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EXPLORING CERVICAL CANCER KNOWLEDGE AMONG FEMALE HEALTHCARE PROFESSIONALS AND MEDICAL TRAINEES: A CROSS-SECTIONAL ANALYSIS

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Abstract
The study delves into understanding the comprehension levels of cervical cancer, its risk factors, and preventative measures among female healthcare providers and medical students. The study, conducted in December 2023 at, Krishna Institute of Medical Sciences, KVV, Karad, involved 205 participants comprising doctors, medical students (1st, 2nd & 3rd-year MBBS), and nurses. Utilizing the Google Forms platform, an online survey was administered, with data analysis conducted using SPSS software version 26. Key findings indicated a notable recognition of HPV infection (141 participants) and multiple sexual partners (137 participants) as primary risk factors for cervical cancer. Additionally, 41.95% of respondents were aware of early pregnancy as a risk factor. Among the participants, doctors demonstrated the highest awareness levels of cervical cancer risk factors, followed by nurses and students. Furthermore, 81.95% of participants acknowledged the preventability of cervical cancer, emphasizing the significance of screening in prevention.
The study underscores the importance of continually updating the knowledge base of female nursing personnel, given their role as primary sources of health information for women. It also advocates for the strategic integration of HPV and cervical cancer education into medical curricula early on.
Keywords: Cervical cancer Healthcare professionals Prevention Awareness Education

INTRODUCTION

Cervical cancer remains a significant global health concern, particularly affecting women of reproductive age. With its prevalence ranking second among cancers affecting women worldwide, cervical cancer represents a considerable burden on healthcare systems and communities alike. Despite advancements in medical knowledge and technology, the incidence of cervical cancer persists, necessitating a deeper understanding of its complexities, risk factors, and preventive strategies. This introduction aims to provide a comprehensive overview of cervical cancer, exploring its epidemiology, etiology, screening methods, and the importance of education and awareness among female healthcare professionals and medical trainees.

Epidemiology of Cervical Cancer:

According to the latest data from Globocan 2020, cervical cancer remains a prevalent malignancy globally, with an estimated 604,100 new cases diagnosed and 341,831 deaths reported. These statistics underscore the urgent need for effective prevention and control strategies to mitigate the impact of this disease. Notably, certain regions, such as sub-Saharan Africa and parts of Asia, bear a disproportionate burden of cervical cancer incidence and mortality, reflecting disparities in healthcare access, screening programs, and vaccination coverage.

In India, cervical cancer poses a significant public health challenge, with an estimated 436.76 million women aged 15 and older at risk of developing the disease. Factors such as limited access to healthcare services, inadequate screening infrastructure, and cultural barriers contribute to the high prevalence of cervical cancer in this population. Despite national efforts to improve screening and vaccination coverage, disparities persist, highlighting the need for targeted interventions and awareness campaigns to address these gaps effectively.

Etiology and Risk Factors:

Cervical cancer is primarily caused by persistent infection with high-risk strains of human papillomavirus (HPV), particularly HPV types 16 and 18. These viruses are transmitted through sexual contact and can lead to the development of precancerous lesions on the cervix, which, if left untreated, may progress to invasive cancer over time. Other risk factors for cervical cancer include early age at first sexual intercourse, multiple sexual partners, immunosuppression, smoking, and a family history of the disease. Understanding these risk factors is essential for identifying high-risk individuals and implementing targeted prevention and screening programs.

Screening and Early Detection:

Screening plays a crucial role in the early detection and prevention of cervical cancer. The Papanicolaou (Pap) smear, introduced by Dr. George Papanicolaou in the 1940s, revolutionized cervical cancer screening by enabling the detection of precancerous changes in cervical cells. In recent years, molecular tests, such as HPV DNA testing, have emerged as sensitive and specific tools for detecting high-risk HPV infections and identifying women at increased risk of developing cervical cancer. Additionally, visual inspection methods, such as

visual inspection with acetic acid (VIA) and visual inspection with Lugol's iodine (VILI), offer simple and cost-effective alternatives for resource-limited settings where cytology-based screening may not be feasible.

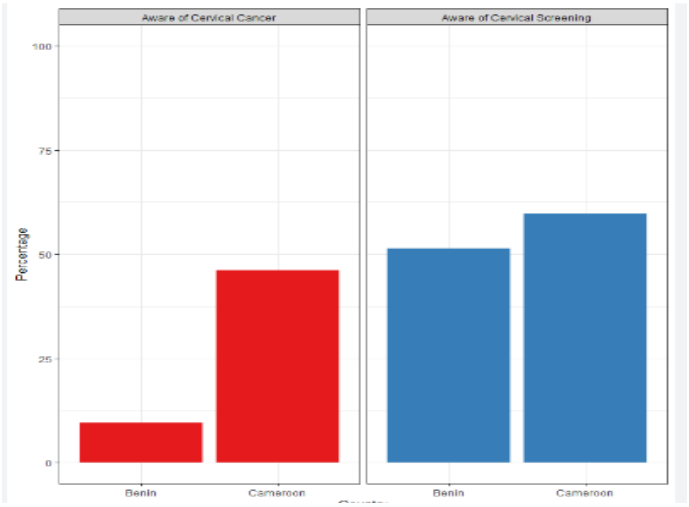

Fig. 1: Awareness of cervical cancer and screening in Benin and Cameroon: an analysis

Despite the availability of these screening modalities, access to cervical cancer screening remains a challenge in many parts of the world, particularly in low- and middle-income countries (LMICs). Barriers to screening include lack of awareness, financial constraints, cultural beliefs, and limited healthcare infrastructure. Addressing these barriers requires a multi-faceted approach that encompasses community education, provider training, infrastructure development, and policy advocacy to ensure equitable access to screening services for all women.

Preventive Strategies:
In addition to screening, vaccination against HPV represents a critical preventive strategy for reducing the burden of cervical cancer. The development of HPV vaccines, such as Gardasil and Cervarix, has significantly decreased the incidence of HPV infections and related cervical abnormalities in vaccinated populations. However, vaccine coverage remains suboptimal in many countries, particularly in LMICs, where access to vaccination services may be limited. Efforts to increase vaccine uptake and coverage are essential for maximizing the public health impact of HPV vaccination and reducing the future burden of cervical cancer.

Education and Awareness:
Education and awareness among healthcare professionals and medical trainees play a pivotal role in the prevention and control of cervical cancer. Healthcare providers, including doctors, nurses, and allied health professionals, serve as trusted sources of information and guidance for women seeking preventive care and screening services. Therefore, it is essential to equip these professionals with the knowledge and skills necessary to effectively communicate the importance of cervical cancer prevention, screening, and vaccination to their patients. Moreover, integrating comprehensive cervical cancer education into medical school curricula can empower future generations of healthcare providers to address the challenges posed by this disease proactively.
Cervical cancer remains a significant global health challenge, disproportionately affecting women in low-resource settings. Despite advances in screening, diagnosis, and treatment, the burden of cervical cancer continues to exact a heavy toll on individuals, families, and communities worldwide. Addressing this burden requires a multi-faceted approach that encompasses primary prevention through vaccination, secondary prevention through screening and early detection, and tertiary prevention through timely and appropriate treatment. Moreover, education and awareness among healthcare professionals and medical trainees are critical for ensuring the success of cervical cancer prevention and control efforts. By working together to raise awareness, increase access to screening and vaccination services, and promote equitable healthcare delivery, we can strive towards a future free from the burden of cervical cancer.

Research Gap:
Despite significant progress in the prevention and treatment of cervical cancer, there still exist several gaps in knowledge and practice that warrant further investigation. One notable research gap is the limited understanding of cervical cancer among female healthcare professionals and medical trainees, particularly regarding its risk factors, screening methods, and preventive measures. While studies have examined cervical cancer awareness and knowledge in various populations, few have focused specifically on healthcare providers and trainees. Furthermore, existing research often lacks a comprehensive exploration of the factors influencing knowledge levels and the effectiveness of educational interventions in improving awareness and practices. Addressing these gaps is crucial for enhancing cervical cancer prevention and control efforts and ultimately reducing the burden of the disease on women's health.

Specific Aims of the Study
The specific aims of this study are to:
1. Assess the baseline knowledge and awareness of cervical cancer, its risk factors, screening methods, and preventive measures among female healthcare professionals and medical trainees.
2. Identify factors influencing cervical cancer knowledge levels, including demographic characteristics, professional experience, and educational background.
3. Evaluate the effectiveness of educational interventions in improving cervical cancer awareness and practices among participants.
4. Explore the attitudes, beliefs, and perceived barriers towards cervical cancer screening and prevention among female healthcare professionals and medical trainees.

Objectives of the Study:
To achieve the specified aims, the study will pursue the following objectives:
1. Conduct a cross-sectional survey among female healthcare professionals and medical trainees to assess their knowledge of cervical cancer and related factors.
2. Analyze survey data to identify correlations between demographic characteristics, professional experience, and knowledge levels.
3. Design and implement educational interventions, such as workshops or seminars, aimed at improving cervical cancer awareness and practices.
4. Administer post-intervention surveys to evaluate the impact of educational interventions on participants' knowledge and practices.

5. Conduct qualitative interviews or focus group discussions to explore participants' attitudes, beliefs, and perceived barriers towards cervical cancer screening and prevention.
6.

Scope of the Study:
This study focuses specifically on female healthcare professionals and medical trainees, including doctors, nurses, and medical students, within Krishna Institute of Medical Sciences, KVV, Karad. The research will assess knowledge levels, attitudes, and practices related to cervical cancer, as well as the effectiveness of educational interventions in improving awareness and practices. While the findings may have broader implications for cervical cancer prevention and control efforts, the scope of the study is limited to the selected population and setting.

Conceptual Framework:
The conceptual framework guiding this study incorporates elements from health behavior theories, such as the Health Belief Model and the Social Cognitive Theory. These theories posit that individual beliefs, attitudes, and perceived barriers influence health-related behaviors, including cancer prevention practices. Additionally, the study draws upon the Diffusion of Innovations theory, which emphasizes the role of communication channels and social networks in disseminating new ideas and behaviors. By integrating these theoretical perspectives, the study seeks to explore the factors shaping cervical cancer knowledge and practices among female healthcare professionals and medical trainees.

Hypothesis:
Based on the conceptual framework and existing literature, the study hypothesizes that:
1. Female healthcare professionals and medical trainees will exhibit varying levels of knowledge and awareness regarding cervical cancer, with factors such as educational background, professional experience, and demographic characteristics influencing knowledge levels.
2. Educational interventions aimed at improving cervical cancer awareness and practices will lead to significant improvements in participants' knowledge levels and attitudes towards screening and prevention.
3. Perceived barriers, including cultural beliefs, stigma, and logistical challenges, will influence participants' attitudes and practices related to cervical cancer screening and prevention.

Research Methodology
The research methodology involved a cross-sectional study conducted among female healthcare providers, including doctors, medical students (1st, 2nd & 3rd-year MBBS), and nurses, at Krishna Institute of Medical Sciences, KVV, Karad, in December 2023. All participants who provided consent to participate were included in the study, totaling 205 individuals.
To collect data, a pre-composed online survey was administered using the Google Forms platform. Informed consent was obtained from all participants at the outset of the survey. The questionnaire was developed based on a thorough review of existing research findings and literature related to cervical cancer. To ensure confidentiality, participants' names and IDs were not included in the survey.
The questionnaire consisted of three sections: Section A focused on gathering demographic information about the participants, Section B included questions about various risk factors associated with cervical carcinoma (such as early sexual intercourse, multiple sexual partners, HPV infection, etc.), and Section C addressed participants' knowledge about cervical cancer as the leading cause of death among female cancers in India and its preventable nature. Each question in Sections B and C provided two response options: "YES" or "AGREE" and "NO" or "DISAGREE". Responses were subsequently dichotomized, with a value of 1 assigned to "YES" and 0 assigned to "NO".
Data analysis involved computing frequencies and percentages for qualitative variables. The collected data were entered and analyzed using SPSS software version 26. Furthermore, ethical approval for the study was obtained from the Institutional Ethics Committee to ensure compliance with research standards and participant protection protocols.

Results and Analysis:
Demographic Characteristics:
The study included a total of 205 participants, consisting of medical doctors, nurses, and medical students. Among the participants, the majority were in the age range of 20-30 years, with 80.32% falling within this category. Additionally, most participants were unmarried (74.15%) and had completed either a Bachelor's degree or diploma (31.22%). Notably, a significant proportion of medical doctors held a Master's degree (80.0%), indicating higher levels of education among this group compared to nurses and students.

Table 1: Demographic characteristics of participants

Variables	Medical Doctors (n=35)	Nurses (n=54)	Students (n=116)	Total (n=205)
Age (Years)	No. (%)	No. (%)	No. (%)	No. (%)
<20	-	-	46 (38.76)	46 (22.24)
20-30	19 (54.29)	53 (98.15)	93 (79.24)	165 (80.32)
>30	23 (65.71)	12 (22.22)	-	35 (17.07)
Marital Status				
Married	29(82.86)	24 (44.44)	-	53 (25.85)
Unmarried	6(17.14)	30 (55.56)	116 (100.0)	152 (74.15)
Education				
12th Passed	-	-	116 (100.0)	116 (56.59)
Bachelor/Diploma	10 (28.57)	54 (100.0)	-	64 (31.22)
Masters	28 (80.0)	-	-	34 (16.59)

These demographic characteristics provide valuable insights into the composition of the study population and highlight the diverse backgrounds and educational levels of the participants. The predominance of younger individuals and unmarried status among the participants reflects the demographics of healthcare professionals and medical trainees in training institutions such as Krishna Institute of Medical Sciences, KVV, Karad. Furthermore, the higher prevalence of Master's degrees among medical doctors suggests a higher level of specialization and expertise within this group.

Knowledge of Risk Factors:

The study assessed participants' knowledge of various risk factors associated with cervical cancer, including early sexual intercourse, early pregnancy, multiple births, multiple sexual partners, cigarette smoking, HIV infection, and HPV infection.

Table 2: Knowledge of the risk factors of cervical cancer among the participants

Variables	Medical Doctors (n=35)	Nurses (n=54)	Students (n=116)	Total (n=205)
	No. (%)	No. (%)	No. (%)	No. (%)
R1 Early Sexual	intercourse			
	34 (97.14)	37 (68.52)	60 (51.10)	131 (63.17)
R2 Early pregnancy	30 (85.71)	29 (53.48)	44 (38.71)	103 (50.36)
R3 Multiple Births	30 (85.71)	31 (57.44)	43 (37.63)	104 (50.91)
R4 Multiple Sexual	partners			
	36 (102.86)	50 (92.59)	78 (66.43)	164 (80.18)
R5 Cigarette Smoking	35 (100)	49(90.72)	62 (53.86)	146 (71.41)
R6 HIV infection	36 (102.86)	40 (74.07)	78 (66.43)	154 (75.13)
R7 HPV infection	42 (120)	56 (103.70)	71 (60.68)	169 (82.74)

Results revealed varying levels of awareness among the different participant groups. Medical doctors demonstrated the highest awareness levels across all risk factors, with percentages ranging from 71.42% to 100%. Nurses exhibited moderate levels of awareness, with percentages ranging from 44.44% to 92.59%. In contrast, medical students showed the lowest awareness levels, particularly regarding early pregnancy (31.89%) and HPV infection (50.86%).

These findings underscore the importance of targeted educational interventions to improve awareness and knowledge among medical students, who represent the future healthcare workforce. Furthermore, the disparity in awareness levels between doctors, nurses, and students highlights the need for tailored educational programs that address the specific needs and knowledge gaps of each group.

Knowledge of Cervical Cancer Prevention:

Participants' knowledge of cervical cancer prevention was assessed through questions regarding the preventability of cervical cancer, the role of screening in prevention, awareness of Pap smear tests, and knowledge of HPV vaccination.

Table 3: Knowledge of cervical cancer prevention among the participants

Variables	Medical Doctors (n=35)	Nurses (n=54)	Students (n=116)	Total (n=205)
	No. (%)	No. (%)	No. (%)	No. (%)
P1 Cervical Carcinoma is a leading	cause of death among all cancers	in India among females(agree)	34 (97.14)	57 (105.48)
P2 Cervical cancer is preventable	(agree)	42 (120.0)	61(112.44)	98 (84.68)
P3 Screening helps in its	prevention(agree)	42 (120.0)	61(112.44)	98 (84.68)
P4 Have you heard about pap smear	test for Cervical Carcinoma	screening (yes)	42 (120.0)	53 (98.15)
P5 Do you know HPV vaccination	helps in the prevention of	carcinoma of the cervix (yes)	42 (120.0)	52 (96.30)

Overall, the majority of participants acknowledged the preventability of cervical cancer (81.95%) and the role of screening in prevention (81.95%). Medical doctors exhibited the highest levels of awareness across all prevention measures, followed by nurses and students. Additionally, awareness of Pap smear tests was relatively high among medical doctors (100%) and nurses (81.48%), while medical students showed lower awareness levels (49.13%). Similarly, knowledge of HPV vaccination was higher among medical doctors (100%) and nurses (79.62%) compared to students (45.68%).

These results highlight the importance of promoting preventive measures such as screening and vaccination among healthcare professionals and medical trainees. Furthermore, the lower awareness levels among students emphasize the need for comprehensive education and training programs that integrate cervical cancer prevention into medical curricula from an early stage.

Each result obtained from the study provides valuable insights into the current knowledge levels and awareness among female healthcare professionals and medical trainees regarding cervical cancer and its prevention. The higher awareness levels among medical doctors compared to nurses and students can be attributed to their advanced education and training, which may include specialized courses or continuing medical education programs focusing on cervical cancer.

The lower awareness levels among nurses and students highlight the importance of targeted educational interventions and continuous professional development to bridge knowledge gaps

and ensure that all healthcare professionals are equipped to effectively address cervical cancer prevention and control. Additionally, the disparity in awareness levels underscores the need for tailored educational strategies that take into account the specific learning needs and preferences of different groups.

Overall, the results underscore the importance of comprehensive cervical cancer education and awareness programs aimed at empowering healthcare professionals and medical trainees with the knowledge and skills necessary to prevent and control this disease effectively. By addressing knowledge gaps and promoting evidence-based preventive measures, such programs have the potential to significantly reduce the burden of cervical cancer and improve women's health outcomes globally.

Conclusion:

In conclusion, this study provides valuable insights into the knowledge levels and awareness among female healthcare professionals and medical trainees regarding cervical cancer and its prevention. The findings highlight variations in awareness levels across different participant groups, with medical doctors demonstrating higher levels of knowledge compared to nurses and students. While the majority of participants acknowledged the preventability of cervical cancer and the role of screening in prevention, there were notable gaps in awareness regarding specific risk factors and preventive measures, particularly among medical students.

These findings underscore the need for targeted educational interventions and continuous professional development programs aimed at improving awareness and knowledge among healthcare professionals and medical trainees. By addressing these knowledge gaps and promoting evidence-based preventive measures such as screening and vaccination, healthcare providers can play a crucial role in reducing the burden of cervical cancer and improving women's health outcomes.

Limitations of the Study:

Despite its contributions, this study has several limitations that warrant consideration. Firstly, the study was conducted in a single institution, which may limit the generalizability of the findings to other settings or populations. Additionally, the cross-sectional design of the study precludes the establishment of causal relationships between variables. Moreover, the reliance on self-reported data may introduce response bias and affect the accuracy of the results. Furthermore, the study did not assess participants' knowledge retention or long-term behavioral changes following educational interventions, limiting the assessment of intervention effectiveness.

Implications of the Study:

The findings of this study have important implications for healthcare practice, education, and policy. Firstly, the identification of knowledge gaps and awareness levels among healthcare professionals and medical trainees can inform the development of targeted educational interventions and training programs. By addressing these gaps and promoting evidence-based preventive measures, healthcare providers can enhance their ability to effectively prevent and control cervical cancer. Additionally, the study highlights the importance of integrating cervical cancer education into medical school curricula to ensure that future generations of healthcare professionals are adequately equipped to address this disease.

Future Recommendations:

Based on the findings of this study, several recommendations can be made for future research and practice. Firstly, longitudinal studies are needed to assess the long-term impact of educational interventions on knowledge retention and behavioral changes among healthcare professionals and medical trainees. Additionally, research should explore the effectiveness of different educational approaches, including workshops, seminars, and online modules, in improving awareness and knowledge levels among healthcare providers.

Furthermore, future studies should examine the barriers to cervical cancer screening and vaccination uptake among women, particularly in underserved populations. By identifying and addressing these barriers, healthcare providers can improve access to preventive services and reduce disparities in cervical cancer outcomes. Finally, ongoing surveillance and monitoring of cervical cancer incidence and mortality rates are essential for evaluating the effectiveness of prevention and control efforts and guiding policy decisions aimed at reducing the burden of this disease.

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