

Research Article

Cervical Cancer and Its Screening: Assessing the Knowledge, Awareness, and Perception among Health and Allied Students

Syed Sameer Aga ^{1,2,3}, Nusrath Yasmeen ^{3,4} and Muhammad Anwar Khan ^{2,3}

¹Department of Basic Medical Sciences, College of Medicine, King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS), Jeddah, Saudi Arabia

²Department of Medical Education, College of Medicine, King Saud Bin Abdul Aziz University for Health Sciences (KSAU-HS), Jeddah, Saudi Arabia

³King Abdullah International Medical Research Centre (KAIMRC), National Guard Health Affairs (NGHA), King Abdulaziz Medical City, Jeddah, Saudi Arabia

⁴Department of Pharmacology, College of Nursing, King Saud Bin Abdul Aziz University for Health Sciences (KSAU-HS), Jeddah, Saudi Arabia

Correspondence should be addressed to Syed Sameer Aga; agas@ksau-hs.edu.sa

Received 16 November 2021; Accepted 14 March 2022; Published 1 April 2022

Academic Editor: Ayoub Bahnasse

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Background. Cervical cancer (CC) is the fourth most common cancers affecting women. It being preventable, a robust and effective national education cum screening program is the key to curb its increasing incidence. **Objectives.** This cross-sectional study was designed to investigate the knowledge, awareness, and perceptions (KAP) towards CC etiology, its signs and symptoms and risk factors among Health Professions Students' (HPSs) in King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS), Jeddah Campus. **Methods.** Data was collected using predesigned and validated study questionnaire. The respondents' KAP were compared across gender, colleges, and levels of education. Data analysis was done using SPSS v 20.0 (IBM Corporation) at 95% CI. **Results.** A total of 580 HPS responded to the survey, 128 (22.1%) were males, while 452 (77.9%) were females with the mean age \pm SD 20.36 ± 1.74 years. Although 70% of the respondents had heard about CC, but only 27.9% and 18.6% knew that CC is common among women and it is transmissible, respectively. Additionally, the knowledge of relationship between viral infection and vaccination was also dismal (34.1%) and only 18.6% of the students had knowledge that CC was a transmissible disease. Interestingly, students from college of medicine had more knowledge and awareness about CC ($p < 0.05$). **Conclusions.** Since HPSs had considerable low knowledge about CC, we identify the dire need to implement an effective education programs, curricular activities, and awareness campaigns for HPSs as well as general population to augment the learning process effectively.

1. Introduction

Cervical cancer (CC) is one of the important gynecological cancers which continue to be the significant global health problem worldwide affecting middle-aged women [1]. Cervical cancer represents the fourth most common cancer in women. In 2018, an estimated 570 000 women were diagnosed with CC worldwide and about 311 000 women died from the disease [1, 2]. Cervical cancer incidence varies widely among countries across all continents, with age-

standardized incidence rate (ASIR) of around 13.1 per 100,000 globally and the average age at diagnosis being 53 years [2, 3]. The lowest incidence burden of CC is in Western Asia (age – specific incidence rate – ASIR < 6 per 100 000), modest in Australia, New Zealand, Northern America, Western Europe, Northern Africa, Southern Europe, and Northern Europe (ASIR < 10 per 100 000) and highest in Africa, Melanesia, Micronesia, Southeastern Asia, Eastern Europe, the Caribbean, and South America (ASIR \geq 11 – 15 per 100 000) [2]. CC has been reported to be leading cause

of deaths in women in about 42 lower-resource countries amounting to approximately 84% of all CCs cases and 88% of all deaths [2–4].

In western Asia, Kingdom of Saudi Arabia (KSA) is among the 12 countries (Iraq, Yemen, Iran, Palestine, Saudi Arabia, Jordan, Kuwait, Syria, Bahrain, Qatar, Israel, and Turkey) which have the lowest of all lowest ASIR values (<5 per 100 000 women). In KSA, the incidence of CC is very low (1.9/100000), and it ranks 20th among other cancers with only 316 new cases and 158 deaths reported in 2018 [5], making it a sixth leading cause of cancer-related death in women aged 15–44 years [4].

Cervical cancer is one of the preventable gynecological cancers with an identifiable etiological factor of infection by human papilloma virus (HPV) especially the high-risk subtypes—HPV-16 and HPV-18, which are responsible for approximately 70% of CC cases [6–8]. Therefore, provided that the HPV infection is detected and established early, this cancer is easily curable. Thus, the knowledge and awareness about the various risk factors, infection by HPV, early warning signs, and symptoms of cervical cancer are highly crucial for its early diagnosis [4, 8]. In a conservative and traditional Muslim society including KSA, there are numerous important identifiable barriers for the early detection, diagnosis, and treatment of the disease [9, 10]. To add to the complication, there also exists a huge gap in the knowledge and practice for HPV and a structured national CC screening programs among the general masses within Gulf States and in the Kingdom as well [4, 8, 10–18].

As already mentioned, the prevention of CC critically depends on the basic factoid knowledge within the general population about the etiology and risk factors and an awareness of the screening program and techniques provided by the government including the various vaccination and treatment modalities [8, 10, 11, 13, 15, 17, 18]. An easy way to mitigate it is by providing extensive and regular awareness among communities through well-designed educational programs on cancer screening and prevention covering the aspects of preventable risk factors, benefits of early diagnosis, and various government screening services provided to the general masses especially sexually active women of critical age [18–20].

In developed countries like USA, CC screening programs have successfully reduced the incidence of invasive lesions up to 80% [2]. Several important studies carried in various regions across the Kingdom of Saudi Arabia (KSA) have reported lack of suitable awareness and knowledge regarding cervical cancer, its etiology, risk factors, and the availability of any national screening testing and vaccines [4, 8, 10, 12, 14, 16, 18, 21, 22].

The objectives of this study were to assess the knowledge, awareness, and attitude of health professions students in the KSAUHS, Jeddah, regarding the cervical cancer, its risk factors, the screening methods available for the early detection, and the vaccination for preventing CC.

2. Material and Methods

2.1. Study Design. This research study is a cross-sectional, descriptive type, which was carried during the two-

month period, i.e., February–March 2020. Medical students were selected for this study using convenience and indiscriminate sampling technique. The study was carried out in line with the Helsinki protocol, and an ethical approval from the Institutional Research Board was duly acquired prior to carrying out the study.

2.2. Study Sample. The sample size required to carry out this study was calculated using online Raosoft® software tool (link: http://www.raosoft.com/sample_size.html). For calculation, the estimated prevalence of awareness about the HPV and CC was kept at 50.0%; confidence level was kept at 90% and margin of error at $\pm 5\%$. Total number of students studying in our University in Jeddah Campus being 2600, a necessary sample size was calculated to be 245.

2.3. Consent and Ethical Approval. An informed consent was taken from all the participants before participation in this study. None of the Names and IDs was taken from the participants, and the data was stored within 64-bit encrypted software that was not prone to be breached by nonauthorized persons. The study was approved by the Institutional Ethic and Research Board (IRB) of King Saud Bin Abdulaziz University for Health Sciences (KSAU-HS) and King Abdullah International Medical Research Centre (KAIMRC), Riyadh (Reference No: RJ19/149/J; Dated: 22/12/2019).

2.4. Questionnaire. Google Forms platform was used for the dispensation of the predesigned online survey. And an informed consent was taken from all participating medical students on the first-introductory page of the survey. The questionnaire used in this study was carefully developed after an extensive literature survey [8, 10, 12, 15, 23–25]. It constituted of specific sections for the cervical cancer (CC), its early warning signs and various risk factors of CC.

The three sections of the survey were as: section A constituting questions regarding the demographics of participating students, section B contained queries regarding cervical cancer (CC), section C contained statements about various early warning signs of CC, and section D contained statements about various risk factors of CC (questionnaire available on request). For each question, three options were as: yes (true), no (false), and do not know.

2.5. Data and Statistical Analysis. The results of this study were expressed in frequencies and percentages for qualitative variables. Independent *t*-test was conducted to compare the awareness and knowledge scores between the participants. Collection and analysis of the data were performed by using SPSS version 20. For frequencies and percentages, a detailed descriptive analysis was done. Comparison of the categorical variables was made using chi-square (χ^2) test, and a statistical significance was kept at a *p* value of ≤ 0.05 .

3. Results

3.1. Demographic Profile of Participating Students. A total of 580 students responded positively to the dispensed survey, of them, 128 (22.1%) were males, while 452 (77.9%) were females with a ratio of 1:0.28. The mean age of the

respondents was 20.36 (SD = 1.74). Furthermore, 95.9% (556) of the respondents were single, 2.4% (14) were married, 1.4% (8) divorced, and 0.3% (2) widow(er). Demographic characteristics of the participants are presented in Table 1. Based on college of study, 126 (21.7%) of the respondents represented College of Medicine (COM), 154 (26.6%) were from College of Sciences & Health Professions (COSHP), 100 (17.2%) from College of Applied Medical Sciences (CAMS), and 200 (34.5%) from College of Nursing (CON) (Table 1). And 130 (22.4%) of the respondents were from first year, 154 (26.6%) were from second year, 176 (30.3%) from third year, 64 (11.0%) from fourth year, 46 (7.9%) were from fifth, and 10 (1.7%) were from sixth year of their academic level.

3.2. Knowledge about the Cervical Cancer. With regards to possessing the knowledge of CC, out of total 580 respondents, 406 (70%) had heard about cervical cancer, and majority of them were able to correctly identify that CC was not the frequent cancer in women (246; 42.4%); it affects only old women (308; 53.1%) and it is preventable disease (272; 46.9%). However, majority of the respondents did not know that CC occurs more common in young women (364; 62.8%), is transmissible (246, 42.4%), is viral infection (280, 48.3%), is bacterial infection (318, 54.8%), and is caused by HPV infection (222, 38.3%). Also, they had no knowledge about CC is being the rare cancer affecting women, with 240 (41.4%) of them choosing false option. Table 2 provides the frequency of responses to the knowledge domain of the questionnaire.

Regarding knowledge about signs and symptoms of CC, only five of the eleven provided symptoms were identified correctly by the majority (>42%) of the respondents—bleeding between periods (306; 52.8%), persistent pelvic pain (292; 50.3%), foul smell discharge (288; 49.7%), discomfort during sexual intercourse (276, 47.6%), and postcoital discharge/bleeding (242; 41.7%). However, majority of respondents did not know about the false symptoms of the CC, i.e., pain in armpit (260, 44.8%) and occasional constipation (330, 56.9%). So, majority of the respondents were not aware of the signs and symptoms of cervical cancer. Table 3 provides the frequency of responses to the signs and symptoms portion of the questionnaire.

3.3. Awareness and Perception about the Cervical Cancer. Regarding awareness of the respondents about various risk factors of CC, only eight out of total twenty listed risk factors were correctly identified by the majority (>43.4%) which were aging (286, 49.3%), family history (272, 46.9%), smoking (252, 43.4%), immunosuppression (256, 44.1%), multiple sexual partners (292, 50.3%), multiple sexual partners (292; 50.3%), recurrent/chronic cervix diseases (288, 49.7%), viral infections (282, 48.6%) as true positive, and breastfeeding (272, 46.9%) as true negative. For the rest of the twelve risk factors, majority of the respondents chose either “No” as the answer or they simply were not aware of them being a risk factor. And as already mentioned, out of four false risk factors (obesity, lack of physical exercise, breastfeeding, and early marriage), respondents were able to distinguish

TABLE 1: Sociodemographic data of the participants ($n = 580$).

| Variable | n | Mean | SD |
|----------------|-------------|-------|-------|
| Age | 580 | 20.36 | 1.74 |
| Variable | | n | % |
| Gender | Male | 128 | 22.1 |
| | Female | 452 | 77.9 |
| Marital status | Single | 556 | 95.9 |
| | Married | 14 | 2.4 |
| | Divorced | 8 | 1.4 |
| | Widow(er) | 2 | 0.3 |
| College | COM | 126 | 21.7 |
| | COSHP | 154 | 26.6 |
| | CAMS | 100 | 17.2 |
| | CON | 200 | 34.5 |
| Academic level | First year | 130 | 22.4 |
| | Second year | 154 | 26.6 |
| | Third year | 176 | 30.3 |
| | Fourth year | 64 | 11.0 |
| | Fifth year | 46 | 7.9 |
| | Sixth year | 10 | 1.7 |
| | Total | 580 | 100.0 |

only one as false (breastfeeding) one from the rest. Table 4 provides the frequency of responses to the risk factors of CC portion of the questionnaire.

3.4. Sources of Information for Cervical Cancer. With regards to the sources of information about CC, the respondents opted self-learning (154, 26.7%), internet (134, 23.3%), curriculum (46, 8.0%), never heard (18, 3.1%), and others (182, 31.6%) in decreasing order. The comparisons between the various sources of information are provided in Table 5 and Figure 1. Furthermore, the analysis of the data also revealed that respondents from COM had good knowledge of CC, its symptoms and risk factors. Also, we found that there was a significant difference in the knowledge with respect to gender as well as level of education in colleges. Tables 6–11 provide a description of the respondents' options stratified according to the gender, college, and level of education.

4. Discussion

This prospective cross-sectional study aimed to measure the levels of knowledge, awareness, and attitude of Saudi Health Professions Students' (HPSs) towards cervical cancer (CC) etiology, its signs and symptoms, and risk factors. The results of our cross-sectional study found a poor level of knowledge among our HPSs. These results do clearly demonstrate that there exists large knowledge gaps with regards students' knowledge of CC, its signs and symptoms and risk factors. The results are in concordance with the previous studies across the world where participants have

TABLE 2: Responses of the participants regarding the knowledge and awareness of the etiology of cervical cancer ($n = 580$).

| | | <i>n</i> | % |
|--|-------------|----------|------|
| Ever heard of cervical cancer | Yes | 406 | 70.0 |
| | No | 144 | 24.8 |
| | Do not know | 30 | 5.2 |
| Most frequently occurring cancer in women is cervical cancer | True | 162 | 27.9 |
| | False | 246 | 42.4 |
| | Do not know | 172 | 29.7 |
| Cervical cancer only affects old women | True | 66 | 11.4 |
| | False | 308 | 53.1 |
| | Do not know | 206 | 35.5 |
| Cervical cancer is more common in young women | True | 88 | 15.2 |
| | False | 128 | 22.1 |
| | Do not know | 364 | 62.8 |
| Cervical cancer is one of the rare cancer affecting women | True | 132 | 22.8 |
| | False | 240 | 41.4 |
| | Do not know | 208 | 35.9 |
| Cervical cancer is preventable disease | True | 272 | 46.9 |
| | False | 80 | 13.8 |
| | Do not know | 228 | 39.3 |
| Cervical cancer is transmissible disease | True | 108 | 18.6 |
| | False | 226 | 39.0 |
| | Do not know | 246 | 42.4 |
| Cervical cancer is caused by viral infections | True | 240 | 41.4 |
| | False | 60 | 10.3 |
| | Do not know | 280 | 48.3 |
| Cervical cancer is caused by bacterial infections | True | 94 | 16.2 |
| | False | 168 | 29.0 |
| | Do not know | 318 | 54.8 |
| Cervical cancer is caused by HPV infection? | Yes | 176 | 30.3 |
| | No | 182 | 31.4 |
| | Do not know | 222 | 38.3 |
| Ever heard of HPV vaccination? | Yes | 198 | 34.1 |
| | No | 262 | 45.2 |
| | Do not know | 120 | 20.7 |

demonstrated a poor total knowledge of CC [10, 11, 19, 26–29]. In this study, the correct response rates were lower than 40%, ranging from 18.6% to 50%. A total of 46.9% and 41.4% of participants provided correct answers to the items on preventable nature of CC, and it is caused by viral

TABLE 3: Responses of the participants regarding the knowledge and awareness of the signs and symptoms of cervical cancer ($n = 580$).

| | | <i>n</i> | % |
|---------------------------------------|-------------|----------|------|
| Bleeding in between menstrual periods | Yes | 306 | 52.8 |
| | No | 76 | 13.1 |
| | Do not know | 198 | 34.1 |
| Foul-smelling vaginal discharge | Yes | 288 | 49.7 |
| | No | 86 | 14.8 |
| | Do not know | 206 | 35.5 |
| Discomfort during sexual intercourse | Yes | 276 | 47.6 |
| | No | 88 | 15.2 |
| | Do not know | 216 | 37.2 |
| Post coital discharge/bleeding | Yes | 242 | 41.7 |
| | No | 90 | 15.5 |
| | Do not know | 248 | 42.8 |
| Persistent pelvic pain | Yes | 292 | 50.3 |
| | No | 94 | 16.2 |
| | Do not know | 194 | 33.4 |
| Unexplained weight loss | Yes | 218 | 37.6 |
| | No | 118 | 20.3 |
| | Do not know | 244 | 42.1 |
| Blood in stool or urine | Yes | 214 | 36.9 |
| | No | 116 | 20.0 |
| | Do not know | 250 | 43.1 |
| Lower back pain | Yes | 228 | 39.3 |
| | No | 110 | 19.0 |
| | Do not know | 242 | 41.7 |
| Persistent diarrhea | Yes | 128 | 22.1 |
| | No | 144 | 24.8 |
| | Do not know | 308 | 53.1 |
| Pain in the breast or armpit | Yes | 182 | 31.4 |
| | No | 138 | 23.8 |
| | Do not know | 260 | 44.8 |
| Occasional constipation | Yes | 118 | 20.3 |
| | No | 132 | 22.8 |
| | Do not know | 330 | 56.9 |
| | Total | 580 | 100 |

infection, respectively. Altamimi reported that most participants in her study had poor knowledge about CC and its prevention, with 819 of participants (84.8%) showing poor scores [19].

For most of the items of the cervical cancer questions, less than 30% of the respondents were able to respond correctly like, only 30.0% of respondents considered CC caused by HPV infection, and 29.0% of them correctly identified the false statement of CC caused by bacterial infections (see Tables 2–4). Additionally, the relationship between HPV infection and its vaccination was also dismally poor (34.1%), only 18.6% of the students had knowledge that CC was a transmissible disease, and majority of whom

TABLE 4: Responses of the participants regarding the knowledge and awareness of the risk factors of cervical cancer (n = 580).

| | | n | % |
|--|-------------|-----|------|
| Aging | Yes | 286 | 49.3 |
| | No | 128 | 22.1 |
| | Do not know | 166 | 28.6 |
| Family history of breast cancer | Yes | 272 | 46.9 |
| | No | 162 | 27.9 |
| | Do not know | 146 | 25.2 |
| Having a close relative with breast cancer | Yes | 196 | 33.8 |
| | No | 190 | 32.8 |
| | Do not know | 194 | 33.4 |
| Smoking | Yes | 252 | 43.4 |
| | No | 154 | 26.6 |
| | Do not know | 174 | 30.0 |
| Marrying late | Yes | 110 | 19.0 |
| | No | 252 | 43.4 |
| | Do not know | 218 | 37.6 |
| Early menarche | Yes | 136 | 23.4 |
| | No | 174 | 30.0 |
| | Do not know | 270 | 46.6 |
| Late menopause | Yes | 154 | 26.6 |
| | No | 160 | 27.6 |
| | Do not know | 266 | 45.9 |
| Having children later on in life or not at all | Yes | 142 | 24.5 |
| | No | 198 | 34.1 |
| | Do not know | 240 | 41.4 |
| High number of births | Yes | 110 | 19.0 |
| | No | 228 | 39.3 |
| | Do not know | 242 | 41.7 |
| Hormone replacement therapy | Yes | 210 | 36.2 |
| | No | 104 | 17.9 |
| | Do not know | 266 | 45.9 |
| Use of oral contraceptives | Yes | 168 | 29.0 |
| | No | 108 | 18.6 |
| | Do not know | 304 | 52.4 |
| Immunosuppression | Yes | 256 | 44.1 |
| | No | 84 | 14.5 |
| | Do not know | 240 | 41.4 |

TABLE 4: Continued.

| | | n | % |
|-----------------------------------|-------------|-----|------|
| Multiple sexual partners | Yes | 292 | 50.3 |
| | No | 96 | 16.6 |
| | Do not know | 192 | 33.1 |
| Recurrent/chronic cervix diseases | Yes | 288 | 49.7 |
| | No | 78 | 13.4 |
| | Do not know | 214 | 36.9 |
| Bacterial infections | Yes | 128 | 22.1 |
| | No | 168 | 29.0 |
| | Do not know | 284 | 49.0 |
| Viral infections | Yes | 282 | 48.6 |
| | No | 90 | 15.5 |
| | Do not know | 208 | 35.9 |
| Obesity | Yes | 164 | 28.3 |
| | No | 186 | 32.1 |
| | Do not know | 230 | 39.7 |
| Lack of physical exercise | Yes | 180 | 31.0 |
| | No | 172 | 29.7 |
| | Do not know | 228 | 39.3 |
| Breastfeeding | Yes | 90 | 15.5 |
| | No | 272 | 46.9 |
| | Do not know | 218 | 37.6 |
| Early marriage | Yes | 100 | 17.2 |
| | No | 222 | 38.3 |
| | Do not know | 258 | 44.5 |
| | Total | 580 | 100 |

belonged to College of Medicine (25.4%). These results were similar to the results of already published studies in KSA [15, 30]. Dhaher in her study in Women in the Southern Region of KSA reported that only 43% of the women surveyed were aware of cervical cancer, its etiology and link to HPV infection as risk factor. Altamimi recently reported that the majority of the students (67%) were unaware of the availability of the HPV vaccine, and around 41% knew that HPV infection was a risk factor for CC [19]. In a similar study by Baloch et al., in Chinese women [31], authors reported a maximum of 77% of respondents to have some knowledge of CC, while as high as 35% knew that HPV was a causative agent of CC, and a maximum of 19.4% were aware that CC can be prevented by using HPV vaccine. Also, in his study on health science students, Rajiah et al. reported the majority of respondents knew that HPV infection is preventable (88.6%) and that HPV is a cause of CC (80.2%), and

TABLE 5: Responses of the participants regarding the identified sources of information for cervical cancer stratified by gender, college, and academic level.

| Variable | Gender | | College enrolled | | | | | | Academic level | | | | | | p value |
|-------------------------|---------------|-----------------|------------------|----------------|---------------|--------------|----------|---------------------|----------------------|---------------------|----------------------|---------------------|---------------------|----------|---------|
| | Male N (%) | Female N (%) | COM N (%) | COSHP N (%) | CAMS N (%) | CON N (%) | p value | First year N (%) | Second year N (%) | Third year N (%) | Fourth year N (%) | Fifth year N (%) | Sixth year N (%) | | |
| Self-learning | 17.5% | 29.3% | 12.7% | 33.8% | 34.0% | 26.5% | | 40.6% | 27.3% | 24.1% | 15.6% | 17.4% | 0.0% | | |
| Curriculum | 17.5% | 5.3% | 15.9% | 2.6% | 8.0% | 7.1% | | 3.1% | 0.0% | 9.2% | 18.8% | 21.7% | 40.0% | | |
| Faculty | 0.0% | 2.2% | 0.0% | 1.3% | 2.0% | 3.1% | | 1.6% | 1.3% | 2.3% | 0.0% | 4.3% | 0.0% | | |
| Hospital | 1.6% | 3.1% | 0.0% | 2.6% | 0.0% | 6.1% | | 1.6% | 1.3% | 4.6% | 0.0% | 8.7% | 0.0% | | |
| Internet | 15.9% | 25.3% | <0.001** | 22.2% | 27.3% | 26.0% | <0.001** | 17.2% | 41.6% | 19.5% | 15.6% | 8.7% | 0.0% | <0.001** | |
| Workshops | 1.6% | 2.2% | 3.2% | 1.3% | 0.0% | 3.1% | | 1.6% | 0.0% | 3.4% | 0.0% | 8.7% | 0.0% | | |
| Campaigns | 0.0% | .9% | 1.6% | 0.0% | 2.0% | 0.0% | | 0.0% | 1.3% | 1.1% | 0.0% | 0.0% | 0.0% | | |
| Do not know/never heard | 6.3% | 2.2% | 1.6% | 3.9% | 6.0% | 2.0% | | 4.7% | 3.9% | 2.3% | 3.1% | 0.0% | 0.0% | | |
| Others | 39.7% | 29.3% | 42.9% | 27.3% | 22.0% | 32.7% | | 29.7% | 23.4% | 33.3% | 46.9% | 30.4% | 60.0% | | |

Significance is at $p \leq 0.05$. *Chi-square test. **Fisher-Exact test.

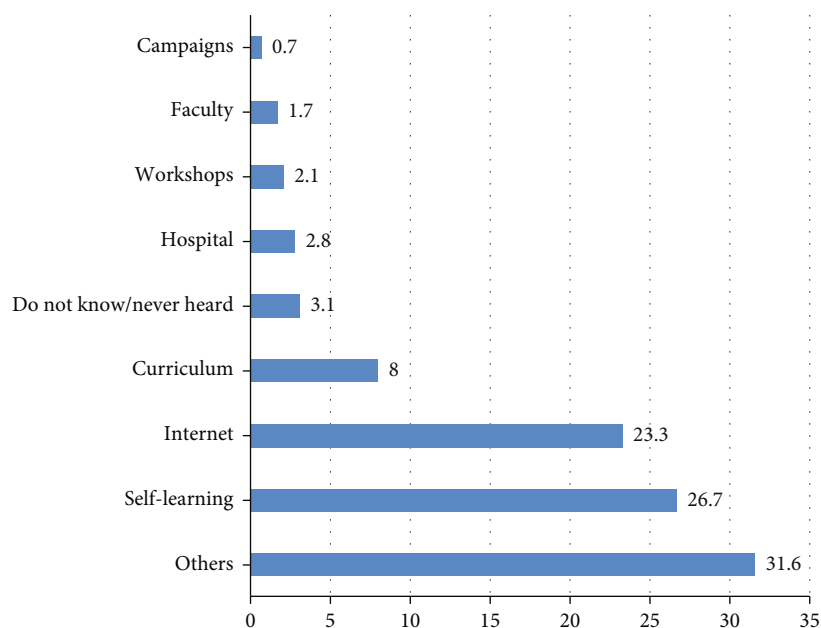


FIGURE 1: Representation of the identified sources of information for cervical cancer as provided by participants, in increasing order of percentage.

these results are much huger than what we found in the current study [23].

Furthermore, even though this study involved health professions students, 70% of the respondents had heard about CC, but only 27.9% and 18.6% knew that CC is common among women, and it is transmissible, respectively. Among the students who had heard about CC, 88.9% of were from COM. For most of the correctly identifiable statements about CC, majority of the respondents were medicine students. Also, we also found that students of final year were knowledgeable about CC and its etiology (Table 8). These results were like that reported by earlier researchers [8, 15, 19, 30]. Altamimi recently have shown a significantly higher knowledge score among the medical college and applied medical science students [19]. Pandey et al. had also demonstrated in his study among medical students that they had better knowledge about preventable nature of cervical cancer (89.6%), its HPV etiology (89.2%), and the availability of vaccine for prevention (75.6%) [32].

For the identification of the signs and symptoms and the related risk factors of CC, the awareness among respondents was also dismal (see Tables 2–11). For the topmost correctly identified signs and symptoms factors for CC, the response frequency ranged from 41.7% to 52.8%, and that for the risk factors it varied from 44.1% to 50.3%. Our results were similar to that of the Al-Shaikh et al. [15] and Salem et al. [20] from KSA. Salem et al. reported that about two-thirds of the respondents were not knowledgeable about CC-related risk factors, signs, and symptoms and only one-quarter knew that infection with HPV (human papilloma virus) is a risk factor for CC [20]. However, contrarily, Al-Darwish et al., in their study in KSA, had reported that 41% of his respondents were aware of HPV and 41.5% of smoking being one of the risk factors for CC [8].

The current study revealed that “Bleeding in between menstrual periods,” “Foul smelling vaginal discharge,” “Discomfort during sexual intercourse,” “Post coital discharge/bleeding,” and “Persistent pelvic pain” were the most identifiable sign and symptoms; while as “Aging,” “Family history of breast cancer,” “Smoking,” “immunosuppression,” “Multiple sexual partners,” “Recurrent/Chronic Cervix Diseases,” and “Viral Infections” were the most identifiable risk factor of CC made by our respondents (for percentages, see Tables 2–4). A number of studies have already established these as most important signs, symptoms, and risk [8, 10, 12, 15, 21, 23–25]. Numerous studies published previously have found that lack of knowledge regarding risk factors of CC is the single most important factor for the women not opting for the screening tests. This emphasizes the need for dedicated national screening programs and public education campaigns which would enable women to be aware of the disease’s risk factors [4, 10, 18, 31, 33–35]. Pandey et al. have also identified that chief obstacle in implementation of the HPV vaccination program is inadequate information among the population. Thus, according to them, medical teaching had a definitive impact on the understanding of the CC, with regards to its etiology, vaccine availability, and its preventive efficacy [32].

Furthermore, 154 (26.7%), 134 (23.3%), and 46 (12.2%) of participants stated that their source of knowledge for CC was self-learning, internet, and curriculum, respectively (see Figure 1). These findings were in tune with the results reported by Alnafisah et al., Rajiah et al., and Al Shaman et al., in all of which the respondents had identified the mass media and internet as their prime source of knowledge [12, 22, 23]. However, the study by Jassim et al. [13] from Bahrain contrarily reported “gynecologists” to be the primary source of information and a study by Al-Darwish

TABLE 6: Responses of the participants regarding the knowledge and awareness of the etiology of cervical cancer stratified based upon gender and college of enrollment ($n = 580$).

| | | Gender | | College | | | | | <i>p</i> value |
|--|-------------|--------|--------|---------|-------|-------|-------|---------|----------------|
| | | Male | Female | COM | COSHP | CAMS | CON | | |
| Ever heard of cervical cancer | Yes | 81.3% | 66.8% | 88.9% | 67.5% | 74.0% | 58.0% | | |
| | No | 18.8% | 26.5% | 11.1% | 26.0% | 24.0% | 33.0% | <0.001* | |
| Most frequently occurring cancer in women is cervical cancer | Do not know | 0.0% | 6.6% | 0.0% | 6.5% | 2.0% | 9.0% | | |
| | True | 18.8% | 30.5% | 7.9% | 26.0% | 28.0% | 42.0% | <0.001* | |
| Cervical cancer only affects old women | False | 57.8% | 38.1% | 68.3% | 40.3% | 40.0% | 29.0% | | |
| | Do not know | 23.4% | 31.4% | 23.8% | 33.8% | 32.0% | 29.0% | 0.002* | |
| Cervical cancer is more common in young women | True | 7.8% | 12.4% | 4.8% | 11.7% | 6.0% | 18.0% | | |
| | False | 59.4% | 51.3% | 63.5% | 53.2% | 56.0% | 45.0% | 0.002* | |
| Cervical cancer is one of the rare cancer affecting women | Do not know | 32.8% | 36.3% | 31.7% | 35.1% | 38.0% | 37.0% | | |
| | True | 18.8% | 14.2% | 20.6% | 11.7% | 8.0% | 18.0% | 0.004* | |
| Cervical cancer is preventable disease | False | 25.0% | 21.2% | 12.7% | 28.6% | 20.0% | 24.0% | | |
| | Do not know | 56.3% | 64.6% | 66.7% | 59.7% | 72.0% | 58.0% | <0.001* | |
| Cervical cancer is transmissible disease | True | 15.6% | 24.8% | 4.8% | 28.6% | 20.0% | 31.0% | | |
| | False | 42.2% | 41.2% | 55.6% | 32.5% | 42.0% | 39.0% | 0.0063* | |
| Cervical cancer is caused by viral infections | Do not know | 42.2% | 34.1% | 39.7% | 39.0% | 38.0% | 30.0% | | |
| | True | 48.4% | 46.5% | 66.7% | 42.9% | 50.0% | 36.0% | <0.001* | |
| Cervical cancer is caused by bacterial infections | False | 9.4% | 15.0% | 6.3% | 16.9% | 10.0% | 18.0% | | |
| | Do not know | 42.2% | 38.5% | 27.0% | 40.3% | 40.0% | 46.0% | 0.002* | |
| Cervical Cancer is caused by HPV infection? | True | 18.8% | 18.6% | 25.4% | 16.9% | 16.0% | 17.0% | | |
| | False | 40.6% | 38.5% | 36.5% | 28.6% | 50.0% | 43.0% | 0.002* | |
| Ever heard of HPV vaccination? | Do not know | 40.6% | 42.9% | 38.1% | 54.5% | 34.0% | 40.0% | | |
| | True | 56.3% | 37.2% | 61.9% | 33.8% | 48.0% | 31.0% | <0.001* | |
| Cervical Cancer is caused by HPV infection? | False | 6.3% | 11.5% | 6.3% | 9.1% | 6.0% | 16.0% | | |
| | Do not know | 37.5% | 51.3% | 31.7% | 57.1% | 46.0% | 53.0% | <0.001* | |
| Cervical cancer is caused by bacterial infections | True | 15.6% | 16.4% | 3.2% | 23.4% | 14.0% | 20.0% | | |
| | False | 28.1% | 29.2% | 42.9% | 22.1% | 32.0% | 24.0% | 0.935* | |
| Cervical Cancer is caused by HPV infection? | Do not know | 56.3% | 54.4% | 54.0% | 54.5% | 54.0% | 56.0% | | |
| | Yes | 43.8% | 26.5% | 61.9% | 15.6% | 22.0% | 26.0% | <0.001* | |
| Ever heard of HPV vaccination? | No | 34.4% | 30.5% | 22.2% | 44.2% | 30.0% | 28.0% | | |
| | Do not know | 21.9% | 42.9% | 15.9% | 40.3% | 48.0% | 46.0% | 0.331* | |
| Ever heard of HPV vaccination? | Yes | 39.1% | 32.7% | 54.0% | 19.5% | 30.0% | 35.0% | | |
| | No | 43.8% | 45.6% | 36.5% | 58.4% | 40.0% | 43.0% | <0.001* | |
| Ever heard of HPV vaccination? | Do not know | 17.2% | 21.7% | 9.5% | 22.1% | 30.0% | 22.0% | | |

*Chi-square test. **Fisher-exact test.

TABLE 7: Responses of the participants regarding the knowledge and awareness of the signs and symptoms of cervical cancer stratified based upon gender and college of enrollment (n = 580).

| | | Gender | | p value | College | | | | | p value |
|---------------------------------------|-------------|--------|--------|---------|---------|-------|-------|-------|---------|---------|
| | | Male | Female | | COM | COSHP | CAMS | CON | | |
| Bleeding in between menstrual periods | Yes | 46.9% | 54.4% | | 54.0% | 55.8% | 50.0% | 51.0% | | |
| | No | 6.3% | 15.0% | 0.001* | 7.9% | 11.7% | 14.0% | 17.0% | 0.337* | |
| Foul smelling vaginal discharge | Do not know | 46.9% | 30.5% | | 38.1% | 32.5% | 36.0% | 32.0% | | |
| | Yes | 43.8% | 51.3% | <0.001* | 54.0% | 46.8% | 50.0% | 49.0% | <0.001* | |
| Discomfort during sexual intercourse | No | 4.7% | 17.7% | | 4.8% | 13.0% | 6.0% | 27.0% | | |
| | Do not know | 51.6% | 31.0% | 0.136* | 41.3% | 40.3% | 44.0% | 24.0% | <0.001* | |
| Post coital discharge/bleeding | Yes | 45.3% | 48.2% | | 57.1% | 42.9% | 50.0% | 44.0% | | |
| | No | 10.9% | 16.4% | 0.052* | 4.8% | 15.6% | 6.0% | 26.0% | <0.001* | |
| Unexplained weight loss | Do not know | 43.8% | 35.4% | | 38.1% | 41.6% | 44.0% | 30.0% | | |
| | Yes | 37.5% | 42.9% | | 49.2% | 40.3% | 38.0% | 40.0% | | |
| Blood in stool or urine | No | 10.9% | 16.8% | | 3.2% | 20.8% | 8.0% | 23.0% | | |
| | Do not know | 51.6% | 40.3% | <0.001* | 47.6% | 39.0% | 54.0% | 37.0% | <0.001* | |
| Lower back pain | Yes | 45.3% | 51.8% | | 58.7% | 49.4% | 46.0% | 48.0% | | |
| | No | 7.8% | 18.6% | | 6.3% | 14.3% | 10.0% | 27.0% | | |
| Pain in the breast or armpit | Do not know | 46.9% | 29.6% | | 34.9% | 36.4% | 44.0% | 25.0% | | |
| | Yes | 48.4% | 34.5% | <0.001* | 54.0% | 28.6% | 28.0% | 39.0% | <0.001* | |
| Occasional constipation | No | 3.1% | 25.2% | | 4.8% | 23.4% | 16.0% | 30.0% | | |
| | Do not know | 48.4% | 40.3% | | 41.3% | 48.1% | 56.0% | 31.0% | | |
| Persistent diarrhea | Yes | 34.4% | 37.6% | | 33.3% | 39.0% | 46.0% | 33.0% | | |
| | No | 9.4% | 23.0% | <0.001* | 11.1% | 19.5% | 12.0% | 30.0% | <0.001* | |
| Persistent pelvic pain | Do not know | 56.3% | 39.4% | | 55.6% | 41.6% | 42.0% | 37.0% | | |
| | Yes | 26.6% | 42.9% | | 34.9% | 28.6% | 34.0% | 53.0% | | |
| Occasional constipation | No | 15.6% | 19.9% | | 9.5% | 23.4% | 20.0% | 21.0% | | |
| | Do not know | 57.8% | 37.2% | <0.001* | 55.6% | 48.1% | 46.0% | 26.0% | <0.001* | |
| Blood in stool or urine | Yes | 17.2% | 23.5% | | 15.9% | 18.2% | 22.0% | 29.0% | | |
| | No | 12.5% | 28.3% | <0.001* | 14.3% | 28.6% | 20.0% | 31.0% | <0.001* | |
| Pain in the breast or armpit | Do not know | 70.3% | 48.2% | | 69.8% | 53.2% | 58.0% | 40.0% | | |
| | Yes | 14.1% | 36.3% | | 15.9% | 27.3% | 26.0% | 47.0% | | |
| Occasional constipation | No | 21.9% | 24.3% | | 14.3% | 29.9% | 24.0% | 25.0% | | |
| | Do not know | 64.1% | 39.4% | <0.001* | 69.8% | 42.9% | 50.0% | 28.0% | <0.001* | |
| Lower back pain | Yes | 15.6% | 21.7% | | 14.3% | 24.7% | 16.0% | 23.0% | | |
| | No | 14.1% | 25.2% | 0.002* | 14.3% | 20.8% | 14.0% | 34.0% | <0.001* | |
| Unexplained weight loss | Do not know | 70.3% | 53.1% | | 71.4% | 54.5% | 70.0% | 43.0% | | |
| | Yes | | | | | | | | | |

*Chi-square test.

TABLE 8: Responses of the participants regarding the knowledge and awareness of the risk factors of cervical cancer stratified based upon gender and college of enrollment ($n = 580$).

| | | Gender | | p value | College | | | | p value |
|--|-------------|--------|--------|---------|---------|-------|-------|-------|---------|
| | | Male | Female | | COM | COSH | CAMS | CON | |
| Aging | Yes | 53.1% | 48.2% | | 42.9% | 55.8% | 48.0% | 49.0% | |
| | No | 12.5% | 24.8% | 0.010* | 23.8% | 19.5% | 20.0% | 24.0% | 0.422* |
| Family history of breast cancer | Do not know | 34.4% | 27.0% | | 33.3% | 24.7% | 32.0% | 27.0% | |
| | Yes | 40.6% | 48.7% | 0.001* | 47.6% | 51.9% | 34.0% | 49.0% | <0.001* |
| Having a close relative with breast cancer | No | 21.9% | 29.6% | | 20.6% | 23.4% | 28.0% | 36.0% | |
| | Do not know | 37.5% | 21.7% | 0.097 | 31.7% | 24.7% | 38.0% | 15.0% | |
| Smoking | Yes | 39.1% | 32.3% | | 34.9% | 42.9% | 24.0% | 31.0% | |
| | No | 25.0% | 35.0% | | 25.4% | 26.0% | 36.0% | 41.0% | 0.002* |
| Marrying late | Do not know | 35.9% | 32.7% | | 39.7% | 31.2% | 40.0% | 28.0% | |
| | Yes | 50.0% | 41.6% | 0.001* | 46.0% | 50.6% | 32.0% | 42.0% | <0.001* |
| Early menarche | No | 14.1% | 30.1% | | 12.7% | 26.0% | 34.0% | 32.0% | |
| | Do not know | 35.9% | 28.3% | | 41.3% | 23.4% | 34.0% | 26.0% | |
| Late menopause | Yes | 18.8% | 19.0% | | 17.5% | 23.4% | 10.0% | 21.0% | |
| | No | 26.6% | 48.2% | <0.001* | 34.9% | 42.9% | 42.0% | 50.0% | 0.002* |
| Having children later on in life or not at all | Do not know | 54.7% | 32.7% | | 47.6% | 33.8% | 48.0% | 29.0% | |
| | Yes | 15.6% | 25.7% | 0.003* | 20.6% | 15.6% | 6.0% | 40.0% | <0.001* |
| High number of births | No | 25.0% | 31.4% | | 17.5% | 32.5% | 32.0% | 35.0% | |
| | Do not know | 59.4% | 42.9% | | 61.9% | 51.9% | 62.0% | 25.0% | |
| Hormone replacement therapy | Yes | 18.8% | 28.8% | | 22.2% | 16.9% | 14.0% | 43.0% | |
| | No | 25.0% | 28.3% | 0.018* | 20.6% | 31.2% | 28.0% | 29.0% | <0.001* |
| Use of oral contraceptives | Do not know | 56.3% | 42.9% | | 57.1% | 51.9% | 58.0% | 28.0% | |
| | Yes | 23.4% | 24.8% | 0.004* | 19.0% | 24.7% | 16.0% | 32.0% | <0.001* |
| Use of oral contraceptives | No | 23.4% | 37.2% | | 23.8% | 33.8% | 36.0% | 40.0% | |
| | Do not know | 53.1% | 38.1% | | 57.1% | 41.6% | 48.0% | 28.0% | |
| Use of oral contraceptives | Yes | 15.6% | 19.9% | | 19.0% | 26.0% | 12.0% | 17.0% | |
| | No | 34.4% | 40.7% | 0.096* | 27.0% | 39.0% | 44.0% | 45.0% | 0.002* |
| Use of oral contraceptives | Do not know | 50.0% | 39.4% | | 54.0% | 35.1% | 44.0% | 38.0% | |
| | Yes | 31.3% | 37.6% | 0.021* | 36.5% | 36.4% | 30.0% | 39.0% | 0.010* |
| Use of oral contraceptives | No | 12.5% | 19.5% | | 12.7% | 18.2% | 12.0% | 24.0% | |
| | Do not know | 56.3% | 42.9% | | 50.8% | 45.5% | 58.0% | 37.0% | |
| Use of oral contraceptives | Yes | 26.6% | 29.6% | | 34.9% | 26.0% | 24.0% | 30.0% | |
| | No | 14.1% | 19.9% | 0.159* | 11.1% | 16.9% | 12.0% | 28.0% | <0.001* |
| Use of oral contraceptives | Do not know | 59.4% | 50.4% | | 54.0% | 57.1% | 64.0% | 42.0% | |

TABLE 8: Continued.

| | Gender | | p value | COM | College | | | p value |
|-----------------------------------|-------------|--------|---------|-------|---------|-------|-------|---------|
| | Male | Female | | | COSH | CAMS | CON | |
| Immunosuppression | Yes | 44.2% | | 60.3% | 29.9% | 44.0% | 45.0% | |
| | No | 7.8% | 0.030* | 4.8% | 19.5% | 10.0% | 19.0% | <0.001* |
| Multiple sexual partners | Do not know | 48.4% | | 34.9% | 50.6% | 46.0% | 36.0% | |
| | Yes | 57.8% | | 60.3% | 53.2% | 60.0% | 37.0% | |
| Recurrent/chronic cervix diseases | No | 9.4% | 0.031* | 11.1% | 15.6% | 10.0% | 24.0% | <0.001* |
| | Do not know | 32.8% | | 28.6% | 31.2% | 30.0% | 39.0% | |
| Bacterial infections | Yes | 48.4% | | 60.3% | 48.1% | 50.0% | 44.0% | |
| | No | 6.3% | 0.009* | 4.8% | 16.9% | 8.0% | 19.0% | 0.002* |
| Viral infections | Do not know | 45.3% | | 34.9% | 35.1% | 42.0% | 37.0% | |
| | Yes | 12.5% | | 7.9% | 32.5% | 18.0% | 25.0% | |
| Lack of physical exercise | No | 25.0% | 0.001* | 41.3% | 22.1% | 30.0% | 26.0% | <0.001* |
| | Do not know | 62.5% | | 50.8% | 45.5% | 52.0% | 49.0% | |
| Obesity | Yes | 53.1% | | 69.8% | 44.2% | 52.0% | 37.0% | |
| | No | 14.1% | 0.513* | 9.5% | 16.9% | 8.0% | 22.0% | <0.001* |
| Breast feeding | Do not know | 32.8% | | 20.6% | 39.0% | 40.0% | 41.0% | |
| | Yes | 26.6% | | 22.2% | 31.2% | 18.0% | 35.0% | |
| Early marriage | No | 17.2% | <0.001* | 38.1% | 26.0% | 34.0% | 32.0% | 0.010* |
| | Do not know | 56.3% | | 39.7% | 42.9% | 48.0% | 33.0% | |
| Obesity | Yes | 18.8% | | 20.6% | 33.8% | 32.0% | 35.0% | |
| | No | 21.9% | <0.001* | 33.3% | 27.3% | 24.0% | 32.0% | 0.058* |
| Breast feeding | Do not know | 59.4% | | 46.0% | 39.0% | 44.0% | 33.0% | |
| | Yes | 10.9% | | 6.3% | 18.2% | 8.0% | 23.0% | |
| Early marriage | No | 39.1% | 0.004* | 49.2% | 48.1% | 52.0% | 42.0% | 0.001* |
| | Do not know | 50.0% | | 44.4% | 33.8% | 40.0% | 35.0% | |
| Obesity | Yes | 14.1% | | 12.7% | 19.5% | 12.0% | 21.0% | |
| | No | 29.7% | 0.010* | 33.3% | 37.7% | 32.0% | 45.0% | 0.003* |
| Breast feeding | Do not know | 56.3% | | 54.0% | 42.9% | 56.0% | 34.0% | |

*Chi-square test.

TABLE 9: Responses of the participants regarding the knowledge and awareness of the etiology of cervical cancer stratified based upon academic level ($n = 580$).

| | | Academic level | | | | | | p value |
|--|-------------|----------------|-------------|------------|-------------|------------|------------|-----------|
| | | First year | Second year | Third year | Fourth year | Fifth year | Sixth year | |
| Ever heard of cervical cancer | Yes | 67.7% | 62.3% | 69.3% | 93.8% | 65.2% | 100.0% | |
| | No | 20.0% | 36.4% | 27.3% | 3.1% | 26.1% | 0.0% | <0.001* |
| Most frequently occurring cancer in women is cervical cancer | Do not know | 12.3% | 1.3% | 3.4% | 3.1% | 8.7% | 0.0% | |
| | True | 32.3% | 15.6% | 33.0% | 21.9% | 43.5% | 40.0% | |
| Cervical cancer only affects old women | False | 30.8% | 46.8% | 39.8% | 62.5% | 43.5% | 40.0% | <0.001* |
| | Do not know | 36.9% | 37.7% | 27.3% | 15.6% | 13.0% | 20.0% | |
| Cervical cancer is more common in young women | True | 13.8% | 6.5% | 13.6% | 15.6% | 4.3% | 20.0% | |
| | False | 58.5% | 53.2% | 43.2% | 56.3% | 65.2% | 80.0% | 0.004* |
| Cervical cancer is one of the rare cancer affecting women | Do not know | 27.7% | 40.3% | 43.2% | 28.1% | 30.4% | 0.0% | |
| | True | 15.4% | 5.2% | 15.9% | 25.0% | 21.7% | 60.0% | |
| Cervical cancer is preventable disease | False | 35.4% | 15.6% | 14.8% | 18.8% | 34.8% | 40.0% | <0.001* |
| | Do not know | 49.2% | 79.2% | 69.3% | 56.3% | 43.5% | 0.0% | |
| Cervical cancer is transmissible disease | True | 23.1% | 26.0% | 22.7% | 12.5% | 26.1% | 20.0% | |
| | False | 40.0% | 26.0% | 46.6% | 56.3% | 52.2% | 60.0% | 0.001* |
| Cervical cancer is caused by viral infections | Do not know | 36.9% | 48.1% | 30.7% | 31.3% | 21.7% | 20.0% | |
| | True | 36.9% | 45.5% | 50.0% | 53.1% | 52.2% | 80.0% | |
| Cervical cancer is caused by bacterial infections | False | 18.5% | 10.4% | 15.9% | 9.4% | 8.7% | 20.0% | 0.036* |
| | Do not know | 44.6% | 44.2% | 34.1% | 37.5% | 39.1% | 0.0% | |
| Cervical Cancer is caused by HPV infection? | True | 12.3% | 16.9% | 20.5% | 12.5% | 39.1% | 40.0% | |
| | False | 27.7% | 33.8% | 48.9% | 40.6% | 47.8% | 40.0% | <0.001* |
| HPV vaccination? | Do not know | 60.0% | 49.4% | 30.7% | 46.9% | 13.0% | 20.0% | |
| | True | 29.2% | 31.2% | 40.9% | 71.9% | 56.5% | 100.0% | |
| Cervical Cancer is caused by HPV infection? | False | 9.2% | 9.1% | 11.4% | 3.1% | 26.1% | 0.0% | <0.001* |
| | Do not know | 61.5% | 59.7% | 47.7% | 25.0% | 17.4% | 0.0% | |
| Cervical Cancer is caused by bacterial infections | True | 24.6% | 14.3% | 14.8% | 9.4% | 8.7% | 40.0% | |
| | False | 15.4% | 23.4% | 31.8% | 43.8% | 47.8% | 60.0% | <0.001* |
| Cervical Cancer is caused by HPV infection? | Do not know | 60.0% | 62.3% | 53.4% | 46.9% | 43.5% | 0.0% | |
| | Yes | 15.4% | 19.5% | 33.0% | 56.3% | 52.2% | 80.0% | |
| Cervical Cancer is caused by HPV infection? | No | 33.8% | 44.2% | 27.3% | 15.6% | 21.7% | 20.0% | <0.001* |
| | Do not know | 50.8% | 36.4% | 39.8% | 28.1% | 26.1% | 0.0% | |
| HPV vaccination? | Yes | 32.3% | 19.5% | 37.5% | 43.8% | 52.2% | 80.0% | |
| | No | 47.7% | 55.8% | 42.0% | 34.4% | 34.8% | 20.0% | <0.001* |
| HPV vaccination? | Do not know | 20.0% | 24.7% | 20.5% | 21.9% | 13.0% | 0.0% | |

*Chi-square test. **Fisher-exact test.

TABLE 10: Responses of the participants regarding the knowledge and awareness of the signs and symptoms of cervical cancer stratified based upon academic level (n = 580).

| | | Academic level | | | | | | p value |
|---------------------------------------|-------------|----------------|-------------|------------|-------------|------------|------------|---------|
| | | First year | Second year | Third year | Fourth year | Fifth year | Sixth year | |
| Bleeding in between menstrual periods | Yes | 52.3% | 48.1% | 52.3% | 59.4% | 60.9% | 60.0% | 0.008* |
| | No | 10.8% | 14.3% | 9.1% | 15.6% | 21.7% | 40.0% | |
| Foul smelling vaginal discharge | Do not know | 36.9% | 37.7% | 38.6% | 25.0% | 17.4% | 0.0% | <0.001* |
| | Yes | 44.6% | 48.1% | 54.5% | 46.9% | 43.5% | 100.0% | |
| Discomfort during sexual intercourse | No | 23.1% | 6.5% | 12.5% | 12.5% | 34.8% | 0.0% | <0.001* |
| | Do not know | 32.3% | 45.5% | 33.0% | 40.6% | 21.7% | 0.0% | |
| Post coital discharge/bleeding | Yes | 35.4% | 48.1% | 50.0% | 53.1% | 65.2% | 40.0% | <0.001* |
| | No | 21.5% | 7.8% | 14.8% | 12.5% | 17.4% | 60.0% | |
| Persistent pelvic pain | Do not know | 43.1% | 44.2% | 35.2% | 34.4% | 17.4% | 0.0% | 0.001* |
| | Yes | 27.7% | 44.2% | 45.5% | 40.6% | 52.2% | 80.0% | |
| Unexplained weight loss | No | 30.8% | 10.4% | 9.1% | 12.5% | 17.4% | 20.0% | <0.001* |
| | Do not know | 41.5% | 45.5% | 45.5% | 46.9% | 30.4% | 0.0% | |
| Blood in stool or urine | Yes | 38.5% | 54.5% | 52.3% | 56.3% | 52.2% | 60.0% | 0.113* |
| | No | 20.0% | 7.8% | 17.0% | 15.6% | 26.1% | 40.0% | |
| Lower back pain | Do not know | 41.5% | 37.7% | 30.7% | 28.1% | 21.7% | 0.0% | <0.001* |
| | Yes | 18.5% | 29.9% | 45.5% | 50.0% | 56.5% | 100.0% | |
| Persistent diarrhea | No | 30.8% | 18.2% | 19.3% | 12.5% | 17.4% | 0.0% | 0.691* |
| | Do not know | 50.8% | 51.9% | 35.2% | 37.5% | 26.1% | 0.0% | |
| Pain in the breast or armpit | Yes | 30.8% | 40.3% | 37.5% | 34.4% | 34.8% | 80.0% | <0.001* |
| | No | 20.0% | 18.2% | 21.6% | 15.6% | 26.1% | 20.0% | |
| Occasional constipation | Do not know | 49.2% | 41.6% | 40.9% | 50.0% | 39.1% | 0.0% | 0.047* |
| | Yes | 23.1% | 39.0% | 48.9% | 34.4% | 56.5% | 40.0% | |
| | No | 24.6% | 16.9% | 18.2% | 15.6% | 13.0% | 40.0% | <0.001* |
| | Do not know | 52.3% | 44.2% | 33.0% | 50.0% | 30.4% | 20.0% | |
| | Yes | 20.0% | 19.5% | 25.0% | 18.8% | 26.1% | 40.0% | 0.691* |
| | No | 27.7% | 22.1% | 26.1% | 21.9% | 26.1% | 20.0% | |
| | Do not know | 52.3% | 58.4% | 48.9% | 59.4% | 47.8% | 40.0% | <0.001* |
| | Yes | 20.0% | 27.3% | 42.0% | 28.1% | 34.8% | 60.0% | |
| | No | 36.9% | 22.1% | 17.0% | 21.9% | 21.7% | 20.0% | <0.001* |
| | Do not know | 43.1% | 50.6% | 40.9% | 50.0% | 43.5% | 20.0% | |
| | Yes | 18.5% | 22.1% | 19.3% | 15.6% | 26.1% | 40.0% | 0.047* |
| | No | 27.7% | 14.3% | 26.1% | 18.8% | 26.1% | 40.0% | |
| | Do not know | 53.8% | 63.6% | 54.5% | 65.6% | 47.8% | 20.0% | 0.047* |
| | Yes | | | | | | | |

*Chi-square test.

TABLE 11: Responses of the participants regarding the knowledge and awareness of the risk factors of cervical cancer stratified based upon academic level (n = 580).

| | | Academic level | | | | | | p value |
|--|-------------|----------------|-------------|------------|-------------|------------|------------|---------|
| | | First year | Second year | Third year | Fourth year | Fifth year | Sixth year | |
| Aging | Yes | 38.5% | 57.1% | 45.5% | 53.1% | 65.2% | 40.0% | 0.020* |
| | No | 23.1% | 22.1% | 22.7% | 21.9% | 13.0% | 40.0% | |
| Family history of breast cancer | Do not know | 38.5% | 20.8% | 31.8% | 25.0% | 21.7% | 20.0% | 0.290* |
| | Yes | 41.5% | 51.9% | 48.9% | 43.8% | 43.5% | 40.0% | |
| Having a close relative with breast cancer | No | 33.8% | 23.4% | 26.1% | 21.9% | 39.1% | 40.0% | 0.060* |
| | Do not know | 24.6% | 24.7% | 25.0% | 34.4% | 17.4% | 20.0% | |
| Smoking | Yes | 29.2% | 39.0% | 33.0% | 40.6% | 26.1% | 20.0% | 0.041* |
| | No | 41.5% | 26.0% | 31.8% | 21.9% | 43.5% | 60.0% | |
| Marrying late | Do not know | 29.2% | 35.1% | 35.2% | 37.5% | 30.4% | 20.0% | 0.019* |
| | Yes | 40.0% | 41.6% | 44.3% | 43.8% | 60.9% | 20.0% | |
| Early menarche | No | 33.8% | 24.7% | 26.1% | 18.8% | 17.4% | 60.0% | <0.001* |
| | Do not know | 26.2% | 33.8% | 29.5% | 37.5% | 21.7% | 20.0% | |
| Late menopause | Yes | 20.0% | 20.8% | 18.2% | 12.5% | 21.7% | 20.0% | <0.001* |
| | No | 43.1% | 45.5% | 46.6% | 25.0% | 47.8% | 60.0% | |
| Having children later on in life or not at all | Do not know | 36.9% | 33.8% | 35.2% | 62.5% | 30.4% | 20.0% | 0.077* |
| | Yes | 16.9% | 13.0% | 30.7% | 18.8% | 60.9% | 0.0% | |
| High number of births | No | 33.8% | 28.6% | 33.0% | 18.8% | 21.7% | 60.0% | <0.001* |
| | Do not know | 49.2% | 58.4% | 36.4% | 62.5% | 17.4% | 40.0% | |
| Hormone replacement therapy | Yes | 21.5% | 16.9% | 37.5% | 15.6% | 47.8% | 20.0% | 0.009* |
| | No | 26.2% | 29.9% | 25.0% | 28.1% | 30.4% | 40.0% | |
| Use of oral contraceptives | Do not know | 52.3% | 53.2% | 37.5% | 56.3% | 21.7% | 40.0% | <0.001* |
| | Yes | 21.5% | 23.4% | 26.1% | 18.8% | 39.1% | 20.0% | |
| Use of oral contraceptives | No | 35.4% | 32.5% | 34.1% | 28.1% | 43.5% | 40.0% | 0.077* |
| | Do not know | 43.1% | 44.2% | 39.8% | 53.1% | 17.4% | 40.0% | |
| Use of oral contraceptives | Yes | 23.1% | 22.1% | 13.6% | 18.8% | 8.7% | 60.0% | <0.001* |
| | No | 30.8% | 44.2% | 38.6% | 31.3% | 69.6% | 0.0% | |
| Use of oral contraceptives | Do not know | 46.2% | 33.8% | 47.7% | 50.0% | 21.7% | 40.0% | 0.009* |
| | Yes | 35.4% | 29.9% | 38.6% | 50.0% | 34.8% | 20.0% | |
| Use of oral contraceptives | No | 18.5% | 16.9% | 14.8% | 12.5% | 34.8% | 40.0% | 0.009* |
| | Do not know | 46.2% | 53.2% | 46.6% | 37.5% | 30.4% | 40.0% | |
| Use of oral contraceptives | Yes | 18.5% | 24.7% | 31.8% | 53.1% | 21.7% | 60.0% | <0.001* |
| | No | 24.6% | 14.3% | 18.2% | 12.5% | 30.4% | 0.0% | |
| Use of oral contraceptives | Do not know | 56.9% | 61.0% | 50.0% | 34.4% | 47.8% | 40.0% | <0.001* |
| | Yes | 24.6% | 14.3% | 18.2% | 12.5% | 30.4% | 0.0% | |

TABLE 11: Continued.

| | | Academic level | | | | | | <i>p</i> value |
|-----------------------------------|-------------|----------------|-------------|------------|-------------|------------|------------|----------------|
| | | First year | Second year | Third year | Fourth year | Fifth year | Sixth year | |
| Immunosuppression | Yes | 24.6% | 35.1% | 55.7% | 59.4% | 60.9% | 60.0% | <0.001 * |
| | No | 20.0% | 14.3% | 9.1% | 12.5% | 21.7% | 20.0% | |
| Multiple sexual partners | Do not know | 55.4% | 50.6% | 35.2% | 28.1% | 17.4% | 20.0% | |
| | Yes | 49.2% | 49.4% | 43.2% | 62.5% | 56.5% | 100.0% | |
| Recurrent/chronic cervix diseases | No | 18.5% | 14.3% | 19.3% | 15.6% | 13.0% | 0.0% | 0.029* |
| | Do not know | 32.3% | 36.4% | 37.5% | 21.9% | 30.4% | 0.0% | |
| Bacterial infections | Yes | 35.4% | 50.6% | 51.1% | 59.4% | 60.9% | 80.0% | |
| | No | 15.4% | 11.7% | 10.2% | 12.5% | 26.1% | 20.0% | <0.001 * |
| Viral infections | Do not know | 49.2% | 37.7% | 38.6% | 28.1% | 13.0% | 0.0% | |
| | Yes | 26.2% | 24.7% | 21.6% | 9.4% | 17.4% | 40.0% | |
| Obesity | No | 23.1% | 26.0% | 28.4% | 43.8% | 34.8% | 40.0% | 0.058* |
| | Do not know | 50.8% | 49.4% | 50.0% | 46.9% | 47.8% | 20.0% | |
| Lack of physical exercise | Yes | 33.8% | 49.4% | 46.6% | 71.9% | 56.5% | 80.0% | |
| | No | 24.6% | 9.1% | 13.6% | 15.6% | 17.4% | 20.0% | <0.001 * |
| Breast feeding | Do not know | 41.5% | 41.6% | 39.8% | 12.5% | 26.1% | 0.0% | |
| | Yes | 26.2% | 26.0% | 30.7% | 21.9% | 34.8% | 60.0% | |
| Early marriage | No | 26.2% | 37.7% | 29.5% | 34.4% | 39.1% | 20.0% | 0.086* |
| | Do not know | 47.7% | 36.4% | 39.8% | 43.8% | 26.1% | 20.0% | |
| Obesity | Yes | 24.6% | 37.7% | 30.7% | 28.1% | 30.4% | 40.0% | |
| | No | 32.3% | 26.0% | 28.4% | 25.0% | 43.5% | 40.0% | 0.169* |
| Lack of physical exercise | Do not know | 43.1% | 36.4% | 40.9% | 46.9% | 26.1% | 20.0% | |
| | Yes | 15.4% | 13.0% | 17.0% | 12.5% | 17.4% | 40.0% | |
| Breast feeding | No | 41.5% | 53.2% | 44.3% | 46.9% | 56.5% | 20.0% | 0.195* |
| | Do not know | 43.1% | 33.8% | 38.6% | 40.6% | 26.1% | 40.0% | |
| Early marriage | Yes | 21.5% | 16.9% | 11.4% | 15.6% | 21.7% | 60.0% | |
| | No | 35.4% | 39.0% | 42.0% | 28.1% | 47.8% | 20.0% | 0.003* |
| Obesity | Do not know | 43.1% | 44.2% | 46.6% | 56.3% | 30.4% | 20.0% | |

*Chi-square test.

et al. [8] from Al-Ahsa, KSA reported that self-learning, curriculum, and internet to be first, second, and third top sources of information, respectively. Hence, it is recommended that curriculums within health colleges do actively incorporate the necessary amendments to improve the knowledge and awareness of the students about cancers and their etiology from early on in their various medical education programs and levels. In addition, robust awareness campaigns and screening programs need to be designed to serve the two diverse purposes, one to promote knowledge and awareness about the disease itself helping in eliminating the negative perceptions, beliefs, and taboos associated with it and secondly to promote active participation by the members of the society enabling a better and successful health care system. Altamimi et al. also suggested that there is a dire need for the initiation of culturally accepted public education programs and awareness campaigns on CC and its prevention like many before her [4, 10, 12, 18, 21].

4.1. Study Limitations

- (1) The sample population in this study were Health Profession students of Jeddah campus of KSAUHS, Saudi Arabia, and hence, the results do not necessarily reflect that of the general population
- (2) Cross-sectional study design is highly sensitive to a variety of biases
- (3) Data collection questionnaire was an online self-administered one and hence has an inherent risk of recalling bias or contamination by the participating students

5. Conclusion

The prevalence of CC is growing yearly in KSA. Since KSA has a relatively young population, it becomes imperious to implement an effective education program and curricular activities which targets the Health Profession students early on their career to increase the knowledge and awareness about cancers and related diseases, especially focusing on the availability of screening and vaccinations programs in the Kingdom for the improved health care availability in the society. The educational curriculum among various health care schools and programs should integrate cancer focused teaching in it. Additionally, health care practitioners should play an additive mentor in motivating and teaching their patients about various protection methods against the transmissible diseases. Clear policies, guidelines, and regulations should be framed to educate primary care physicians and carry out screening to vulnerable patients and prevent disease.

Data Availability

The raw data collected using the survey for this study is available on request from the corresponding author.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

SSA conceptualized the project, designed the study questionnaire in its final form, analyzed the collected data, and wrote the entire manuscript. NY reviewed the proposal for ethical approval, helped in data collection, and edited the manuscript. MAK statistically analyzed the collected data and made sense of it for the manuscript.

Acknowledgments

We would like to express their deep gratitude towards all students of the KSAU-HS, Jeddah, campus who proactively participated in this study. We acknowledge the help of Mr. Abdul Rehman of College of Medicine and Ms. Alia Basha-weh of College of Nursing, KSAU-HS, Jeddah, in dispensing the survey to various leaders of KSAU-HS students for the collection of data.

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