neonates from the hospitals due to COVID-19, the responsibility of mothers in recognizing NJ has increased in the postpartum period. Mothers therefore play a vital role in the early identification and prevention of complications at home. The mother as the primary caretaker, and the family as the support group, should have a clear understanding on how to identify NJ and respond appropriately, because early recognition and proper management minimize the liability of the long-term complications **(Allahony, Hegazy, Kasemy, & Bahgat, 2016)**. Moreover, antenatal education is an essential component of primary health care by reducing maternal and neonatal morbidity and mortality, but antenatal health education seems to focus on breastfeeding, and little information about NJ is taught to expectant mothers **(Zhang et al, 2015)**.

Aim of the study

This study aimed to examine the effect of antenatal sessions on postnatal knowledge and practices regarding neonatal jaundice among high-risk primigravidas.

Research hypotheses

H.1. High-risk primigravid women who undergo antenatal sessions regarding neonatal jaundice would gain a satisfactory knowledge score compared with the control group.

H.2. High-risk primigravid women who undergo antenatal sessions regarding neonatal jaundice would exhibit an adequate practice level of postnatal care for their babies regarding jaundice compared with the control group.

Subjects and method

Study design

The present study employed a quasi-experimental design.

Study setting

The study was conducted in the Antenatal Clinics of the Obstetrics and Gynecological Specialty Center at Mansoura University Hospital, Egypt. The center consists of a reception area, two antenatal clinics, a sonar clinic, a fetal heart count clinic, a gynecological examination clinic, a vesicular mole clinic, and a post-cesarean care clinic. Two nurses and two obstetricians introduced the routine ANC in the antenatal clinics, and the following services were provided to pregnant women: examination and follow-up of fetal growth via ultrasound, urine tests for albumin and acetone for HRP, and therapeutic services from the pharmacy. Before the COVID-19 pandemic, the center received 75

pregnant women daily, but during the pandemic, this was reduced to only 25 pregnant women daily.

Study subjects

The study included a purposive sample of 122 high-risk primigravidas who fulfilled the following criteria: primigravidas at 28–34 weeks of pregnancy; diagnosed as HRP with the presence of risky health conditions such as hypertension, anemia, DM, antepartum bleeding, preeclampsia, heart disease, risk of preterm labor, and multiple pregnancies; can read and write; agreed to take part in the study; and regularly attended antenatal follow-up visits.

Sample Size:

Based on data from literature **(Khalaf, Mohamed, Hassan, Mohamed, & Ibrahim, 2019),** taking into account the significance level of 5%, and power of study of 80%, the sample size had been estimated using the next procedure:

$n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}]/$ (mean difference between the two groups)^2

where SD = standard deviation

$Z_{\alpha/2}$: This depends on level of significance, for 5% this is 1.96,

Z_{β}: This depends on power, for 80% this is 0.84.

Therefore, $n= [(1.96 + 0.84)^2 \times \{2(1.97)^2\}]/ (1.0)^2=60.8$. According to the above procedure, the sample size needed per group is 61.

Groups' Allocation

One hundred twenty two high-risk primigravid women were randomly assigned into two equal groups of Sixty-one by using a closed envelope containing study or control group cards. In relation to the study group, received antenatal sessions regarding NJ beside the routine antenatal care from 28 to 34 weeks of gestation. The control group received routine antenatal care only.

Tools of the study

Two tools were used for data collection:

Tool I: A structured interview schedule was designed by the researchers after reviewing related literatures and consisted of two parts:

Part (1): Personal characteristics, which include age, level of education, residence, occupation, and income

Part (2): Women's knowledge questionnaire about neonatal jaundice (definition, types, causes, symptoms, risk factors, complications, and treatment) **(Blackburn, 2018; Perry et al., 2018)**

Scoring system of women's knowledge questionnaire:

The knowledge tool is a 50 items questionnaire arranged in 14 domains. The women's answers were compared with the model key answer, where each question is scored in a binary basis as incorrect answer (score 0), incomplete correct answer (score 1) and complete correct answer (score 2). The items of each domain were summed up and are expressed in mean ±SD. The total score of the knowledge tool is the sum of the scores of the 14 domains (= the sum of the responses to the 50 items). The total knowledge score is then categorized as poor level of knowledge (<50% of the maximum possible score), fair level of knowledge (50-65% of the maximum possible score) and good level of knowledge ($\geq$65% of the maximum possible score).

Tool II: Women's reported practice regarding neonatal jaundice

This tool was developed by the researchers after examining the recent relevant literatures and covered eight reported practice questions regarding NJ, including feeding methods, use of neon lamp, use of medical herbs, maintaining exposure to sunlight, skin blanching by applying digital pressure to assess skin color, weight monitoring, observing infant behavior, and observing stool color **(Hockenberry & Wilson, 2019; Murray et al., 2019)**. Each question is scored in a binary basis as either incorrect practice (score 0) or correct practice (score 1). The total practice score is the sum of the scores of the eight items, which is then categorized as inadequate practice (<60% of the maximum possible score) or adequate practice (>60% of the maximum possible score).

Validity and Reliability: Structured interview schedule, women's knowledge, and reported practice sheet were studied and reviewed by a special Obstetrics, Pediatrics, and Community nursing staff at Mansoura University. The board reviewed the tools for clarity, relevance, completeness, understanding and applicability. Reliability was ascertained by Cronbach's Alpha and it gave an internal consistency of $\alpha = 0.82$ and $\alpha = 0.78$ for knowledge questionnaire and reported practice, respectively.

Ethical Considerations: This study was approved from Research Ethics Committee of Faculty of Nursing, Mansoura University, and approval letter from the director of Obstetrics and Gynecological Specialty Center was taken. Informed consents were taken from women before their involvement. They have been informed of their rights to preserve confidentiality, withdraw at any time, and study maneuver cannot cause harm to participants.

Pilot study: A pilot study was conducted on 13 high-risk primigravidas to test the applicability and clarity of the questionnaire. The women included in the pilot study were excluded from the study sample. After the statistical analysis of the pilot study, some modifications were considered, such as changing open-ended questions to close-ended multiple-choice questions.

Procedure:

The present study took place from October 2020 to March 2021. The research was conducted in four phases: preparation, assessment, implementation, and evaluation phases.

I–Preparation phase: A review of related literature was conducted to construct tools of data collection and prepare educational materials including a PowerPoint presentation about antenatal sessions and an educational handbook written in a simple Arabic language. This aims to guide and empower high-risk primigravidas to recognize NJ and educate them on how to provide care after delivery for their babies exhibiting NJ. The researchers formulated the content of the antenatal educational handbook after appraising related literatures **(Blackburn, 2018; Perry et al., 2018)**.

II–Assessment phase: The researchers went to the Antenatal Clinics and checked the registration book to identify the pregnant women who met the inclusion criteria. The researchers introduced themselves to the participants and clarified the study aim. The study and control groups were allocated via the simple random method, which used closed envelopes including study or control group cards. After enrollment, the researchers held a meeting with each participant individually to complete the structured interview and determine women's knowledge about NJ. The questions were asked in Arabic, and the researchers recorded their responses to evaluate participants' information (pre-test). The assessment phase was conducted for both the study and control groups.

III–Implementation phase: The pregnant women in the study group underwent antenatal sessions, lasting 30–45 min each, regarding NJ in a private, comfortable, and quiet room for over three consecutive weeks guided with an antenatal educational handbook. The educational materials included lecture, group discussion, media used laptop, and fetal–mother model. The first session included registration, clarifying the objectives of antenatal sessions, and distributing the handbook. The second session discussed NJ, specifically its signs and symptoms, causes, risk factors, danger signs (and how to recognize these), complications, and treatment. In the third session, the pregnant women were trained using the fetal–mother model; this had practical lessons on neonatal feeding and how to provide care after delivery for babies exhibiting NJ. The control group underwent routine ANC only.

IV–Evaluation phase: This phase took place in the postpartum period and used the same questionnaires from the assessment phase to evaluate women's reported knowledge and practices regarding NJ. The data on reported practices were collected from mothers whose babies exhibited physiological jaundice and were treated at home only; we excluded those with babies who exhibited pathological jaundice and were referred to the hospital. The

participants in the study and control groups were called for this second evaluation, and face-to-face interviews were conducted when the participants came in for postpartum follow-up visits for post-cesarean care, whereas telephone interviews were conducted for those who were unable to visit the Obstetric and Gynecological Specialty Center for postpartum follow-up.

Statistical Analysis

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). All continuous data were normally dispersed and were stated in mean ±standard deviation (SD). Categorical data were stated in number and percentage. The contrasts were resolute using Student's t test for two variables with continuous data. Chi-square test was applied to compare between variables with categorical data. Statistical significance was set at $p<0.05$.

Results

Table 1 illustrates the mean age was 29.2 ± 6.2 and 27.9 ± 5.6, of the study and control groups, respectively. Concerning the educational level, 72.1 % of the study group and 77.0 % of the control group had secondary education; also, 85.2 % of the study group and 83.6 % of the control group were lived in rural regions. Regarding occupation, 88.5 % and 85.2 % of the study and control groups, respectively were housewives. On the other hand, more than half (57.4 %) of the study group reported insufficient income, while half (50.8 %) of the control group reported sufficient income. There were no significant differences between the two groups regarding their socio-demographic characteristics.

Figure 1 demonstrates that 73.3% and 78.4% of the study and control groups, respectively, had prior knowledge regarding NJ from their relatives. Conversely, a minority of them (11.1% and 7.8% of the study and control groups, respectively) only had the medical team as a source of knowledge, with no significant difference between the two groups ($p = 0.815$).

Figure 2 demonstrates that, in the study and control groups, respectively, 32.8% and 41.0% were exhibiting gestational DM, whereas 31.1% and 26.2% were exhibiting preeclampsia. A minority (6.6%) of the pregnant women in the study group were exhibiting anemia, and 8.2% in the control group were exhibiting placenta previa.

Table 2 shows at the initial baseline assessment, the knowledge scores between the two groups regarding the NJ were approximately similar (8.19 ± 2.7 for the study and 8.46 ± 3.1 for the control group), with no statistically significant difference was found ($P=0.609$). After implementing the antenatal sessions, the total mean knowledge score in the study group (46.77 ±9.13) was significantly improved compared to the control group (13.29 ±3.60), with a statistically significant difference between the two groups ($p < 0.001$).

As shown in Figure 3, prior to the intervention, majority of the study and control groups (88.5% and 86.9%, respectively) had poor levels of knowledge about NJ, with no statistically significant differences between the two groups ($p = 0.783$). Post-intervention, the levels of knowledge in the study group improved, and 68.9% of the participants recorded good levels of knowledge. In contrast, poor levels of knowledge were seen in 83.6% of participants in the control group. There were statistically significant differences between the two groups in terms of post-intervention levels of knowledge ($p < 0.001$).

Table 3 clarifies that 77.0 % and 83.6 % of the study and control groups, respectively currently delivered by CS. In addition, 80.3 % of newborns in the study group and 73.8 % in the control group were suffering from NJ after birth. The highest percentage of neonates who had jaundice were suffer from physiological jaundice and treated at home (79.6% and 91.1 %) of the study and control groups, respectively. There were no significant differences between the two groups regarding their newborn characteristics.

Table 4 shows that the majority of parturient women in the study group were able to perform care for their babies suffering from NJ after receiving the antenatal sessions, and recorded maintained exclusive breastfeeding, used neon lamp at home, maintained exposure to sunlight, and skin blanching by applying

digital pressure to check the skin color (93.9%, 85.7%, 95.9%, and 91.8% respectively) compared to the minority of parturient women in the control group (13.3%, 8.9%, 24.4%, and 0.0%) respectively. There were statistically significant differences between the two groups in relation to their levels of practice regarding the NJ care ($p<0.001$).

Figure 4 shows that, after attending the antenatal sessions, 67.3% of the participants in the study group had an adequate level of practice regarding how to provide care after delivery for their babies exhibiting NJ. In contrast, majority (88.9%) of the control group had inadequate levels of practice, with a significant difference between the two groups ($p < 0.001$).

Table 1. Comparison of the studied groups according to their general characteristics

	Study group N = 61	%	Control group N = 61	%	Chi square test χ^2	P
Age (years)						
< 25	15	24.6	19	31.1		
25 – 29	13	21.3	14	23.0		
30 – 34	22	36.1	21	34.4		
35 or more	11	18	7	11.5	1.420	0.701
Mean ±SD	29.2 ±6.2		27.9 ±5.6		1.215#	0.227
Gestational age (weeks)						
28 – 30	31	50.8	32	52.5		
31 – 34	30	49.2	29	47.5	3.106	0.212
Mean ±SD	30.5 ±2.7		31.0 ±2.1		1.142#	0.256
Education Level						
Secondary education	44	72.1	47	77.0		
University education	17	27.9	14	23.0	0.389	0.533
Residence						
Urban	9	14.8	10	16.4		
Rural	52	85.2	51	83.6	0.062	0.803
Occupation						
Housewife	54	88.5	52	85.2		
Employed	7	11.5	9	14.8	0.288	0.592
Income						
Insufficient	35	57.4	30	49.2		
Sufficient	26	42.6	31	50.8	0.823	0.364
Having any knowledge about neonatal jaundice?						
No	16	26.2	10	16.4		
Yes	45	73.8	51	83.6	1.760	0.185

 # t values, Student's t test

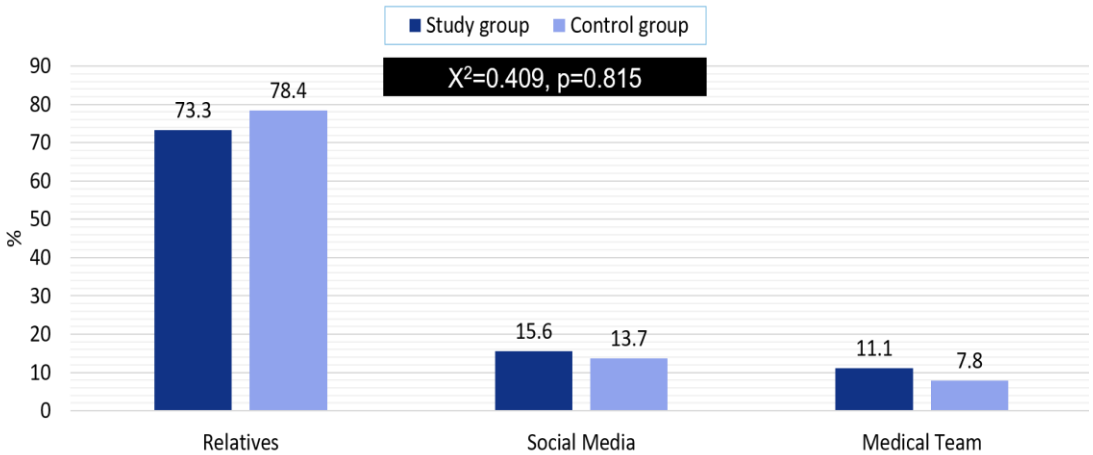

Figure 1. The source of knowledge regarding neonatal jaundice between the study and control groups

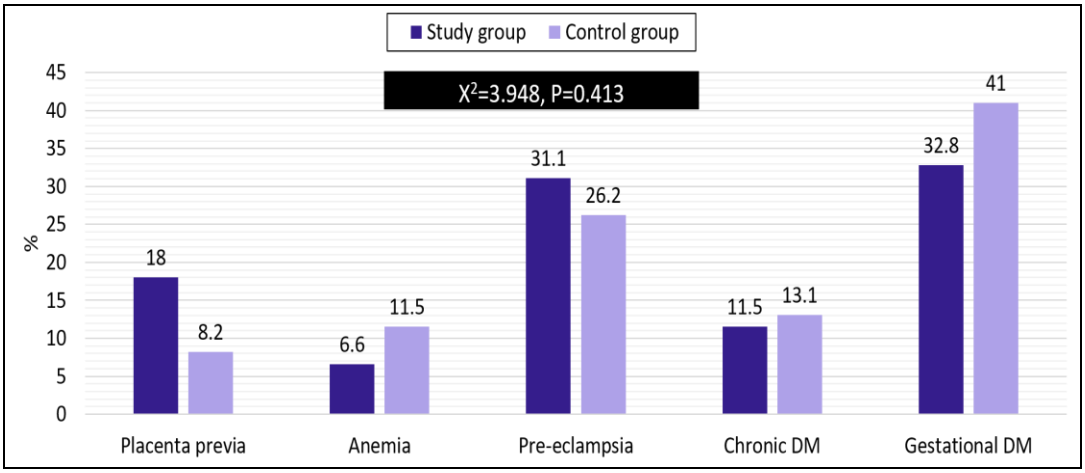

Figure 2. The current medical diagnosis between the study and control groups

Table 2. Comparison of the studied groups according to their knowledge scores regarding neonatal jaundice before and after implementing the antenatal sessions

Knowledge Domains	Before Intervention			After Intervention		
	Study group	Control group	Student's t test	Study group	Control group	Student's t test
	Mean ± SD	Mean ± SD	t [p]	Mean ± SD	Mean ± SD	t [p]
Definition of NJ	0.94 ±0.41	0.97 ±0.29	0.467 [0.642]	1.86 ±0.43	0.97 ±0.37	12.254 [<0.001]**
Types of NJ	0.91 ±0.42	1.04 ±0.51	1.537 [0.127]	2.57 ±0.50	1.69 ±0.31	11.683 [<0.001]**
Breastfeeding NJ	0.23 ±0.11	0.26 ±0.13	1.376 [0.171]	1.80 ±0.53	1.31 ±0.15	6.948 [<0.001]**
Definition of Physiological NJ	0.26 ±0.12	0.30 ±0.15	1.627 [0.106]	1.71 ±0.67	0.51 ±0.25	13.105 [<0.001]**
Causes of physiological NJ	0.23 ±0.11	0.26 ±0.12	1.439 [0.153]	2.71 ±0.52	0.60 ±0.22	29.191[<0.001]**
Definition of Pathological NJ	0.19 ±0.9	0.21 ±0.10	1.161 [0.248]	1.83 ±0.57	1.14 ±0.49	7.170 [<0.001]**
Causes of pathological NJ	0.42 ±0.20	0.39 ±0.17	0.893 [0.374]	4.69 ±1.18	1.19 ±0.47	21.523 [<0.001]**
Onset	0.35 ±0.15	0.40 ±0.20	1.562 [0.121]	3.69 ±0.47	1.28 ±0.57	25.478 [<0.001]**
Symptoms	0.31 ±0.15	0.28 ±0.14	1.142 [0.256]	2.94 ±0.76	1.21 ±0.53	14.583 [<0.001]**
Timing to visit physician	0.18 ±0.08	0.16 ±0.07	1.469 [0.145]	5.34 ±1.41	0.49 ±0.24	26.483 [<0.001]**
Risk factors	1.26 ±0.11	1.29 ±0.14	1.316 [0.191]	7.63 ±1.31	0.46 ±0.22	42.157 [<0.001]**
Complications	1.51 ±0.24	1.47 ±0.23	0.940 [0.349]	2.46 ±0.74	0.33 ±0.16	21.971[<0.001]**
Prevention	0.62 ±0.30	0.63 ±0.29	0.187 [0.852]	3.17 ±0.79	0.88 ±0.43	19.885[<0.001]**
Treatment	0.78 ±0.35	0.80 ±0.37	0.307 [0.760]	4.37 ±0.69	1.23 ±0.61	26.630 [<0.001]**
Total knowledge score	8.19 ±2.7	8.46 ±3.1	0.513 [0.609]	46.77 ±9.13	13.29±3.60	26.644 [<0.001]**

*** Highly statistically significant*

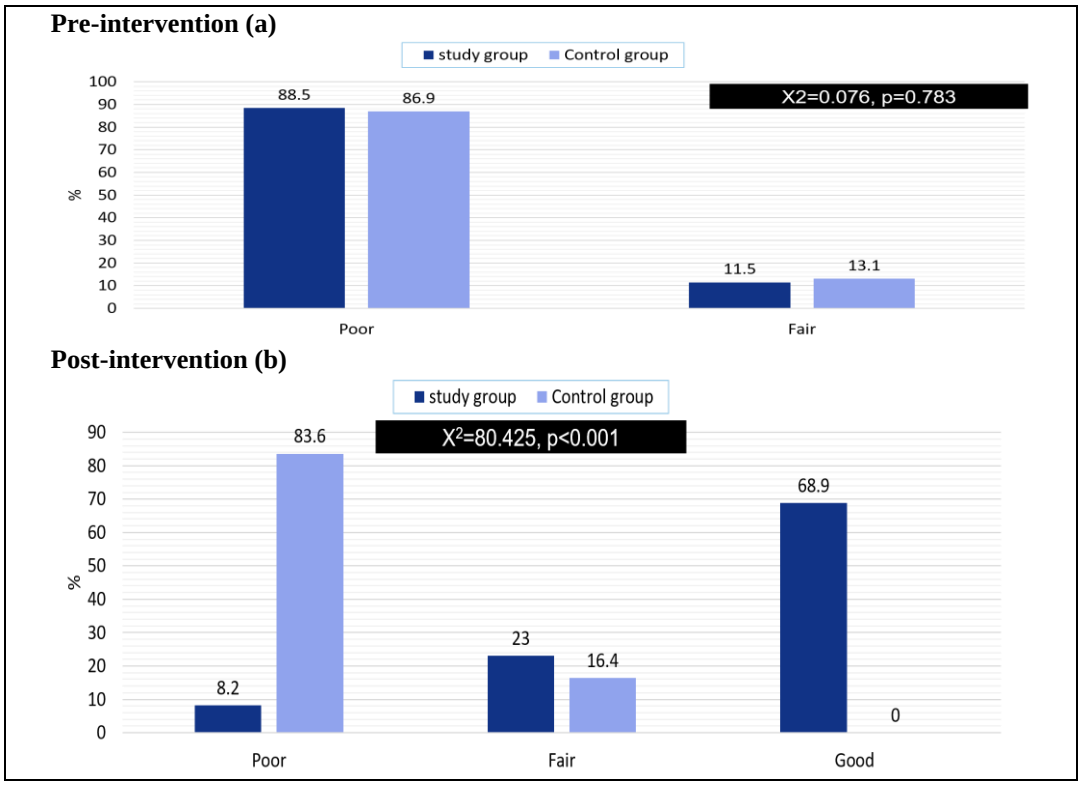

Figure 3. The total knowledge level regarding neonatal jaundice between the study and control groups pre-intervention (a) and post-intervention (b)

Table 3. Comparison of the newborn characteristics among the studied groups

	Study group		Control group		Chi square test	
	N (61)	%	N (61)	%	X^2	p
Mode of delivery						
Normal vaginal	14	23.0	10	16.4		
Cesarean section	47	77.0	51	83.6	0.830	0.362
Newborn weight at birth						
Normal	54	88.5	48	78.7		
Bigger than normal	7	11.5	13	21.3	2.153	0.142
Neonatal jaundice						
No	12	19.7	16	26.2		
Yes	49	80.3	45	73.8	0.742	0.389
If yes, what type of neonatal jaundice						
Physiological (treated at home)	39	79.6	41	91.1		
Pathological (referred to hospital for treatment)	10	20.4	4	8.9	2.456	0.117
Time of labor						
Preterm	7	11.5	3	4.9		
Full term	54	88.5	58	95.1	1.743	0.187

Table 4. Comparison of levels of practice among the studied groups regarding postnatal care for their babies exhibiting neonatal jaundice

	Study group (n=49)		Control group (n=45)		Chi square test	
	N	%	N	%	X^2	p
Feeding methods						
Breastfeeding exclusively	46	93.9	6	13.3		
Breastfeeding and artificial	3	6.1	28	62.2		
Artificial	0	0.0	11	24.4	61.872	<0.001**
Use neon lamp at home						
No	7	14.3	41	91.1		
Yes	42	85.7	4	8.9	55.405	<0.001**
Use medical herbs						
No	41	83.7	11	24.4		
Yes	8	16.3	34	75.6	33.293	<0.001**
Maintain exposure to sunlight						
No	2	4.1	34	75.6		
Yes	47	95.9	11	24.4	50.711	<0.001**
Blanching skin by applying digital pressure						
No	4	8.2	45	100.0		
Yes	45	91.8	0	0.0	79.279	<0.001**
Weight monitoring						
No	11	22.4	37	82.2		
Yes	38	77.6	8	17.8	33.539	<0.001**
Observe infant behavior						
No	11	22.4	41	91.1		
Yes	38	77.6	4	8.9	44.742	<0.001**
Observe stool color						
No	17	34.7	37	82.2		
Yes	32	65.3	8	17.8	21.676	<0.001**
Mean ±SD	3.3 ±1.2		1.6 ±0.8		8.007	<0.001**

*** Highly statistically significant*

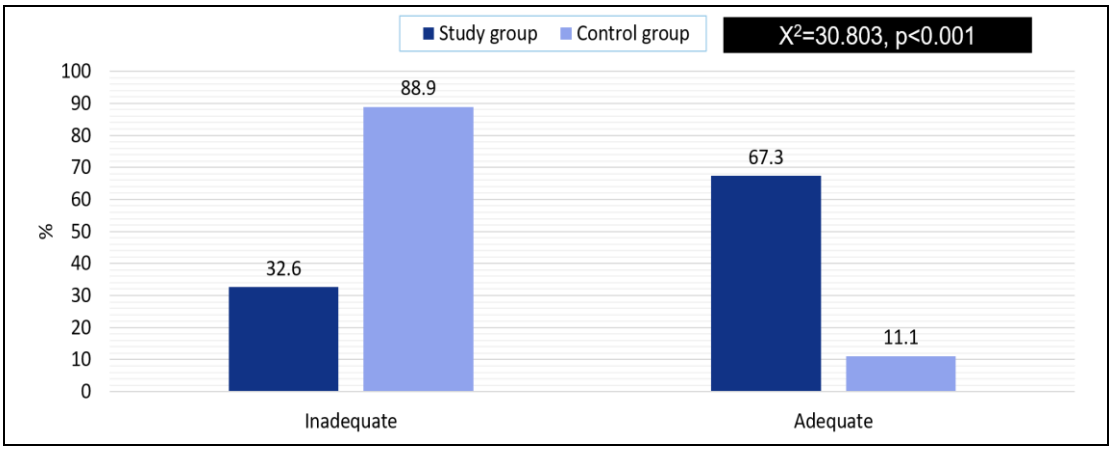

Figure 4. The postnatal total practice levels regarding neonatal jaundice between the study and control groups after implementing the antenatal sessions

Discussion

Mass antenatal education sessions regarding NJ are needed by high-risk primigravidas to improve the early detection of NJ, timing of treatment, and prevention of complications to maintain neonatal health. This study aimed to examine the effect of antenatal sessions on postnatal knowledge and practices regarding NJ among high-risk primigravidas. The findings of the current study will be discussed in light of the following hypotheses: H.1. High-risk primigravid women who undergo antenatal sessions regarding NJ would gain a satisfactory knowledge score compared with the control group. H.2. High-risk primigravid women who undergo antenatal sessions regarding NJ would exhibit an adequate practice level of postnatal care for their babies regarding jaundice compared with the control group.

Our findings revealed that most pregnant women in both groups were exhibiting DM, preeclampsia, and placenta previa. Similarly, a recent Iranian study conducted by **Boskabadi et al (2020)**, which aimed to systematically review the maternal risk factors of neonatal hyperbilirubinemia, found that preeclampsia, DM, and vaginal bleeding were the most common maternal risk factors for NJ.

In our study, nearly three-quarters of the study group and majority of the control group reported that they had knowledge about NJ. However, during the pre-test, all subjects responded incorrectly and had poor knowledge scores. These findings highlight the lack of health literacy among those pregnant women. They have only heard about NJ, but did not have sufficient and accurate knowledge about it. Likewise, **Olatunde et al. (2020)**, who studied the NJ perception of pregnant women attending an antenatal clinic at a Nigerian hospital, found that, despite the fact that more than three-quarters of pregnant women have heard about NJ, most had poor levels of knowledge about its causes, treatment, danger signs, and complications. Another Nigerian study by **Onyearugha, Chapp-Jumbo, and George (2016)** found that majority of pregnant women were aware of NJ, but had poor knowledge of its causes, danger signs, consequences, and management.

Alarmingly, most participants in the study and control groups cited their relatives as their main source of knowledge about NJ, whereas only a minority cited the medical team. This could be attributed to the workload experienced by healthcare workers, as well as the absence of educational facilities such as antenatal educational classes and teaching materials that are important for educating pregnant women during their antenatal follow-up visits. Likewise, an Egyptian study of the WHO conducted by **Iskander, Gamaleldin, and Kabbani (2012)** aimed to explore the reasons for the late presentation of cases of severe neonatal hyperbilirubinemia among one hundred and thirty infants and found that none of the parents of these infants received any specific instructions regarding NJ.

Other recent Egyptian studies also recommended on-the-job training for healthcare workers about neonatal care, specifically regarding neonatal hyperbilirubinemia, and regular education workshops about NJ (**Mostafa et al, 2019; Al Gameel, El-Sherbiny, Mohamed, and Amin, 2020**). Moreover, **Allahony et al. (2016)** recommended that healthcare providers should continuously educate pregnant women about NJ during ANC, with a special focus on its causes and danger signs of its complications. In line with our findings, a Saudi Arabian study by **Alfouwais et al. (2018)** also found that pregnant women got their information about NJ mostly from relatives and friends, and the least information coming from healthcare workers. In contrast to our study findings, however, **Onyearugha et al. (2016) and Olatunde et al. (2020)** found that pregnant women got their information about NJ mostly from healthcare workers.

Regarding the level of knowledge about NJ, there were no significant differences between the two groups pre-intervention, because all pregnant women had poor levels of knowledge. However, post-intervention, the levels of knowledge in the study group improved, as more than two thirds of them had a good level of knowledge. Conversely, most of the control group still had poor knowledge levels. The difference between both groups was highly significant. These findings may be explained by the absence of the role of healthcare workers as educators, as well as the absence of antenatal education classes provided to

pregnant women. Our results also highlight the effectiveness of the antenatal session materials given in this study.

Similarly, an Egyptian study by **Khalaf et al. (2019)** reported that primigravidas' knowledge about NJ significantly improved post-intervention. An Iranian study conducted by **Kashaki et al. (2016)** also reported that the level of knowledge about NJ was improved in trained mothers and remained low in untrained mothers, with a highly significant difference.

In our study, majority of the neonates in both groups were delivered via CS. A Turkish study by **Siyah Bilgin, Altun Koroglu, Yalaz, Karaman, and Kultursay (2013)** also reported in their study that slightly less than three quarters of the studied infants were delivered via CS. An Egyptian study by **Mohammed, Nasef, EL Kazaz, and Mohammed (2016)** also reported that most neonates were delivered via CS. Our study showed that most NJ cases were due to physiological jaundice and treated at home. Similarly, an American study by **Pan and Rivas (2017)** found that majority of neonates exhibited physiological jaundice.

Majority of mothers in our study group demonstrated an adequate level of practice regarding how to provide care after delivery for their babies exhibiting NJ, in terms of the following: maintaining exclusive breastfeeding, maintaining exposure to sunlight, blanching the skin to check color, and using a neon lamp at home. In contrast, majority of mothers in the control group demonstrated an inadequate level of practice. The differences between the two groups were statistically significant. This is a logical finding, because the level of knowledge of the study group was improved after the intervention. Thus, these results could be attributed to the antenatal sessions and the handbook that included information about NJ, specifically about caring for babies exhibiting NJ. When pregnant women have enough information about a topic and appreciate its significance, they feel more empowered, and self-confident to carry it out; this explains the adequate practice rate in the current study. Mothers in the control group had an inadequate level of practice; this may be due to a lack of awareness about the care of neonates with hyperbilirubinemia, lack of continuous supervision and guidance, and poor knowledge levels.

This explanation is supported by an Indian study by **Karale, Mohite, Patil, Kadam, and Karale (2018)** that concluded that the planned educational program regarding the management of NJ was an effective method for providing and enhancing knowledge. Similarly, an Egyptian study by **Mohammed et al. (2016)** reported that the practices of actual nurses regarding NJ significantly improved after they underwent an educational program. Moreover, **Kashaki et al. (2016)** reported that the mean score for practices related to NJ was significantly higher in trained mothers than in untrained ones. A recent Nigerian study by **Olanrewaju and Chalice (2020)** found post-intervention mean scores regarding the management of NJ significantly improved among participants in the experimental group.

Conclusion

Holding antenatal sessions about neonatal jaundice for high-risk primigravidas was effective in instilling satisfactory knowledge and adequate practical skills about postnatal care for babies exhibiting neonatal jaundice.

Recommendations

Considering the positive effect of antenatal sessions in high-risk primigravidas, the following are recommended:

- Awareness programs with adequate health information regarding neonatal jaundice should be conducted for high-risk primigravidas attending antenatal clinics to improve their health literacy.
- Nurses should be encouraged to take an active role in conducting antenatal education sessions suitable for high-risk primigravidas.
- Awareness campaigns should be appropriately held at the community level through outreach programs or home visits for high-risk primigravidas who are unable to attend postpartum follow-up visits to increase their awareness and improve their practical approach regarding neonatal jaundice, thus decreasing rates of neonatal morbidity and mortality.

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