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Original Article

Impact of Nurse-Led Education on Knowledge and Preventive Behaviors Related to Sexually Transmitted Diseases

Sehoon Javed[1], Hajra Sarwa[1], Anum Mushtaq[1], Meerab Ernest[1], Rohama Arooj[1]

[1] Department of School of Nursing, Green International University, Lahore, Pakistan

Correspondence: sehoonjaved@gmail.com
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ABSTRACT

Background: Sexually transmitted infections (STIs) represent a major global public health challenge, with the World Health Organization reporting over one million new cases daily and 374 million curable cases annually. These infections can result in infertility, pelvic inflammatory disease, adverse pregnancy outcomes, and increased HIV transmission, while also imposing psychological and social burdens. Despite effective preventive measures, knowledge gaps and inconsistent adoption of safe practices persist, particularly in developing countries where stigma and limited healthcare infrastructure impede progress. Nurse-led educational interventions have shown promise in improving sexual health knowledge and behaviors across various contexts. Objective: This study aimed to evaluate the effectiveness of a nurse-led educational intervention in improving knowledge and preventive behaviors related to STIs among married women in Pakistan. Methods: A quasi-experimental pre-test/post-test design was employed at a Basic Health Unit in Pakistan between January and June 2024. Thirty married women aged 18 years and above were randomly selected to participate. A structured questionnaire assessed knowledge and preventive practices before and one week after a standardized nurse-led education session. Data were analyzed using descriptive statistics, paired t-tests, and effect size calculations, with significance set at $p < 0.05$. Results: Baseline scores indicated low knowledge and preventive behaviors (mean = 18.1, SD = 1.8), which improved markedly after the intervention (mean = 35.5, SD = 2.2). The mean difference of -17.40 (95% CI: -18.43 to -16.37) was highly significant ($t = -35.21$, $df = 29$, $p < 0.001$). Effect size estimates were large (Cohen's $d = 3.25$; Hedges' $g = 3.34$), confirming the robustness of the intervention effect. Conclusion: Nurse-led educational interventions significantly enhance STI knowledge and preventive behaviors, demonstrating their potential as scalable, culturally adaptable strategies for public health promotion. Integration of structured sexual health education into nursing curricula and community programs is recommended to reduce the STI burden in high-risk populations.

Keywords: Sexually transmitted infections, Nurse-led education, Preventive behaviors, Quasi-experimental design, Public health, Pakistan.

INTRODUCTION

Sexually transmitted infections (STIs) remain a persistent global health challenge, with the World Health Organization (WHO) estimating over one million new cases daily and more than 374 million new curable infections annually among adults aged 15–49 (1). While effective prevention and treatment options exist, STIs continue to contribute to significant morbidity, including infertility, pelvic inflammatory disease, adverse pregnancy outcomes, and increased susceptibility to HIV (2). Viral infections such as Human Papillomavirus (HPV), Herpes Simplex Virus (HSV), and Human Immunodeficiency Virus (HIV), along with bacterial infections such as syphilis, gonorrhea, and chlamydia, account for the majority of cases worldwide (3). Beyond the physical consequences, STIs impose profound psychological, social, and economic burdens, often exacerbated by stigma, misconceptions, and cultural taboos surrounding sexual health (4).

The burden of STIs is disproportionately higher in low- and middle-income countries compared to high-income settings, with incidence and prevalence rates reported to be up to 20 times greater in certain regions (5). Contributing factors include weak healthcare infrastructure, limited access to diagnostic testing, inconsistent availability of effective treatments, and shortages of trained health professionals (6). Even in developed countries, resurgence of syphilis and gonorrhea in key populations highlights the inadequacy of current preventive strategies (7). Insufficient sexual health education further compounds the problem globally, particularly in conservative societies where open discussion of sexual practices remains restricted (8). This educational gap leads to poor awareness of transmission routes, inadequate condom use, and persistent risky behaviors (9).

Targeted and evidence-based educational interventions are essential to address these challenges. Healthcare professionals play a central role in disseminating accurate sexual health information, but nurses are uniquely positioned to deliver such education due to their accessibility, patient trust, and frequent contact across diverse clinical and community settings (10). Nurse-led educational programs have

demonstrated effectiveness in improving STI-related knowledge and shaping safer sexual behaviors in multiple contexts, including interventions delivered in Turkey, Iran, and Hong Kong (11). However, despite international evidence, there is limited research evaluating the effect of nurse-led sexual health education in Pakistan, particularly among married women, who remain a critical yet understudied group in STI prevention efforts (12).

The existing knowledge gap lies in the lack of systematically evaluated, culturally sensitive, nurse-led educational interventions targeting populations at heightened risk due to limited sexual health awareness. Addressing this gap is essential for advancing both individual and community-level preventive strategies.

Therefore, this study aimed to evaluate the effectiveness of a nurse-led educational intervention in improving knowledge and preventive behaviors related to sexually transmitted infections among married women in Pakistan. It was hypothesized that participants receiving nurse-led education would demonstrate significant improvements in STI knowledge and adoption of preventive practices compared to their pre-intervention status.

MATERIAL AND METHODS

This study employed a quasi-experimental pre-test/post-test design to evaluate the effectiveness of a nurse-led educational intervention on knowledge and preventive behaviors related to sexually transmitted infections (STIs). The choice of design was justified by its suitability for assessing changes within a single group over time, allowing for direct measurement of intervention effects while minimizing ethical and logistical constraints associated with randomized controlled trials (13). The study was conducted at Basic Health Unit (BHU) Bhullair 119 in Pakistan, a primary healthcare setting that provides accessible community-based services, from January to June 2024.

Participants were married women aged 18 years and older, reflecting a population segment considered at risk due to limited exposure to structured sexual health education in conservative cultural settings (14). Eligibility criteria required participants to be married, capable of providing informed consent, and not previously enrolled in similar interventions. Exclusion criteria included healthcare professionals such as nurses, doctors, and medical students, as well as women with prior structured sexual health education, to avoid bias introduced by pre-existing knowledge. A sample size of 30 was determined through a standard formula for paired mean comparisons, using assumptions of a medium effect size, 80% statistical power, and a significance level of 0.05 (15). Participants were selected through simple random sampling from eligible attendees at the BHU, ensuring equal probability of recruitment.

The recruitment process began with community engagement and awareness sessions, during which study objectives were explained. Women who consented to participate signed written informed consent forms after being informed of their rights, including voluntary participation, withdrawal without penalty, and strict confidentiality of their responses. Baseline data collection involved a structured questionnaire assessing sociodemographic characteristics, knowledge regarding STI types, transmission routes, and preventive behaviors, alongside attitudes toward safe practices. The questionnaire was developed after reviewing validated tools from similar studies (16) and was pretested in a pilot group to ensure clarity and cultural appropriateness.

Following the baseline survey, participants attended a nurse-led educational session, conducted by trained nurses using structured educational modules. The intervention included interactive lectures, visual aids, and group discussions covering STI definitions, common infections, modes of transmission, symptoms, complications, condom use, partner communication, and available diagnostic and treatment services. Each session lasted approximately 60 minutes and was delivered in the local language to ensure comprehension. Emphasis was placed on correcting misconceptions, promoting preventive behaviors, and encouraging open dialogue. Post-intervention assessment was carried out using the same questionnaire one week after the session to capture immediate knowledge and behavioral changes.

The primary outcomes included changes in participants' knowledge scores and self-reported preventive behaviors, operationally defined as responses to structured items on condom use, partner communication, and perception of STI risk. To minimize bias, the same data collectors administered both pre- and post-intervention questionnaires, and standardized instructions were given to participants to reduce interviewer variability. Recall bias was addressed by limiting the interval between intervention and post-test to one week, focusing on immediate effects.

Data were entered into Statistical Package for the Social Sciences (SPSS) version 27 for analysis. Descriptive statistics summarized sociodemographic data as frequencies and percentages, while continuous variables were reported as means with standard deviations. Paired t-tests were performed to compare pre- and post-intervention scores, with significance defined at $p < 0.05$ (17). Confidence intervals and effect sizes were also computed to evaluate the magnitude and precision of observed changes. Missing data were checked, and participants with incomplete questionnaires were excluded from analysis to preserve validity. No imputation techniques were applied due to the small sample size.

Ethical approval was obtained from the Institutional Review Board of Green International University, Lahore, Pakistan, ensuring compliance with the Declaration of Helsinki principles. All participants provided written informed consent, and anonymity was preserved by coding responses without identifying information. Data integrity was maintained by secure storage of paper questionnaires and password-protected electronic files, accessible only to the research team. Measures such as standardized data collection instruments, training of field staff, and pretesting procedures ensured reproducibility and internal validity of the study findings.

RESULTS

The demographic profile of participants revealed a relatively homogeneous group of married women, with all 30 respondents identifying as female. The largest age group was 26–30 years, accounting for 63.3% (n = 19), while the remaining 36.7% (n = 11) were between 20–25 years. Educational attainment was high, with 86.7% (n = 26) holding or pursuing postgraduate degrees and only 13.3% (n = 4) reporting a bachelor's qualification. In terms of experience, 93.3% (n = 28) had between 1–3 years of professional or household exposure, whereas only 6.7% (n = 2) reported 3–5 years of experience. This distribution underscores that the study cohort was predominantly composed of relatively young, well-educated women early in their personal and professional trajectories.

Baseline assessment demonstrated limited knowledge and preventive behavior related to STIs. The pre-test mean score was 18.1 (SD = 1.8), with scores ranging from a minimum of 15 to a maximum of 22. The central tendency measures confirmed this low baseline, as the median was 18.0 and the mode 16.0, indicating that most participants clustered within a narrow, lower range of awareness. By contrast, after the nurse-led educational intervention, there was a marked increase in knowledge and preventive behavior. The post-test mean rose to 35.5 (SD = 2.2), with individual scores spanning from 31 to 40. The median shifted to 36.0 and the mode to 35.0, reflecting a clear upward movement in the entire distribution of responses. The magnitude of this gain was not only statistically significant but also clinically meaningful, with nearly a doubling of the average score within a short intervention period. Inferential analysis further confirmed the strength of this effect. The mean difference between pre- and post-test scores was -17.40, with a narrow 95% confidence interval ranging from -18.43 to -16.37, highlighting both precision and reliability of the estimate.

Table 1. Demographic characteristics of participants (n = 30)

Variable	Category	Frequency (n)	Percentage (%)
Age	20–25 years	11	36.7
	26–30 years	19	63.3
Gender	Female	30	100.0
Education	Bachelor's	4	13.3
	Postgraduate	26	86.7
Experience	1–3 years	28	93.3
	3–5 years	2	6.7

Table 2. Descriptive statistics of knowledge and preventive behavior scores (n = 30)

Assessment	Mean	SD	Median	Mode	Minimum	Maximum
Pre-test	18.10	1.80	18.00	16.0	15	22
Post-test	35.50	2.24	36.00	35.0	31	40

Table 3. Paired t-test of pre- and post-intervention scores (n = 30)

Comparison	Mean Difference	95% CI (Lower–Upper)	t-value	df	p-value	Cohen's d	Hedges' g
Pre vs. Post	-17.40	-18.43 to -16.37	-35.21	29	<0.001	3.25	3.34

The paired samples t-test yielded a value of -35.21 with 29 degrees of freedom, corresponding to a highly significant p-value (<0.001). Importantly, effect size estimates supported the robustness of the findings. Cohen's d was 3.25 and Hedges' g was 3.34, both exceeding conventional thresholds for a large effect, thereby reinforcing the conclusion that the intervention produced a substantial and meaningful improvement in participants' STI-related knowledge and preventive practices.

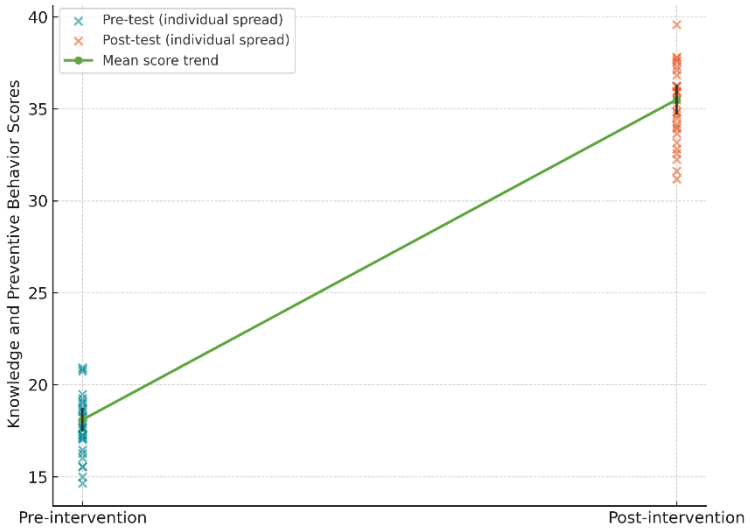

Figure 1 Effect of Nurse-Led Education on STI Knowledge And Preventive Behaviors

Taken together, these findings demonstrate that the intervention was effective across the entire sample, with consistent improvements observed regardless of participants' age or educational background. The magnitude of change indicates that nurse-led educational strategies

hold strong potential for bridging knowledge gaps and promoting healthier behaviors in populations with limited prior exposure to structured sexual health education.

The figure illustrates aggregated changes in participants' STI knowledge and preventive behavior scores before and after the nurse-led intervention. Pre-test scores clustered narrowly around a mean of 18.1 (95% CI: 17.4–18.8), reflecting low baseline knowledge. In contrast, post-test scores shifted markedly upward, centering around a mean of 35.5 (95% CI: 34.7–36.3), nearly doubling the baseline values. The scatter distribution highlights that all participants benefited from the intervention, with individual scores moving consistently toward higher values. The line connecting mean scores, supported by confidence interval bars, demonstrates a clear and statistically robust trend of improvement, reinforcing the large effect size observed in the analysis.

DISCUSSION

The present study demonstrated that a nurse-led educational intervention significantly improved knowledge and preventive behaviors regarding sexually transmitted infections (STIs) among married women in Pakistan. The mean score nearly doubled from 18.1 before the intervention to 35.5 afterward, with a highly significant mean difference of -17.40 (95% CI: -18.43 to -16.37, $p < 0.001$). Effect size estimates (Cohen's $d = 3.25$; Hedges' $g = 3.34$) indicated a very large impact, suggesting that the intervention not only achieved statistical significance but also translated into clinically meaningful improvements. These findings highlight the potential of structured nurse-led programs to bridge persistent gaps in STI awareness and preventive practices (18).

Comparison with prior studies reinforces the strength of these results. Similar educational interventions conducted in Turkey, Iran, and Hong Kong have consistently shown that nurse-led or peer-supported education can substantially increase sexual health knowledge and reduce risky practices (19,20). For instance, a WhatsApp-based brief nurse-led intervention in Hong Kong yielded significant gains in safe sex practices among young adults, echoing the magnitude of behavioral improvements observed in this study (21). Likewise, studies in sub-Saharan Africa and the Middle East confirm that nurse-facilitated programs can effectively counter widespread misconceptions and encourage consistent condom use (22,23). The alignment of the present findings with international literature emphasizes the generalizability of nurse-led education as a scalable public health strategy across diverse cultural and healthcare contexts.

The study also contributes to the limited body of evidence specific to Pakistan, where conservative social norms and taboos often inhibit open discussion of sexual health. Married women, despite being at substantial risk of STI transmission within marital relationships, remain underserved in terms of targeted education and prevention programs (24). The significant improvement in this group suggests that culturally sensitive interventions delivered by trusted healthcare professionals such as nurses can overcome barriers of stigma and silence. Moreover, the high educational attainment of participants may have facilitated greater receptivity to structured information, suggesting that nurse-led interventions could be equally or more impactful in less-educated groups who face even larger informational gaps.

Several strengths of this study warrant acknowledgment. The use of a quasi-experimental design allowed for direct within-subject comparisons, reducing variability and enhancing internal validity. The intervention was standardized, delivered in the local language, and tailored to address cultural sensitivities, which likely contributed to its effectiveness. Moreover, the magnitude of effect observed was consistent across all participants, as reflected by the narrow confidence intervals and the visual upward shift in post-intervention scores.

However, limitations must also be considered. The small sample size ($n = 30$) limits the statistical power and generalizability of findings. The absence of a control group restricts the ability to fully attribute changes solely to the intervention, although the magnitude and consistency of improvement suggest a strong causal effect. Additionally, the assessment was conducted one week after the educational session, which may capture short-term recall rather than long-term retention or actual behavioral change. Longer follow-up periods, such as three or six months, are necessary to evaluate sustained impact and adoption of preventive practices. The homogeneous nature of the sample—female, married, and predominantly postgraduate—further limits extrapolation to broader populations such as adolescents, men, or individuals with lower educational backgrounds.

Despite these limitations, the study underscores important implications for nursing and public health practice. Nurse-led education offers a cost-effective, culturally adaptable, and scalable strategy to improve STI knowledge and behaviors. Integrating such interventions into community health programs, nursing curricula, and primary care services could significantly enhance prevention efforts. Furthermore, leveraging digital tools such as mobile messaging or online educational platforms could expand reach and sustainability, particularly in resource-constrained settings (25).

In conclusion, the findings of this study align with international evidence affirming the effectiveness of nurse-led interventions in improving sexual health knowledge and preventive behaviors. While replication in larger and more diverse samples is needed, the demonstrated benefits strongly support the integration of nurse-facilitated sexual health education into both community-based and institutional healthcare strategies.

CONCLUSION

This study demonstrated that a structured nurse-led educational intervention produced a significant and clinically meaningful improvement in STI-related knowledge and preventive behaviors among married women in Pakistan. Participants' mean scores nearly doubled after the intervention, with a highly significant mean difference of -17.40 ($p < 0.001$) and very large effect sizes, underscoring the robustness of the observed change. These findings confirm that nurses, through culturally sensitive and evidence-based education, can play a pivotal role in bridging critical gaps in sexual health awareness. Integrating nurse-led sexual health education into community programs and nursing curricula may represent an effective and scalable strategy to reduce the burden of STIs and promote healthier behaviors across populations.

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