Effectiveness of Educational Intervention on Risk Factors Leading to Preterm Labor Among Pregnant Women in Public Sector Hospital, Peshawar

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ABSTRACT

Background: Preterm labor, a significant concern in maternal and neonatal health, has high prevalence rates in low- and middle-income countries, including Pakistan. Identifying and managing risk factors through education can reduce these rates.

Objective: To evaluate the effectiveness of an educational intervention on risk factors leading to preterm labor among pregnant women.

Methods: A quasi-experimental study was conducted with 54 pregnant women attending antenatal care at Lady Reading Hospital, Peshawar. Participants aged 18–45 years without chronic illness were recruited. Baseline knowledge of preterm labor risk factors was assessed using a validated questionnaire, followed by a three-week educational intervention. Post-intervention knowledge was reassessed. Data were analyzed using SPSS version 25, with paired sample t-tests and Chi-square tests applied.

Results: Pre-intervention, 93% of participants demonstrated poor knowledge. Post-intervention, 80% achieved good knowledge, with mean scores increasing from 34.65 (SD = 3.999) to 53.65 (SD = 3.332). The knowledge gain was significant (p = 0.000).

Conclusion: Educational interventions effectively improved pregnant women's knowledge of preterm labor risk factors. Integrating such programs into prenatal care may enhance maternal health outcomes.

INTRODUCTION

Preterm labor, defined as the birth of an infant before 37 weeks of gestation, poses significant health challenges worldwide and is a major cause of neonatal morbidity and mortality (1). The prevalence of preterm birth varies widely across regions, with reports ranging from 5% to 18% globally, impacting countries with limited healthcare resources disproportionately (2). Each year, approximately 130 million babies are born worldwide, with around 15 million of these births occurring preterm (3). In Pakistan, the prevalence of preterm births is estimated at 21.64%, placing immense pressure on healthcare services and contributing significantly to the national neonatal mortality rate (4). Prematurity remains the leading cause of neonatal death and is a considerable barrier to achieving Millennium Development Goal 4, which targets a reduction in child mortality (5). Although advancements in neonatal care have improved survival rates, preterm birth continues to present substantial healthcare challenges.

Risk factors for preterm labor are multifactorial, encompassing both maternal and environmental influences. For example, poor prenatal care, maternal age, nutritional status, and lifestyle factors such as smoking and substance use are well-documented contributors (6,7). Infections during pregnancy, as well as medical conditions like hypertension and diabetes, further increase the risk (8). Environmental pollutants, particularly nitrogen dioxide and carbon monoxide, have also been linked to elevated rates of preterm birth (9). Low socioeconomic status and limited healthcare access exacerbate these risks, highlighting the need for comprehensive prevention strategies. Among pregnant women in Pakistan, early-age pregnancy, obesity, and infectious diseases are prevalent risk factors associated with preterm labor, contributing significantly to the high incidence rate (10,11). Evidence suggests that early intervention through effective prenatal care can play a crucial role in mitigating these risks and improving maternal and neonatal health outcomes (12).

Education is a vital intervention that empowers pregnant women to recognize and manage risk factors for preterm labor. Studies indicate that educational interventions can improve knowledge and encourage healthy behaviors, such as regular antenatal check-ups, nutritional adequacy, and stress management, thereby reducing the likelihood of preterm delivery

(13,14). Research has shown that educational programs tailored to local needs and delivered in healthcare settings can effectively enhance awareness among pregnant women. For instance, a recent study found that 47% of mothers demonstrated only moderate knowledge regarding risk factors for preterm labor, underlining the need for targeted educational support (15). Similarly, a cross-sectional study conducted in Pakistan revealed that 88% of pregnant women had limited understanding of preterm birth risks, emphasizing the importance of educational interventions in promoting maternal health (16,17).

This study aims to evaluate the effectiveness of an educational intervention in increasing awareness of preterm labor risk factors among pregnant women in a public sector hospital in Peshawar. By measuring changes in knowledge pre- and post-intervention, this research seeks to determine the impact of education on improving maternal awareness and supporting preventive healthcare. The findings could have significant implications for prenatal care practices in resource-limited settings, providing insights into effective strategies for reducing preterm birth rates and enhancing maternal and neonatal health outcomes (18).

MATERIAL AND METHODS

A quasi-experimental study design was utilized to assess the effectiveness of educational interventions on risk factors leading to preterm labor among pregnant women attending the antenatal care clinics at Lady Reading Hospital (LRH) in Peshawar. The study was conducted over six months, from May to October 2021, and included a sample of 54 pregnant women aged between 18 and 45 years who were receiving regular antenatal care. Participants with chronic or severe illnesses were excluded to maintain a focus on otherwise healthy pregnancies.

Data were collected using a structured, adapted questionnaire that addressed participants' awareness of preterm labor risk factors. The questions allowed responses categorized as "Fully Aware," "Aware to some extent," and "Unaware," with scores assigned as 2, 1, and 0, respectively. A composite awareness score was calculated for each participant, with scores over 75% indicating "Good Awareness," scores from 50% to 75% indicating "Average Awareness," and scores below 50% indicating "Poor Awareness." The questionnaire underwent a validation process, achieving a validity score of 0.92, and demonstrated reliable results within the accepted range (Cronbach's Alpha = 0.84). Before the intervention, participants' baseline knowledge regarding preterm labor risk factors was assessed to establish initial understanding.

The educational intervention was delivered over three weeks and consisted of structured sessions on the various risk factors contributing to preterm labor, including lifestyle factors, prenatal care practices, and common medical conditions associated with preterm birth. Each session employed visual aids and interactive discussions to ensure content comprehension and engagement. Post-intervention data collection was performed using the same questionnaire to measure changes in knowledge. Ethical approval for this study was obtained from the ethical review board of Khyber Medical University, and the research was conducted in accordance with the Declaration of Helsinki to ensure participant welfare and confidentiality.

Statistical analysis was carried out using SPSS software, version 25. Descriptive statistics, including frequencies and percentages, were used to describe the participants' sociodemographic characteristics. Knowledge scores before and after the intervention were compared using paired sample t-tests to determine the intervention's impact on participants' awareness. Chi-square tests were also applied to assess any associations between participants' sociodemographic variables and their level of knowledge. Statistical significance was set at $p < 0.05$ to validate any observed differences in knowledge levels before and after the intervention.

RESULTS

A total of 54 participants were included in the study, with their sociodemographic characteristics summarized in Table 1. Nearly half of the participants (48.1%) were aged between 31 and 40 years, and the majority (74.1%) were housewives, followed by 18.5% who were government employees. Educational levels varied, with 38.9% of participants identified as illiterate, 31.5% with primary education, 18.5% with secondary education, and 11.1% with graduate-level education. Most participants (44.4%) were in the gestational age group of 31 to 40 weeks, while 42.6% reported weights between 55 and 65 kg. The Chi-square test indicated no significant association between sociodemographic factors and pre-intervention knowledge levels, with all p-values > 0.05. The pre-intervention knowledge assessment revealed that the majority (93%) of participants had "Poor knowledge" regarding risk factors for preterm labor, while only 7% demonstrated "Average knowledge" (Figure 1).

Post-intervention, 80% of participants achieved a "Good knowledge" score, with the remaining 20% showing "Average knowledge" (Figure 2).

Table 1: Socio-Demographic Profile of Participants (n=54)

| Variable	Category	Frequency	Percentage (%)	p-value
Occupation	Housewife	40	74.1	0.23
	Government Employee	10	18.5	
	Private Employee	4	7.4	
Education Level	Illiterate	21	38.9	0.17
	Primary	17	31.5	
	Secondary	10	18.5	
	Graduate	6	11.1	
Age Group	< 20 Years	5	9.3	0.42
	20–30 Years	21	38.9	
	31–40 Years	26	48.1	
	> 40 Years	2	3.7	
Gestational Age	< 20 Weeks	7	13.0	0.35
	20–30 Weeks	23	42.6	
	31–40 Weeks	24	44.4	
Weight	< 55 kg	1	1.9	0.29
	55–65 kg	23	42.6	
	66–75 kg	22	40.7	
	76–85 kg	6	11.1	
	> 85 kg	2	3.7	
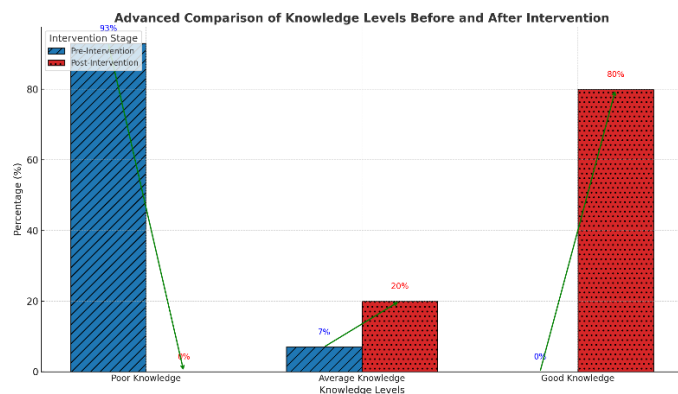
Figure 1: Pie Chart Depicting Pre-Interventional Understanding of Participants Regarding Preterm Delivery

The mean pre-intervention knowledge score was 34.65 (SD = 3.999), which significantly increased to 53.65 (SD = 3.332) post-intervention, confirming the effectiveness of the educational intervention.

Paired sample t-tests validated this improvement with a mean difference of 19.00, a t-value of -26.936, and a p-value of 0.000 (Table 2). These results indicate a statistically significant increase in knowledge following the intervention. The Chi-square test showed no significant associations between knowledge improvement and sociodemographic characteristics such as Paired sample t-tests validated this improvement with a mean difference of 19.00, a t-value of -26.936, and a p-value of 0.000 (Table 2). These results indicate a statistically significant increase in knowledge following the intervention. The Chi-square test showed no significant associations between knowledge improvement and sociodemographic characteristics such as

Table 2: Comparison of Pre- and Post-Interventional Knowledge Scores Using Paired T-Test (n=54)

Knowledge Level	Mean Score	Std. Deviation	Mean Difference	t-value	p-value
Pre-Knowledge	34.65	3.399			
Post-Knowledge	53.65	3.332	19.00	-26.936	0.000

age, education level, weight, parity, and job status, suggesting that the intervention was uniformly effective across these demographic groups.

DISCUSSION

The current study demonstrated a substantial improvement in pregnant women's knowledge of risk factors contributing to preterm labor following an educational intervention, with knowledge scores significantly increasing from pre- to post-intervention. This finding aligns with other studies that have shown the positive impact of structured education on maternal awareness and behavior modification. For instance, a study conducted in Pakistan reported similar outcomes, noting that educational programs targeting maternal health risks significantly improved participants' understanding and ability to manage contributing factors to preterm labor (19,20). Furthermore, research conducted in Iran and Kenya similarly highlighted limited baseline knowledge among pregnant women regarding preterm birth risk

factors, reinforcing the need for such educational initiatives (21,22).

The intervention effectively addressed gaps in participants' awareness, with most transitioning from "Poor" to "Good" knowledge levels post-intervention. This outcome is encouraging, as previous literature has emphasized the role of maternal education in reducing preterm births and improving neonatal outcomes (23). Evidence suggests that women who are informed about potential risks are better equipped to take preventive actions, such as attending regular prenatal visits, managing lifestyle factors, and seeking early intervention for medical complications (24). This study contributes to this body of evidence, providing further validation of educational interventions as effective, low-cost strategies to enhance maternal health literacy and promote healthier pregnancies.

The study's design, focusing on a quasi-experimental model with pre- and post-intervention assessments, allowed for an effective evaluation of the intervention's impact. However, there are limitations to consider. The sample size was relatively small and limited to a single public sector hospital, which may affect the generalizability of the findings. Moreover, the exclusion of women with chronic or severe conditions may have influenced the outcomes, as these individuals could exhibit different levels of knowledge or responsiveness to educational interventions. A broader and more diverse sample could provide a more comprehensive assessment of the intervention's effectiveness. Another limitation is the reliance on self-reported knowledge measures, which might be influenced by social desirability bias; participants could have reported improved knowledge to align with perceived expectations (25).

Despite these limitations, the study has notable strengths, including the high reliability and validity of the assessment tool and the structured, tailored nature of the intervention sessions, which were designed to engage and inform participants actively. The use of interactive teaching methods may have enhanced retention and comprehension, contributing to the observed improvements in knowledge. Additionally, the study followed ethical guidelines as per the Declaration of Helsinki, ensuring participant welfare and data confidentiality, which bolsters the study's ethical integrity.

Future research could explore the long-term effects of educational interventions on maternal behaviors and pregnancy outcomes, as well as assess the impact of similar interventions in different healthcare settings and among diverse demographic groups. Implementing educational programs on a wider scale, particularly in areas with limited healthcare access, could further support maternal health improvements. Regularly updated education and continuous support for pregnant women could be beneficial in sustaining knowledge gains and promoting proactive health behaviors. Moreover, incorporating family members into educational sessions might enhance the overall support system for pregnant women, creating a more conducive environment for healthy pregnancy outcomes.

CONCLUSION

In conclusion, this study underscored the importance of educational interventions in empowering pregnant women with essential knowledge to mitigate preterm labor risks. The findings support integrating such programs into prenatal care services, particularly in resource-limited settings where preterm birth rates are high and health literacy may be low. Comprehensive, evidence-based educational interventions offer a promising approach to reducing the burden of preterm births and improving neonatal and maternal health outcomes (26,27).

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