

Impact of Structured Nurse-Led Intervention on Maternal Knowledge, Practices, and Labour Outcomes in High-Risk Pregnancy

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ABSTRACT

Background: Many high-risk pregnancies result in negative health outcomes for mothers and babies, mainly occurring in regions with few resources. Handling prenatal care by means of organized educational classes or seminars improves mothers' and babies' health. This study checks if a planned nurse-guided educational program for antenatal mothers increases their knowledge, influences their antenatal habits, and improves outcomes for their babies during labour.

Methods: To carry out the study, 160 antenatal mothers were picked using purposeful sampling, with 80 assigned to the experimental group and 80 to the control group. Both before and after the training, teachers were assessed with structured knowledge and practice quizzes and found impressive positive results on their skill assessments at work. Nurses in the experimental group offered a planned interventional program on high-risk pregnancy to the women involved, whereas the control group got standard routine antenatal care. Chi-square tests and both descriptive and inferential statistics were used to look at the data.

Results: After taking the post-test, the experimental group showed much higher scores than the control group in both knowledge ($p \leq 0.001$) and practice ($p \leq 0.001$). In particular, half of the individuals in the intervention group reached "good practice" levels after the intervention, in contrast to the control group where no changes were noted. Moreover, the results of our study suggest that when the intervention was undertaken, the occurrence of PROM, preterm birth, fetal distress, and low birth weight dropped sharply ($p \leq 0.001$). More members of the experimental group had simple deliveries (41.25%) than did the participants in the control group (16.25%).

Conclusion: The plan led by nurses raised the mothers' awareness and prompted them to follow good practices during pregnancy, improving labour outcomes among high-risk cases. As a result, nurses should regularly provide health information to expectant mothers to reduce complications and make their own and their children's health better

Keywords: High-risk pregnancy, Nurse-led intervention, Antenatal education, Maternal knowledge, Labour outcomes, Maternal practices, Structured teaching, Pregnancy complications

1. INTRODUCTION

Many cases in high-risk pregnancies cause more problems and deaths for mothers and newborns around the world. When quality antenatal care is hard to obtain in developing countries such as India, what a woman knows and does during her pregnancy is key in deciding the health of the child. Many researchers have proven that proper antenatal education and planned intervention by nurses improves maternal behavior and results [1], [2]. Switching to nurse-led education models is a step toward providing healthcare that is based on everyone, including prevention, catching sickness early, and encouraging a healthy lifestyle. Since they are in touch with patients often, nurses are in the ideal position to teach them about health, watch for signs of problems, and offer support, mainly to expectant mothers who are at high risk. Although medical technology is improving, too little knowledge about pregnancy and insufficient prenatal care keep limiting the effectiveness

of healthcare to prevent negative outcomes for mothers and babies [3], [4]. Studies and research are showing that video-assisted modules, group-based training, and counseling can assist expectant mothers in improving their behaviors and understanding important matters [5], [6].

Its value is seen in both education and cost, plus it can be easily managed even in situations with not enough resources. It has been proven that nurse-led group education helps pregnant women make better use of prenatal care and feel more confident about following health guidelines [4], [7]. When doctors are not available enough in some settings, giving nurses specific training can address the shortage of services and help to boost maternal and fetal health. A previous study indicates that not knowing about caring for a newborn, breastfeeding, early-onset problems, and nutrition is linked to complications occurring during and after delivery [8], [9]. More knowledge about these things can influence a person's actions, making it less likely that they experience preventable diseases such as preeclampsia, anemia, gestational diabetes, and having a low birth weight. [10], [11].

When a pregnancy is considered high-risk, education on antenatal care matters greatly since it guides people to notice problems and seek necessary care. Relaying pregnancy advice via pamphlets or short classes has only had a small effect on changing people's behaviors. On the other hand, examining the impact of video-assisted learning and nurse-led sessions has revealed that such approaches greatly contribute to mothers learning more and having more confidence [2], [5], [12]. The approaches are based on studies that explain learning for adults through interactivity, repetition, and relevance to their lives. In addition, structured educational programs support people by helping them learn new things and follow important guidelines for safe pregnancy, including iron and folic acid, regular visits to the doctor, checking blood pressure, and being ready for birth [13], [14].

In the areas of breastfeeding, caring for newborns, and cleanliness for expectant mothers, educating patients by nurses has increased the positive outcomes [15], [16]. A lot of mothers living in rural and poor areas are not informed by the WHO about breastfeeding directly, caring for umbilical cords, and proper warmth for the child, leading to higher risks for their newborns [17], [18]. Such an approach fills the gaps by explaining things simply and steadily, making sure new mothers can ask questions and feel more confident. A study held in Karnataka found that training and sessions conducted by nurses improved participants' postnatal care knowledge, proving the effectiveness of these models [19]. It has also been noticed in studies from other South Asian countries that maternal education by nursing staff led to a lesser number of neonatal cases and made the labor process safer [20], [21].

When knowledge is strengthened and behaviors are addressed, public health interventions have a greater effect in high-risk pregnancy management. Studies find that organized lessons before birth increase mothers' awareness and lead them to change their attitudes and behaviors for the better, mainly when they join conversations and help decide on their care [22], [23]. By taking part in these activities, mothers play a bigger role in their care and thus follow medical advice and plans to deliver their babies safely. Besides, teaching modules that consider the culture and language of the participants tend to be accepted and useful more often than general ones [24], [25]. When mothers gain knowledge, it becomes likely that deliveries are done early, they take supplements as directed, and they notice potential risks, which increases the chances of a safe delivery and the survival of their children [26], [27].

Moreover, the involvement of nurses continues during the postpartum period by offering support for breastfeeding, hygiene of newborns, and noticing the signs of postpartum depression [6], [7], [28]. Because of this model of care, antenatal lessons keep having a positive impact even after birth. When mothers gain useful knowledge, confidence, and mental readiness through these interventions, positive results last for them and their children. Many experts argue that joining family members, mainly the spouse and the mother-in-law, in parenting sessions is vital to ensure the supportive environment is kept and behavior is sustained [29], [30]. So, having nurse intervention in place serves to raise awareness as well as to boost maternal empowerment, especially in antenatal mothers who are more at risk.

For this reason, the present study was developed to determine the positive influence of a structured nurses' intervention on antenatal mothers with high-risk pregnancies. Because of the comparison between the two groups, the study clearly shows how well nurse-led teaching works and benefits the healthcare of mothers. Results from this study are meant to add to the evidence that supports nurses conducting antenatal care and stress the impact of proper education in improving health indicators for both mothers and their babies.

2. RELATED STUDIES

Many studies document that nurse-led measures help improve the health of pregnant and newborn individuals, mostly in antenatal care. These authors [1] showed that special educational sessions organized by nurses greatly improved mothers' knowledge and attitudes regarding breastfeeding and care. Also, Pushpaveni [2] indicated that such video-assisted modules increased the quality of antenatal care and enhanced the results of pregnancies. It was found by Noor et al. [4] that group education by nurses raised awareness and use of antenatal services. Arumugam et al. [5] agreed that having a nursing plan for care helps both mother and infants, especially in regard to breastfeeding. In addition, previous study from Gul et al. [3] highlighted that many mothers who go to outpatient clinics lack important knowledge about newborn care. In their studies,

Link et al. [6] concluded that online modules improved self-confidence in postpartum care for nurses and others, and Şimsek-Çetinkaya et al. [7] confirmed that using internet-based breastfeeding counseling helped improve many aspects of pregnant women's care. Several other studies, for example by Joshi et al. [17] and Castalino et al. [20], show that structured teaching programs support the learning of newborn care and postpartum care practices. Also, Ahmed et al. and Amolo et al. noticed that mothers' awareness about important newborn practices is not satisfactory, and they encouraged nurses to deliver more appropriate education in hospitals. Maheswary et al. [21] and Padmavathi et al. [22] revealed that mothers can benefit from the early start to breastfeeding and should receive nursing care following caesarean delivery. Work by Shahana [28] and Nivashini & Thenmozhi [29] showed the importance of certain breastfeeding practices and difficulties such as breast crawl and tongue-tie, proving that the instructions for breastfeeding must be clear and have variety. Overall, Kaur and Charan [23] and Kaur and Kaur [24] highlighted that making sure hygiene is followed and preventing infections related to childbirth are very important, and nurse-led programs have succeeded in these areas. All these studies agree that nurses trained to provide antenatal education play a key role in enhancing mothers' knowledge, behaviour, and results of childbirth.

3. RESEARCH METHODOLOGY

This study uses a certain method to determine if an intervention program developed by nurses helps improve knowledge, care during pregnancy, and outcomes during labor for expectant mothers. The research plan includes the design used, where the research will be carried out, study participants, sampling methods, the instruments used, data collection steps, and data analysis.

Research Design

Pre-test and post-test control groups were used to study the impact of a nurse-focused intervention with the quasi-experimental research design. With this design, the researcher could easily see any modification in knowledge, practice, and labor for the two groups across time.

Setting of the Study

The research was carried out in Puducherry's selected hospitals that had antenatal units and followed ethical rules for research actions.

Population of the Study

All the women who were expecting children and attended specific hospitals in Puducherry during the study were part of the target population.

Sample Size and Sampling Technique

A total of 160 antenatal mothers were selected using purposive sampling. They were equally divided into two groups:

- **Experimental group** (n = 80): Received the structured nurse-led interventional package.
- **Control group** (n = 80): Received routine antenatal care.

Inclusion Criteria:

- Pregnant women in the second or third trimester.
- Willing to participate and provide informed consent.
- Free from serious mental illness or cognitive impairment.

Exclusion Criteria:

- Mothers with existing chronic medical conditions not related to pregnancy.
- Participants unwilling to continue throughout the study.

3.6 Description of the Intervention

The Structured Nurse-Led Interventional Package included:

- One-on-one counseling.
- Visual aids and demonstration of antenatal practices.
- Dietary and hygiene guidance.
- Risk signs and timely reporting training.

Sessions were conducted in small groups in local language, and follow-up reinforcement was provided during routine visits.

3.7 Data Collection Tools and Techniques

Three key tools were developed and validated:

1. **Knowledge Questionnaire:** 30 multiple-choice items on high-risk pregnancy concepts.
2. **Practice Checklist:** 30-item tool covering routine antenatal practices.
3. **Labour Outcome Checklist:** Documented real-time labor outcomes post-delivery (e.g., PROM, anemia, LSCS, APGAR scores, birth weight).

Pre-test and post-test assessments were conducted for both experimental and control groups to measure intervention effects.

3.8 Validity and Reliability

The instruments were validated by experts in obstetrics, nursing, and biostatistics. Reliability was assessed using **Cronbach's Alpha** for internal consistency and yielded acceptable scores ($\alpha > 0.75$) for all tools.

4. RESULTS AND INTERPRETATION

This study presents the statistical analysis and interpretation of the data collected to evaluate the effectiveness of a structured nurse-led intervention on antenatal mothers' knowledge, practices, and labor outcomes regarding high-risk pregnancy. The findings revealed no significant difference in pre-test practice scores between the experimental and control groups ($p > 0.05$).

4.1 Demographic and Maternal Profile of the Respondents

In interventional studies like this one, understanding the distribution of maternal and demographic variables between the experimental and control groups is crucial. This baseline information establishes the initial comparability of groups and provides context for interpreting outcomes related to maternal health, knowledge, and practices. Table 1 presents the detailed distribution of various maternal characteristics including gravida, parity, pregnancy type, duration of marital life, age at marriage, anthropometric measures, and the presence of high-risk pregnancy symptoms. This data ensures that any observed post-test differences can be attributed to the intervention rather than to differences in baseline profiles.

Table 1: Distribution of Maternal Variables Among Antenatal Mothers in Experimental and Control Groups (N = 160)

Maternal Variables	Category	Experimental Group (n=80)	%	Control Group (n=80)	%
Gravida	Gravida 1	29	36.25	36	45.00
	Gravida 2	33	41.25	40	50.00
	Gravida ≥ 3	18	22.50	4	5.00
Para	1	43	53.75	48	60.00
	2	27	33.75	30	37.50
	≥ 3	10	12.50	2	2.50
Pregnancy Type	Planned	2	2.50	4	5.00
	Unplanned	78	97.50	76	95.00
Duration of Marital Life	1 year	10	12.50	8	10.00
	2 years	14	17.50	24	30.00
	3 years	16	20.00	17	21.25
	≥ 4 years	40	50.00	31	38.75
Age at Marriage	18-24 yrs	62	77.50	52	65.00

	25-29 yrs	16	20.00	26	32.50
	30-35 yrs	2	2.50	2	2.50
Height	141–150 cm	12	15.00	20	25.00
	151–160 cm	52	65.00	41	51.25
	161–170 cm	16	20.00	19	23.75
Weight	41–50 kg	10	12.50	15	18.75
	51–60 kg	32	40.00	28	35.00
	61–70 kg	19	23.75	24	30.00
	>70 kg	19	23.75	13	16.25
BMI	18.5–24.9	35	43.75	39	48.75
	25.5–26.5	15	18.75	10	12.50
	26.5–30.5	17	21.25	16	20.00
	>31.4	13	16.25	15	18.75
Symptoms of High-Risk Pregnancy	Yes	66	82.50	64	80.00
	No	14	17.50	16	20.00

The two groups were similar in demographic characteristics, indicating appropriate randomization. Most participants were multigravida, had unplanned pregnancies, and had been married for over 3 years. The prevalence of high-risk symptoms was noted in over 80% in both groups.

4.2 Pre-test Knowledge Scores

A critical component of any interventional study is to establish the baseline equivalence between the control and experimental groups. This ensures that any post-intervention differences can be confidently attributed to the intervention itself and not to pre-existing disparities. In the present study, both pre-test knowledge and practice levels regarding high-risk pregnancy were assessed among antenatal mothers in both groups prior to administering the structured nurse-led intervention. The comparison was done using the Chi-square test to examine group homogeneity.

Table 2: Comparison of Pre-Test Knowledge on High-Risk Pregnancy

Knowledge Level	Experimental Group (n=80)	%	Control Group (n=80)	%	Chi-square	p-value
Inadequate Knowledge	53	66.25	50	62.50	$\chi^2 = 0.25$	0.62 (NS)
Moderate Knowledge	27	33.75	30	37.50		
Adequate Knowledge	0	0.00	0	0.00		

Both groups showed similar inadequate knowledge about high-risk pregnancy before the intervention. The chi-square test was not significant ($p > 0.05$), confirming homogeneity between groups at baseline.

4.3 Pre-Test Practice Scores

Table 3: Comparison of Pre-Test Practice Scores

Practice Score	Experimental Group	%	Control Group	%	Chi-square	p-value
Poor Practice	45	56.25	37	46.25	$\chi^2 = 1.60$	0.21 (NS)

Moderate Practice	35	43.75	43	53.75		
Good Practice	0	0.00	0	0.00		

The pre-intervention practice levels were mostly poor to moderate across both groups, with no significant difference noted, indicating an equal baseline.

4.4 Post-Test Practice Scores

Effective antenatal care practices play a crucial role in determining maternal and fetal health outcomes, particularly in high-risk pregnancies. After receiving a structured nurse-led intervention package, the practice patterns among antenatal mothers in the experimental group were expected to improve significantly compared to the control group. To evaluate this, post-test practice scores were analyzed and compared between both groups using the Chi-square test. The practices assessed included antenatal checkups, personal hygiene, supplementation adherence, nutrition, and preparedness for labor.

Table 4: Comparison of Post-Test Practice Scores

Practice Score	Experimental Group	%	Control Group	%	Chi-square	p-value
Poor Practice	4	5.00	33	41.25	$\chi^2 = 64.19$	0.001*** (S)
Moderate Practice	36	45.00	47	58.75		
Good Practice	40	50.00	0	0.00		

Post-intervention, there was a marked improvement in the experimental group, where 50% reached good practice scores compared to none in the control group. The difference was statistically highly significant.

4.5 Post-Test Labour Outcome Scores

A critical indicator of the effectiveness of antenatal interventions is the improvement in labour and neonatal outcomes. In this section, the impact of a structured nurse-led intervention on the labor outcomes of antenatal mothers is evaluated by comparing the post-test results of the experimental group (who received the intervention) and the control group (who received routine care). Labour outcomes such as PROM (Premature Rupture of Membranes), LSCS (Lower Segment Caesarean Section), PPH (Postpartum Hemorrhage), hypertension, fetal distress, and APGAR scores were analyzed using the Chi-square test to assess statistical significance.

Table 5: Labour Outcomes Among Experimental and Control Groups

Labour Outcome	Experimental Group	%	Control Group	%	Chi-square	p-value	Significance
PROM	1	1.25	20	25.00	19.78	0.001	S
LSCS	47	58.75	60	75.00	4.77	0.03	S
Normal Labour	33	41.25	13	16.25	12.20	0.001	S
PPH	0	0.00	5	6.25	5.16	0.02	S
Hypertension	21	26.25	41	51.25	10.53	0.001	S
Preterm Baby	2	2.50	37	46.25	41.53	0.001	S
Low Birth Weight	2	2.50	45	56.25	55.70	0.001	S
Fetal Distress	2	2.50	34	42.50	36.70	0.001	S
Low APGAR (5 min)	6	7.50	33	41.25	24.72	0.001	S

The experimental group had significantly better labor outcomes. Reduced PROM, fewer preterm births, and higher APGAR scores post-intervention clearly indicate the effectiveness of the structured nurse-led intervention.

4.6 Post-Test Practice: Item-wise Comparison Between Experimental and Control Groups

Understanding the impact of nurse-led structured interventions on maternal health practices is crucial to improving pregnancy

outcomes. In this section, the post-test practice behaviors of antenatal mothers from both the experimental group (who received the interventional package) and the control group (who did not) are compared item-wise. This analysis evaluates specific maternal actions—such as antenatal check-ups, nutritional adherence, hygiene, rest, and preparedness for delivery—that are critical during high-risk pregnancies. The Chi-square test was used to determine the statistical significance of the differences observed between the two groups.

Table 6: Item-Wise Distribution of Post-Test Practice Scores Among Antenatal Mothers

Practice Item	Experimental Group (n=80)	%	Control Group (n=80)	%	χ^2 Value	p-value	Significance
Attending all antenatal checkups	76	95.00	45	56.25	30.12	0.001	Significant
Maintaining personal hygiene	78	97.50	51	63.75	27.98	0.001	Significant
Consuming iron and folic acid tablets	75	93.75	48	60.00	25.61	0.001	Significant
Following a balanced diet	72	90.00	50	62.50	16.96	0.001	Significant
Resting for at least 8 hours daily	74	92.50	46	57.50	24.43	0.001	Significant
Recognizing danger signs in pregnancy	70	87.50	42	52.50	21.56	0.001	Significant
Knowing early signs of labor	68	85.00	38	47.50	23.64	0.001	Significant
Preparing hospital bag in advance	77	96.25	44	55.00	36.04	0.001	Significant
Planning for delivery at health facility	79	98.75	49	61.25	41.88	0.001	Significant
Involving husband in prenatal decisions	65	81.25	37	46.25	20.71	0.001	Significant

The table clearly shows that after the nurse-led structured intervention, the experimental group demonstrated superior maternal practices in all key domains, with statistically significant differences across every item ($p < 0.001$). These results underline the practical impact of antenatal education.

4.7 Association of Selected Demographic Variables with Post-Test Knowledge Scores

This Table 7 explored the association between selected demographic variables and the post-test knowledge scores of antenatal mothers in the experimental group. Investigating these relationships helps to identify which background factors significantly influence the effectiveness of nurse-led educational interventions aimed at enhancing knowledge regarding high-risk pregnancies. The Chi-square test was employed to determine statistical associations, with $p < 0.05$ considered significant.

Table 7: Association of Demographic Variables with Knowledge Score in Experimental Group (n = 80)

Demographic Variable	Chi-square Value	df	p-value	Interpretation
Age	4.76	2	0.09	Not Significant
Educational Status	10.52	2	0.005**	Significant
Occupation	3.21	2	0.20	Not Significant
Type of Family	5.39	1	0.02*	Significant
Monthly Income	2.97	3	0.39	Not Significant

Parity	4.05	2	0.13	Not Significant
Place of Residence	6.78	1	0.01*	Significant

Among the demographic variables, educational status, type of family, and place of residence showed significant associations with post-test knowledge scores, suggesting that women from nuclear families, urban areas, and those with formal education benefited more from the intervention.

4.8 Association of Selected Demographic Variables with Practice Scores

the relationship between selected demographic variables and the post-test practice scores of antenatal mothers in the experimental group was explored. Understanding this association is essential for determining how factors such as age, education, occupation, family type, income, gravida status, and place of residence may influence the effectiveness of a nurse-focused interventional package aimed at improving maternal practices during high-risk pregnancy.

Table 8: Association of Demographic Variables with Post-Test Practice Score in Experimental Group

Demographic Variable	Chi-square Value	df	p-value	Interpretation
Age	3.34	2	0.18	Not Significant
Educational Status	11.25	2	0.004**	Significant
Occupation	2.71	2	0.25	Not Significant
Family Type	6.91	1	0.008**	Significant
Monthly Income	3.52	3	0.32	Not Significant
Gravida	5.11	2	0.07	Not Significant
Place of Residence	7.45	1	0.006**	Significant

The analysis indicates that educational status, family type, and place of residence have a statistically significant association with the post-test practice scores among antenatal mothers in the experimental group.

- Educational Status ($p = 0.004$): Mothers with higher levels of education showed better adherence to health-promoting practices, likely due to better comprehension of health information and the ability to act upon professional guidance effectively.
- Family Type ($p = 0.008$): Mothers from nuclear families practiced better antenatal care, which could be attributed to increased autonomy in health decisions and less interference from extended family structures.
- Place of Residence ($p = 0.006$): Urban mothers demonstrated improved practice scores compared to rural mothers, indicating that access to healthcare services and exposure to health information may be better in urban settings.

These findings underscore the importance of tailoring educational interventions to socio-demographic profiles—especially focusing more intensively on mothers with lower education levels, from joint families, or residing in rural areas—while also recognizing the universal potential of nurse-led initiatives to enhance maternal practice outcomes.

Post-test practice scores were significantly associated with educational status, family type, and place of residence. These findings suggest that tailored educational interventions can be further customized based on socio-demographic background to enhance outcomes.

- Significant improvement in knowledge and practice scores was observed among antenatal mothers in the experimental group post-intervention.
- Statistically significant reduction in adverse labor outcomes such as PROM, PPH, low birth weight, preterm labor, and fetal distress was observed in the experimental group.
- Educational status, family type, and place of residence were found to influence both knowledge and practice outcomes.

5. CONCLUSION

The present experimental study aimed to assess the effectiveness of a structured nurse-focused interventional package on the knowledge, practice, and labor outcomes among antenatal mothers regarding high-risk pregnancy in a selected hospital in Puducherry. Based on a systematic comparison between the experimental and control groups, the study demonstrated that the intervention had a substantial and statistically significant impact on improving antenatal mothers' knowledge and health-

related practices. Initially, both groups exhibited comparable levels of knowledge and practice, with most participants showing inadequate awareness regarding essential aspects of high-risk pregnancy. Following the nurse-led educational intervention, the experimental group exhibited marked improvements, especially in the domains of personal hygiene, nutritional supplement intake (iron, folic acid, calcium), antenatal check-ups, and avoidance of high-risk behaviors. These findings affirm the crucial role that nurses can play in empowering expectant mothers through structured health education. The intervention significantly contributed to better maternal and neonatal outcomes. Mothers in the experimental group experienced fewer complications such as premature rupture of membranes (PROM), low birth weight, fetal distress, and preterm labor. There was also a higher incidence of normal vaginal deliveries and reduced need for caesarean sections. These outcomes provide strong evidence supporting the clinical value of structured, nurse-led antenatal programs in improving both preventive care and delivery outcomes. In conclusion, the study underscores the effectiveness of nurse-focused interventional packages in enhancing maternal health knowledge, encouraging safe pregnancy practices, and reducing risks during labor and delivery. The findings suggest that integrating such nurse-led educational interventions into routine antenatal care services can be a highly effective strategy in managing high-risk pregnancies and improving maternal-child health indicators in hospital and community settings.

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