

ORIGINAL ARTICLE

Assessment of Knowledge on Sexual Assault Forensic Examination among Nurses in India: A Cross-Sectional Study

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ABSTRACT

Background: Sexual violence is a major global public health and human rights issue that affects women and children in various societies. Survivors of sexual assault need immediate medical care and forensic examination, where healthcare professionals play a very crucial role. Nurses are the first point of contact in most of the health care settings to give immediate and prompt care. Nurses help to identify injuries, collect, preserve, and pack evidence, document findings and maintain chain of custody. However, limited training in forensic aspects may impact their ability to perform this task effectively.

Objectives: This study aimed to evaluate the knowledge level regarding sexual assault examination among registered nurses and final-year nursing students

Methods: A quantitative cross-sectional study was conducted with 276 participants from hospitals and nursing colleges in Dakshina Kannada and Udupi districts. Data were collected using socio-demographic proforma and a 38 item knowledge questionnaire on sexual assault nurse examination (KQSANE). Descriptive statistics summarize knowledge levels. Spearman's correlation and generalized linear model regression were used to explore the relationships between knowledge domains and socio-demographic variables.

Results: The findings indicate that overall knowledge about sexual assault examination was inadequate, with most participants demonstrating poor knowledge. Among the knowledge areas, legal and ethical knowledge domain received the highest scores. The domain forensic examination and imaging

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received the lowest scores. Significant positive correlation was found between the overall knowledge scores and domains of knowledge.

Conclusion: The study points out significant gaps in knowledge about forensic sexual assault examination among nurses and nursing students. Improving forensic nursing education through better curriculum integration and in-service education and training is important to prepare nurses for enhancing the survivor-centered care and ensuring proper evidence management.

KEYWORDS

• Sex Offenses • Forensic Nursing • Sexual Assault Examination • Evidence-Based Practice • Knowledge • Professional Competence • SDG 3 – Good Health and Well-Being • SDG 16 – Peace • Justice and Strong Institutions

INTRODUCTION

Sexual violence is widely considered as one of the most heinous crimes against women and child which violate the human rights. It's a major global public health concern that affects all individuals across all age groups, social classes, cultural contexts producing profound physical, psychological and social consequences for survivors. Survivors of sexual violence frequently experience long term mental health problems, including anxiety, depression and post-traumatic stress disorders, as well as social stigma. They also face disruption in social and personal relationships after such events. Survivors are often entangled in complex investigations and legal processes that can extend to several years. In such cases the quality of the medico-legal evidence collected during the forensic examination becomes a crucial factor in establishing the circumstances for the assault and supporting the criminal investigation by the law-enforcing agencies. The accuracy in identifying, collecting, preserving, packing, and documenting during the medico-legal examination plays a pivotal role in strengthening the judicial proceedings and ensuring justice for the survivor.

Globally, the magnitude of the sexual violence against the women and children are alarming and it underscores the need for coordinated responses from the healthcare systems, police, judiciary and other institutions and agencies involved in social development. Epidemiological research has demonstrated that millions of women and children affected worldwide especially in the middle and lower middle income countries. Systematic review and meta-analytical studies examining the prevalence of sexual assault indicate

that approximately 30% of women were experienced physical and/or sexual intimate partner violence or non-partner sexual violence in their lifetime (Sardinha *et al.*, 2022) and a substantial portion of the children (11.4%) experience sexual victimization with long term implication for their mental, physical, social and emotional well-being (Piolanti *et al.*, 2025). A global burden of disease (GBD) study also showed interpersonal violence including sexual violence significantly contributes to injury related disability among adolescents and young adults (Vos *et al.*, 2020). The global prevalences varied across the location reflecting the differences in cultural context, reporting practices, and research methodologies adopted (Dworkin *et al.*, 2021). These findings show the persistent nature of sexual violence and emphasize the importance of multidisciplinary integration of services.

In India the sexual violence against the women and children are a major social and health issue. The national statistics reported by the National Crime Records Bureau (NCRB) indicate that sexual crimes represent a major proportion of the total reported offences. The long term numerical patterns across various crimes against women and children registered under the Indian Penal Code (IPC), Bharatiya Nyaya Sanhita (BNS) and the Protection of Children from Sexual Offences (POCSO) Act in India over a ten year period from 2014 to 2023 showed a decline of rape cases from 36,735 to 29,670 (-19.2%). Attempts to commit rape also showed a steeper decline of 34.0% during the same period. However, Contradictory findings were seen in crimes against children. POCSO cases increased substantially from 36,022 in 2016 to 67,694 in 2023 (+87.9%). Rape of children demonstrated a marked numerical reduction from 13,766 in 2014 to 849 in 2023

(-93.8%). Conversely, sexual assault of children booked under POCSO section 4 & 6 increased more than threefold rising from 11,335 in 2014 to 40,434 in 2023(+256.7%). These figures reflect the seriousness of the issue, as the official crime statistics are the tip of large icebergs as a substantial portion of the sexual violence remains unreported (National Crime Records Bureau (NCRB), 2013, 2014, 2015, 2016a, 2017a, 2019a, 2019c, 2020a, 2020b, 2021, 2022, 2023, 2024; National Crimes Records Bureau (NCRB), 2023). The crime reporting trends are also increasing in India over the past two decades especially after the legislative reforms such as introduction of POCSO and amendments of criminal laws. This trend is also seen with increased social awareness after the high profile Nirbhaya case of 2012 (Dandona *et al.*, 2022).

The healthcare system plays an important role in responding to the survivors of sexual violence. Survivors seek medical care for treating injuries, emergency contraception after the abuse, treatment and prevention of sexually transmitted infections, or for psychological counselling. In all such circumstances the health care professional becomes the first point of contact. They are responsible not only for providing treatment and caring for the survivors but also for identifying signs of abuse, documenting injuries, collecting medicolegal evidence, preserving and packing evidence, and maintaining chain of custody. Within the health care delivery system, nurses play an essential role in the management of survivors of sexual violence. Nurses automatically become the first health care provider to interact with in the clinical settings such as emergency department, maternity units, labour rooms, pediatric wards, outpatient departments and community health centers. Nurses are uniquely placed in a favorable position to identify the indicators of violence and initiate appropriate medical responses because of their continuous presence in the patient care environments. However, despite these central roles many nurses received limited training in forensic concepts and medico-legal procedures during their professional education. Previous studies have found considerable gaps in the knowledge and preparedness of health care professionals regarding forensic evidence management and taking care of medico-legal responsibilities (Bektaş & Pakiș, 2021; Emami *et al.*, 2024; Machado *et al.*, 2020).

Educational interventions focusing on forensic competencies demonstrated improvement in knowledge, confidence and performance in nursing students and health care professionals. Across the globe multiple programs were developed to enhance these competencies among nurses. Sexual Assault Nurse Examiners (SANE) program is one among such program developed to enhance the quality of care provided to the survivors after the sexual violence. This specialized program focuses on training on nurses to conduct comprehensive forensic examinations, identify collect, and preserve evidence, document the findings accurately and provide trauma informed care (Campbell *et al.*, 2012; Lechner *et al.*, 2018; Patterson & Resko, 2020; Ribeiro & Dixe, 2020).

Evidence indicates that trained nurses in forensic key areas are associated with improved evidence collection, and increased likelihood of referral for prosecution, survivor satisfaction, and reduced revictimization and improves survivors' experiences within healthcare settings. Despite these recognized benefits of forensic nursing programs globally, structured training programs in sexual assault examination remains limited in many countries. In India, nurses assist in the clinical management of the sexual assault survivors however, they lacked formal forensic training in forensic examination and evidence management. This may lead to inadvertent errors, contamination or loss of evidence, errors in documentation, inadequate medicolegal reporting affects the outcome of criminal investigation and judicial proceedings.

Improving the knowledge of sexual assault examination among nurses enhances the survivor centered care, strengthen the quality of medico-legal documentation, and improve the reliability and acceptance of medico-legal evidence presented in the court. Training in these areas will improve the collaboration among major stakeholders.

MATERIALS AND METHODS

Study Design and Settings

A quantitative cross sectional study design was adopted to assess the level of knowledge regarding sexual assault examination among nurses working health care institutions. This design was considered appropriate to

understand the existing knowledge of the nurses related to the forensic procedures of caring the sexual assault victims and survivors. The study was conducted in the hospitals and Nursing colleges of Dakshina Kannada and Udupi district.

Participants

The study population consisted of registered nurses and final year BSc Nursing students were recruited. Any nurse who is working as Auxiliary Nurse Midwife (ANM) is excluded from the study.

Instruments

Data were collected using a socio-demographic proforma and a 38-item Knowledge Questionnaire On Sexual Assault Nurse Examination (KQSANE). The socio-demographic questionnaire includes, gender, occupation type, area of work, assisted in the sexual assault examination, and received training in sexual assault examination. The KQSANE was designed to assess the nurses' knowledge regarding the forensic examination and medico-legal evidence management of survivors of sexual assault. KQSANE has multiple choice items developed by the researchers through rigorous Dr Robert F DeVellis tool development methodology. The KQSANE tool was reviewed by a panel of experts and established content validity. Based on the suggestions provided by the experts, necessary modifications were incorporated to improve the clarity and relevance of the items. The reliability of the questionnaire was established using Kuder-Richardson formula 20 (.869) and Guttman Split-half coefficient (Lambda-4) (0.797), which demonstrated satisfactory internal consistency. The KQSANE has six domains namely legal and ethical knowledge, clinical management, forensic evidence collection, forensic examination technique and imaging, documentation and reporting, trauma informed survivor centered care. Each correct response was assigned one mark, and incorrect or unattended items were scored zero. The total knowledge score ranged from zero to 38, where higher total score indicates better knowledge regarding sexual assault examination. Based on the modified Bloom's cut-off criteria, knowledge levels were categorized as good (80–100%; score 30–38), moderate (60–79%; score 23–29), and poor (<60%; score 0–22).

Data Collection Procedures

Data were collected after obtaining permission from the administrative authorities of the hospitals and nursing institutions. Eligible participants were approached in their respective departments and informed about the purpose of the study. Written informed consents were obtained from participants prior to data collection. The socio-demographic proforma and KQSANE questionnaire were administered in paper format, and participants completed the instruments individually. Completed questionnaires were collected immediately after completion.

Data Analysis

The collected responses were coded and entered the Microsoft excel sheet for analysis and then transferred to Jamovi a statistical software. Descriptive statistics such as frequency, percentage, mean, median, standard deviation, and interquartile range were used to summarize demographic variables and knowledge scores. Inferential statistical tests were applied to examine associations between knowledge scores and selected demographic variables. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Ethics Committee of Kasturba Hospital and Kasturba Medical College, Manipal through wide reference number (IEC 653/2018). Participation in the study was voluntary, and confidentiality of the participants was maintained. No personal identifiers were collected, and the data were used solely for research purposes.

RESULTS

Participant Characteristics

A total of 276 participants were included in the study with an age range of 20 to 56 years and with a mean age of 30.74 ± 10.02 years. The majority of the participants were females (95.7%), while 4.3% were males. Regarding the other socio-demographic variables such as occupation, 225 (81.5%) participants were registered nurses and 51 (18.5%) were final year Bachelor of Nursing (BSN) students. Only eight participants (2.9%) had assisted in sexual assault examination and 257 (93.1%) did not receive any forms of training in sexual assault examination or forensic nursing.

Knowledge Regarding Sexual Assault Examination

Table 1: Mean, Standard Deviation, Median, Interquartile Range Computed for the Total KQSANE Scores and its Domain Subscales

Variable / Domain	Mean ± SD	Median	IQR	Possible Score Range	Minimum Obtained	Maximum Obtained	Mean percentage
Knowledge on sexual Assault Examination	18.71 ± 7.50	19	13	0-38	5	33	49.24%
Domain Subscales							
Legal & Ethical Knowledge	6.47 ± 2.98	6	5	0-12	1	12	53.92%
Clinical Management	2.27 ± 1.27	2	2	0-5	0	5	45.40%
Forensic Evidence Collection	4.01 ± 1.83	4	3	0-8	0	8	50.13%
Forensic Examination & Imaging	2.45 ± 1.44	2	2	0-6	0	6	40.83%
Documentation & Reporting	1.97 ± 1.15	2	2	0-4	0	4	49.25%
Trauma-informed Survivor Care	1.54 ± 0.93	2	1	0-3	0	3	51.33%

Note: N=276

Descriptive statistics of the KQSANE knowledge scores and presented in Table 1. The total knowledge scores had a median score of 19 with an interquartile range (IQR) of 13, indicating moderate variability in knowledge levels. The mean scores of KQSANE knowledge 18.71 ± 7.5 with minimum and maximum scores ranging from 5 to 33. The overall mean knowledge score corresponded to 49.24% of the maximum possible score, indicating poor knowledge levels. Among the domains, clinical management, forensic examination and imaging, and documentation and reporting each had a median score of 2 and IQR of 2. Legal and ethical knowledge showed the highest mean percentage (53.92%), whereas forensic examination and imaging demonstrated the lowest mean percentage (40.83%).

Correlation Between KQSANE Domains

Table 3: Spearman Correlation Coefficients Compute Between KQSANE Domains

Variables	1	2	3	4	5	6	7
KQSANE scale total	1						
Legal-ethical	0.902	1					
Clinical management	0.741	0.614	1				
Forensic evidence collection	0.861	0.726	0.586	1			
Forensic examination and imaging	0.665	0.444	0.437	0.485	1		
Documentation	0.656	0.529	0.315	0.516	0.378	1	
Trauma-informed care	0.659	0.496	0.458	0.500	0.428	0.389	1

Note: N =276

Table 3 presents the Spearman correlation coefficients among the domains of the KQSANE. The results demonstrate positive correlations across all domains. The KQSANE total score showed strong positive correlation

Table 2: Category Distribution of Knowledge Regarding Sexual Assault Examination Scores

Knowledge Regarding Sexual Assault Examination	Score Range	Frequency	Percentage
Good	30-38	24	8.7
Moderate	23-29	73	26.4
Poor	0-22	179	64.9

Note: N=276

Knowledge levels were categorized using the modified Bloom’s cut-off criteria. As shown in Table 2, the majority of participants 179 (64.9%) demonstrated poor knowledge regarding sexual assault examination and 73 participants (26.4%) had moderate knowledge, while only 24 (8.7%) demonstrated good knowledge.

with all domains including legal ethical aspects ($\rho = 0.902$), forensic evidence collection ($\rho = 0.861$), clinical management ($\rho = 0.741$), forensic examination and imaging ($\rho = 0.665$), trauma informed care ($\rho = 0.659$), and documentation

($\rho = 0.656$). These finding indicates that the overall knowledge score strongly reflects the competency across individual domains of sexual assault examination. Among the domains the strongest association was observed between legal-ethical knowledge and forensic evidence collection ($\rho = 0.726$), indicate that understanding medico-legal principles is closely related to the knowledge of managing the medico-legal evidence.

Regression Analysis through Generalized Linear Model

A generalized linear model (GLM) with a Gamma distribution and log link function was fitted to examine the association between knowledge scores and socio-demographic variables (gender, occupation, and age). The Omnibus test of model coefficients (Likelihood ratio $\chi^2(3) = 16.953$, $p = 0.001$) indicated that the model was statistically significant. The effects of predictors were also analyzed, (Wald $\chi^2 = 11.884$, $p = 0.001$). Registered nurses had significantly higher KQSANE scores compared with students ($B = 0.261$, 95% CI: 0.113–0.410). Gender (Wald $\chi^2 = 2.637$, $p = 0.104$) and age (Wald $\chi^2 = 0.405$, $p = 0.524$) were not significantly associated with KQSANE score. The regression analysis demonstrated that occupation was the only significant predictor of knowledge scores.

DISCUSSION

The present study assessed the knowledge regarding sexual assault forensic examination among registered nurses and final-year nursing students. The findings of the study revealed that the overall KQSANE score was inadequate with majority demonstrating poor knowledge. The study findings indicate a huge gap in the preparedness of nurses and nursing students to perform the medico-legal responsibilities such as sexual assault examination and evidence collection (Bektaş & Pakış, 2021; Machado *et al.*, 2020). The present study showed inadequate knowledge which became a concern in situations where the increased magnitude of sexual violence is reported globally as well as nationally. Sexual health is affecting millions of women and children worldwide (Piolanti *et al.*, 2025; Sardinha *et al.*, 2022).

The demographic characteristics of the participants indicated that the majority were

female which reflect the gender distribution commonly observed in the Indian healthcare settings and also in many other countries. This is consistent with global nursing workforce trends. More importantly, the study revealed that a very small proportion of the nurses had assisted in sexual assault examination and the majority had not received any formal training in forensic handling of medico-legal cases. The absence of such forensic training is reported widely in scientific literature and considered to be a major barrier to achieve effective medico-legal case management and evidence collection (Abou Hashish, 2024; Jayanti Humbe *et al.*, 2023; Sakallı & Aslan, 2020).

The present study findings also demonstrated that the overall knowledge about sexual assault examination was relatively low among the participants. The mean knowledge score was less than half of the maximum possible score. Majority of the participants also were categorized as having poor knowledge according to the modified Bloom's cutoff criteria. Similar findings were reported in studies examining forensic nursing knowledge among health care professionals. Sakalli and Aslan (2020) demonstrated that the emergency nurses had moderate levels of knowledge regarding forensic cases. Nurses were generally aware that forensic evidence must be collected and preserved, detailed knowledge of procedures was insufficient.

Among the domains of knowledge regarding sexual assault examination assessed in the present study, legal and ethical knowledge demonstrated the highest percentage. Whereas forensic examination and imaging showed the lowest score. This finding suggests that participants have greater theoretical knowledge of legal responsibilities but less understanding of practical medico-legal examination procedures. Previous research supports these findings. Sakallı & Aslan, (2020), reported the knowledge gap that nurses reported limited knowledge about proper evidence collection techniques, such as handling biological samples, preserving clothing and physical evidence, avoiding contamination and chain of custody. Machado *et al.*, (2020) reported that nurses lack competency in technical aspects such as forensic evidence identification, documentation, and preservation. The practical aspects of forensic examination require specialized training and

clinical exposure, which are often not included in standard nursing curricula.

The spearman's correlation analysis in the present study demonstrated strong positive relationship between the overall knowledge scores and each of the domains particularly between legal-ethical knowledge and forensic evidence collection. Similar observations were also reported in forensic nursing literature. Machado *et al.*, (2020) reported that nursing students showed variation in knowledge across domains such as forensic situations, trace preservation, documentation, and communication of evidence. The knowledge domains in forensic nursing are interrelated and improvement in one domain supports competence in others, especially evidence preservation and documentation (Machado *et al.*, 2020). The regression analysis also showed that the type of occupation was the significant predictor of knowledge scores, with registered nurses showed higher knowledge compared to nursing students. This finding shows that professional experience and exposure may contribute to improved knowledge regarding sexual assault examination.

The findings of the present study indicate that knowledge regarding sexual assault examination among nurses and nursing students remains inadequate, especially in areas related to practical forensic examination and evidence management. The result emphasizes the need for specialized training in forensic nursing and sexual assault examination into undergraduate nursing curricula and implementing continuous education programs for nurses working in hospitals and other institutions. Strengthening forensic competencies among nurses will improve the quality of care provided to the sexual assault survivors and enhance the reliability and acceptability of medico-legal evidence collected in criminal investigation.

CONCLUSION

The present study assessed the knowledge regarding sexual assault forensic examination among nurses and found that the overall knowledge was inadequate, with the majority of participants demonstrating poor knowledge and only a small proportion showing good knowledge. The findings of the study emphasize the need to integrate forensic

nursing and sexual assault examination training into undergraduate nursing curricula and implement in-service education for nursing professionals. Strengthening these competencies among nurses is essential to improve survivor-centered care, enhance the quality of evidence collection, and documentation, and support effective criminal investigation and judicial proceedings.

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