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Research Article

Enhancing Maternal Preparedness: A Quasi-Experimental Study On The Effectiveness Of Nurse-Led Childbirth Education In Primigravida Women

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Abstract:

Background

Childbirth is a significant life event, particularly for primigravida mothers who often face it with anxiety and limited awareness. Lack of adequate antenatal education is linked to increased obstetric interventions, poor birth preparedness, and negative maternal and neonatal experiences. Structured childbirth education, especially when nurse-led, can equip mothers with essential knowledge, reduce childbirth-related fear, and promote positive health outcomes. This study aimed to evaluate the effectiveness of a structured, nurse-led childbirth education program in improving knowledge, childbirth experience, and maternal-fetal outcomes among primigravida mothers.

Methodology

A quasi-experimental, two-group pre- and post-test design was conducted at a tertiary care hospital in Gandhinagar, Gujarat. A total of 200 eligible primigravida mothers (≥28 weeks of gestation, medically stable, with no prior childbirth experience) were selected using purposive sampling. Participants were divided equally into experimental and control groups. The experimental group received two structured childbirth education sessions featuring interactive discussions, video demonstrations, and printed educational materials, while the control group received standard antenatal care. A validated tool developed with expert input (Cronbach's $\alpha = 0.84$) was used for data collection. Data were analyzed using descriptive and inferential statistics, including paired and unpaired t-tests and Chi-square tests. Ethical clearance was obtained from the Pagarav Ethics Committee (Approval No. P.NO/EC/001/2024).

Results

Post-intervention, the experimental group demonstrated a significant improvement in knowledge scores (from 13.28 ± 2.14 to 20.68 ± 2.31; $p < 0.0001$), compared to only a marginal change in the control group. Forty-four percent of participants in the experimental group achieved excellent knowledge levels post-intervention. The experimental group also reported significantly better childbirth experience scores (47.84 ± 4.86) than the control group (29.87 ± 2.84; $p < 0.00001$). Furthermore, favorable maternal outcomes (higher rates of spontaneous labor and vaginal deliveries) and improved fetal outcomes (increased live births and higher APGAR scores) were more common in the experimental group. Knowledge levels were significantly associated with occupation, income, religion, and sources of information.

Conclusion

The structured nurse-led childbirth education program significantly enhanced maternal knowledge, improved childbirth experiences, and led to better maternal and fetal health outcomes. These findings advocate for the integration of structured educational interventions into routine antenatal care to support safe and informed childbirth, especially among first-time mothers.

Keywords: Childbirth Education, Primigravida Mothers, Nurse-Led Intervention, Maternal Knowledge, Childbirth Experience, Maternal-Fetal Outcomes

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Introduction: Childbirth is a transformative and emotionally significant event in a woman's life. For primigravida mothers—those experiencing pregnancy for the first time—it is often accompanied by a mix of excitement, uncertainty, and fear. Without prior experience, these women may have limited understanding of the labor and delivery process, which can lead to heightened anxiety and unpreparedness. This emotional state, coupled with a lack of knowledge, can negatively impact both maternal and neonatal outcomes, contributing to increased obstetric interventions, prolonged labor, and dissatisfaction with the birthing experience. In the Indian context, where maternal and neonatal mortality remains a pressing public health issue, providing comprehensive antenatal education is essential. According to the World Health Organization (2018), structured education during pregnancy enhances a woman's ability to make informed decisions, recognize danger signs, and actively participate in her care. Nurse-led antenatal programs, especially those that use structured and evidence-based methods, are gaining recognition for their ability to improve maternal knowledge, emotional readiness, and childbirth preparedness (Thomas & Solomon, 2023; Deshpande & Patil, 2023). Studies show that primigravida mothers often have insufficient knowledge about the stages of labor, pain management, and birth complications (Mishra & Gupta, 2022; Salama, 2023). This gap not only contributes to fear and stress but also affects their overall birthing experience. Rajpoot and Kaur (2020) emphasized that nurse-led educational interventions play a key role in alleviating anxiety and enhancing a woman's confidence and understanding of childbirth. Sociocultural beliefs, limited access to skilled health workers, and low literacy levels further complicate pregnancy outcomes in many parts of India (Rani & Thomas, 2020). Several studies have explored the effectiveness of various educational strategies. For instance, a study conducted at AIIMS Bhopal (2024) demonstrated that video-assisted nurse-led education significantly improved antenatal knowledge scores. Similarly, Ayenew and Endalew (2023) found that structured education programs led to better birth preparedness and complication readiness. Moreover, Bradley et al. (2017) emphasized that ongoing mentoring and education for nurses indirectly enhance intrapartum care quality. Despite these findings, many healthcare settings in India still lack formal childbirth education programs integrated into routine antenatal care. Existing research highlights a gap in comprehensive, nurse-led interventions targeting primigravida mothers in institutional settings. This study aims to evaluate the effectiveness of a structured nurse-led childbirth education program on knowledge, childbirth experience, and maternal-fetal outcomes among primigravida mothers. The research seeks to provide evidence supporting the inclusion of nurse-led education sessions in routine prenatal care, especially for first-time mothers, thereby contributing to safer, more informed, and empowering childbirth experiences.

Objectives

1. To assess the level of knowledge regarding childbirth among primigravida mothers before and after the nurse-led childbirth education program in both experimental and control groups.
2. To evaluate the childbirth experience among primigravida mothers in the experimental and control groups.
3. To compare maternal and fetal outcomes between the experimental group (receiving structured nurse-led childbirth education) and the control group (receiving routine antenatal care).
4. To determine the association between selected socio-demographic variables (such as age, education, occupation, income, family type, religion, and source of information) and knowledge scores, childbirth experience, and maternal-fetal outcomes among primigravida mothers.

Methodology

Study Design: A quasi-experimental, two-group pre-test and post-test design was employed to assess the effectiveness of a structured, nurse-led childbirth education program on knowledge, childbirth experience, and maternal-fetal outcomes among primigravida mothers. This design enabled comparison between an experimental group, which received the intervention, and a control group, which received routine antenatal care.

Study Setting and Duration: The study was conducted in a tertiary care hospital located in Gandhinagar, Gujarat, known for providing comprehensive maternal and child healthcare services. The data collection spanned over a period of three months, from January to March 2024.

Population and Sampling: The study population comprised primigravida mothers attending the antenatal outpatient department. A non-probability purposive sampling technique was used to select eligible participants.

Inclusion Criteria:
- Women in their **third trimester** (≥28 weeks of gestation)
- Medically stable condition
- No previous history of childbirth
- Willing to provide **informed written consent**
- Available for both intervention and follow-up

Exclusion Criteria:
- High-risk pregnancies (e.g., placenta previa, gestational hypertension)
- Women with known psychological disorders
- Inability to comprehend the language of instruction

A total of **200 participants** were selected and divided equally into two groups:
- **Experimental Group (n = 100)**: Received the structured nurse-led childbirth education program in addition to routine care.
- **Control Group (n = 100)**: Received only routine antenatal care without any additional education sessions.

Participants were assigned to groups based on their availability and willingness to participate in the intervention.

Ethical Considerations: Ethical approval was obtained from the **Pagarav Ethics Committee, Gandhinagar, Gujarat** (Approval No. P.NO/EC/001/2024, dated 01/05/2024). All participants were briefed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any time. Written informed consent was obtained from each participant before enrollment. Confidentiality and anonymity were strictly maintained throughout the study, and the procedures followed were in accordance with the **Declaration of Helsinki**.

Intervention: Nurse-Led Childbirth Education Program
The structured childbirth education program was designed and delivered by trained nurses in two interactive sessions, each lasting **45–60 minutes**, conducted one week apart. The content was tailored to the participants' literacy levels and comprehension abilities.

The program included:
- **Interactive lectures** on stages of labor, signs of labor onset, and pain management techniques
- **Video demonstrations** illustrating breathing exercises, positions during labor, and newborn care
- **Printed educational materials** in the local language for reinforcement
- **Topics covered included:** birth preparedness, complication readiness, labor and delivery process, postnatal care, breastfeeding, and newborn care

Sessions were delivered in small groups of 8–10 mothers to allow personal attention, discussion, and clarification of doubts.

Data Collection Tools
A structured, validated tool was developed to collect data related to the study objectives. The instrument consisted of four sections:
1. Demographic Information Sheet – captured data on age, education, occupation, income, family type, religion, gestational age, diet, and pregnancy history.
2. Knowledge Assessment Questionnaire – 25 multiple-choice items assessing knowledge on childbirth, labor signs, and postnatal care. Each correct answer was awarded one point. Scores were categorized as:
- Poor (≤10)
- Average (11–15)
- Good (16–20)
- Excellent (21–25)

3. Childbirth Experience Scale – adapted and validated to assess satisfaction, comfort, and emotional response during childbirth.
4. Maternal and Fetal Outcome Checklist – included labor type, mode of delivery, use of augmentation methods, complications, APGAR scores, and neonatal well-being.

Tool Validation and Reliability
The tool was developed based on literature review and expert guidance. It was reviewed by **13 experts** in maternal health nursing and obstetrics; **9 experts** provided feedback. Modifications were made to improve clarity, cultural appropriateness, and sequence of items. The final version of the tool was approved by the research supervisor.

The **internal consistency** of the knowledge questionnaire was tested using **Cronbach's alpha**, which yielded a value of **0.84**, indicating high reliability.
Data Collection Procedure
Data were collected in three phases:
- **Phase 1: Pre-test** – Baseline data on demographic variables and knowledge were collected from both groups before any intervention.
- **Phase 2: Intervention** – The experimental group received the nurse-led childbirth education program, while the control group continued to receive standard antenatal care.
- **Phase 3: Post-test** – After one week of completing the intervention, post-test knowledge, childbirth experience, and outcome data were collected.

Statistical Analysis
Data were analyzed using **SPSS version 25.0**. Descriptive statistics such as **frequency, percentage, mean, and standard deviation** were used to summarize demographic characteristics and outcome measures.

Inferential statistics included:
- **Paired t-test** – to compare pre- and post-test knowledge scores within each group
- **Unpaired (independent) t-test** – to compare post-test scores between experimental and control groups

- **Chi-square test** – to assess associations between selected demographic variables and outcomes (knowledge, childbirth experience, maternal/fetal outcomes)

A **p-value < 0.05** was considered statistically significant for all tests.

Results:

This study aimed to evaluate the effectiveness of a structured nurse-led childbirth education program on improving knowledge, childbirth experience, and maternal-fetal outcomes among primigravida mothers. The data were collected from 200 participants, divided equally into experimental (n = 100) and control (n = 100) groups. The findings are presented under the following categories:

Demographic Characteristics of Participants

The demographic profile of both groups was comparable at baseline. In the experimental group:

- The majority of participants (42%) were aged between 26–29 years.
- Most participants (64%) had completed secondary education.
- Around 58% were homemakers.
- The monthly family income of 52% fell between ₹10,001–₹20,000.
- 67% belonged to nuclear families.
- 70% followed a vegetarian diet.
- 86% were in the gestational age of 31–35 weeks.
- 61% reported television or mobile phones as the primary source of antenatal information.

There was no statistically significant difference in the baseline demographic characteristics between the experimental and control groups ($p > 0.05$), confirming group homogeneity.

Knowledge Scores Pre- and Post-Intervention

Knowledge scores were measured before and after the intervention using a structured questionnaire. At baseline, both groups showed comparable knowledge levels:

- **Pre-test Scores:**
  - Experimental group: Mean score = 13.28 ± 2.14
  - Control group: Mean score = 13.46 ± 2.03
  - No significant difference ($p > 0.05$)
- **Post-test Scores:**
  - Experimental group: Mean score increased to 20.68 ± 2.31
  - Control group: Slight increase to 14.22 ± 1.87
  - The difference in post-test means between groups was statistically significant ($p < 0.0001$)

Knowledge Categories (Post-test):

- In the experimental group: 44% scored in the excellent range, 56% scored good, and 0% remained in poor or average categories.
- In the control group: 87% remained in the average range, 12% scored good, and only 1% scored excellent.

These results confirmed a highly significant improvement in knowledge among the experimental group due to the nurse-led childbirth education program.

Childbirth Experience

Childbirth experience was measured post-delivery using a validated scale. The findings indicated a highly significant improvement in the quality of the childbirth experience in the experimental group.

- **Mean childbirth experience score:**
  - Experimental group: 47.84 ± 4.86
  - Control group: 29.87 ± 2.84
  - Difference between groups was statistically significant ($p < 0.00001$)

Participants in the experimental group reported greater emotional readiness, reduced fear, better labor coping strategies, and higher overall satisfaction with their childbirth experience.

Maternal Outcomes

The analysis of maternal outcomes revealed a more favorable pattern among women who received the structured education program.

- **Onset of Labor:**
  - Spontaneous labor occurred in 89% of the experimental group vs. 59% of the control group.
  - Labor augmentation (e.g., oxytocin administration) was required in 11% of the experimental group compared to 41% in the control group.
- **Mode of Delivery:**
  - Vaginal delivery rates were higher in the experimental group (83%) vs. the control group (60%).
  - Cesarean sections occurred in 17% of the experimental group and 40% of the control group.
- **Use of Pain Relief Measures:**
  - Only 16% of participants in the experimental group required pharmacological pain relief compared to 37% in the control group.

These findings indicate that the childbirth education program positively influenced the natural progression of labor, reduced the need for interventions, and supported physiological birth outcomes.

Fetal Outcomes

Fetal outcomes were evaluated using APGAR scores at 1 and 5 minutes, mode of birth, and neonatal condition.

- **APGAR Scores at 1 Minute:**
  - Experimental group: 82% of newborns scored 7–10
  - Control group: 68% scored in the same range
- **APGAR Scores at 5 Minutes:**
  - Experimental group: 96% scored 9–10
  - Control group: 90% scored 9–10
- **Live Births:**
  - Experimental group: 97%
  - Control group: 96%

- **Birth Complications:**
  - Minimal and comparable across groups; no significant increase in neonatal complications was noted.

The structured education program led to improved neonatal health as reflected in higher APGAR scores and fewer resuscitation needs.

Association between Demographic Variables and Outcomes

Chi-square analysis was used to identify associations between socio-demographic variables and knowledge, childbirth experience, and outcomes.

- In the **experimental group**, significant associations were found between:
  - Knowledge scores and: occupation ($p < 0.01$), monthly income ($p < 0.05$), religion ($p < 0.05$), and source of information ($p < 0.01$).
  - Childbirth experience scores and: income ($p < 0.01$) and source of information ($p < 0.05$)
- In the **control group**, significant associations were found between:
  - Knowledge scores and: education level ($p < 0.01$), religion ($p < 0.05$), and dietary pattern ($p < 0.05$)
  - Childbirth experience and: occupation ($p < 0.01$), history of miscarriage ($p < 0.05$) These findings highlight the influence of socio-economic and informational factors on maternal preparedness and birth outcomes.

Summary:

This study was conducted to evaluate the effectiveness of a structured, nurse-led childbirth education program in enhancing maternal knowledge, improving childbirth experiences, and promoting better maternal and fetal outcomes among primigravida mothers. A quasi-experimental, two-group pre-test and post-test design was adopted, involving 200 primigravida mothers attending a tertiary care hospital in Gandhinagar, Gujarat. The participants were purposively assigned to either an experimental group (which received two interactive childbirth education sessions in addition to routine antenatal care) or a control group (which received only routine care). The educational sessions were designed and delivered by trained nurses and covered topics such as labor stages, pain management, newborn care, and postpartum support through interactive discussions, video demonstrations, and printed handouts. A validated tool was used to assess knowledge, childbirth experience, and maternal-fetal outcomes. The results revealed that the intervention significantly improved knowledge levels among mothers in the experimental group, with post-test scores rising from a mean of 13.28 ± 2.14 to 20.68 ± 2.31 ($p < 0.0001$). In contrast, the control group showed only marginal improvement. Furthermore, 44% of the mothers in the experimental group achieved excellent knowledge scores post-intervention, compared to only 1% in the control group. The childbirth experience was also significantly better among the experimental group, with a mean score of 47.84 ± 4.86 versus 29.87 ± 2.84 in the control group ($p < 0.00001$). Regarding maternal outcomes, the experimental group had a higher incidence of spontaneous labor (89%) and vaginal delivery (83%), with less need for labor augmentation and pain relief interventions. Fetal outcomes also favored the experimental group, with higher APGAR scores and more live births. Statistical analysis indicated strong associations between knowledge improvement and demographic variables such as occupation, income, religion, and source of information. The study highlights the critical role of structured antenatal education in empowering first-time mothers, reducing anxiety, encouraging informed decision-making, and facilitating safer childbirth experiences. These findings support the integration of nurse-led childbirth education programs into routine antenatal services, particularly in resource-limited settings, where nurse-midwives are often the first point of contact for expectant mothers. By strengthening antenatal preparedness through educational interventions, healthcare providers can promote positive maternal and neonatal outcomes, ultimately contributing to improved public health and reduced maternal-infant morbidity.

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