Global Journal of
Health Science
(GJHS)

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IPRJB
INTERNATIONAL PEER REVIEWED
JOURNAL AND BOOK PUBLISHING

Global Journal of Health Sciences
ISSN 2519-0210 (Online)
Vol 9, Issue 3, No.1, pp 1 - 31, 2024

www.iprjb.org

Knowledge, Attitude toward Screening and Prevention of Cervical Cancer among Women at HCT in UAE

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Article History

Received 19th April 2024

Received in Revised Form 16th May 2024

Accepted 18th June 2024

How to cite in APA format:

Meskiri, A., Musallam, L., Alkatheeri, A., & Almessabi, N. (2024). Knowledge, Attitude toward Screening and Prevention of Cervical Cancer among Women at HCT in UAE. *Global Journal of Health Sciences*, *9*(3), 1–31. https://doi.org/10.47604/gjhs.2676

Abstract

Purpose: Cervical cancer is one of the leading causes of death in the United Arab Emirates (UAE) among females. Knowledge and awareness toward cervical cancer has been proven to be essential toward decreasing the number of cervical cancer cases. In fact, adequate knowledge towards cervical cancer screening will help in early diagnosis and good prognosis outcome towards cervical cancer. The aim of this capstone project was to address the knowledge, attitude toward screening and prevention of cervical cancer among women at HCT in the UAE.

Methodology: A quantitative cross-sectional study was conducted using an online survey that contained 22 multiple choice questions and was distributed via email. The sample size of this study is to target approximately 250-300 respondents and random sampling is used to select the participants. The data downloaded from Microsoft Forms into a Microsoft Excel sheet (version 16.36). To analyze the data, SPSS version 25.0 was used and the frequency, percentage tables were constructed for each section of the survey.

Results: Responses of 196 participants were used in the data analysis. The vast majority of the participants (55.1%) were aged between 21- 25 years old and were mainly from Abu Dhabi campus (91.8%). A significant association was observed between the field of education and the knowledge of cervical cancer (p=0.002, p<0.05). Additionally, screening knowledge and attitude toward cervical cancer were also noted to have an association between age (p=0.022, p<0.05) and field of education (p=0.002, p<0.05). Cervical cancer prevention had a strong association between age (p=0.007, p<0.05), nationality (p=0.004, p<0.05), and field of education (p=0.000, p<0.05). Furthermore, 54.08% of participants had average knowledge and attitude toward screening and prevention of cervical cancer.

Unique Contribution to Theory, Practice and Policy: Despite the strong association between field of education and the overall knowledge toward cervical cancer. Awareness sessions conducted by wide sponsors such as students' life, campus operation, and department of health, will help in increasing cervical cancer knowledge and attitude. Based on the findings, it is recommending exploring female's perspective in the UAE towards receiving HPV self-sampling kit at home, which helps to identify HPV positive females, therefore estimating the chances of developing cervical cancer.

Keywords: *FDA, COVID-19, GCC, HPV, HIV, Pap Test, UAE*

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INTRODUCTION

In 2018, there were approximately 570,000 cases of cervical cancer and 311,000 deaths reported worldwide. Cervical cancer is a very important topic as it remains a major public health problem, and one of the most common cancers that affects females. Approximately 84% of all cervical cancer cases, and 88% of cervical cancer deaths are from lower-income countries (Arbyn, M., Weiderpass, E., Bruni, L., de Sanjosé, S., Saraiya, M., Ferlay, J., & Bray, F, 2020). Worldwide, cervical cancer is considered as the second leading cause of death in women, which is mainly caused by multiple types of Human Papilloma Virus (HPVs) (Arsdale, A. V., Patterson, N. E., Maggi, E. C., Agoni, L., Doorslaer, K. V., Harmon, B., Nevadunsky, N., Kuo, D. Y. S., Einstein, M. H., Lenz, J., & Montagna, C, 2020). According to the World Health Organization (WHO), cervical cancer was the fourth most frequent cancer in females. In 2018, it was estimated that 570,000 new cervical cancer cases (6.6% of all women cancer), and 90% of cervical cancer deaths occurred in low and middle-income countries (Cohen et al., 2019). A tudy by Al-Zalabani (2020) about the cancer incidence attributable to tobacco smoking in Gulf Cooperation Counselling (GCC) countries in 2018, stated that the UAE is the fourth highest GCC country that has uterine cervix cancer (1.3%) (Al-Zalabani, 2020). In the (UAE), the Health Authority of Abu Dhabi (HAAD) estimated around 50 to 55 cervical cancer cases yearly with the incidence of 7 per 100,000 women. Half of these cases occurred in young females aged between 35 – 55 years old (Ortashi, O., Raheel, H., Shalal, M., & Osman, N., 2013).

The American Cancer Society stated that the development of cervical cancer depends on the growth of normal human cells and the information contained in the cell's DNA. In general, cancers can be caused by mutations that turn on the oncogenes or turn off the tumor suppressor genes (Sawaya et al., 2019). Histologically, the most common subtypes of cervical cancers are squamous cell carcinoma (SCC), adenocarcinoma (AC), and adeno-squamous cell carcinoma (ASC) (Sahasrabudhe et al., 2019). Cervical cancer begins in the cells of the cervix, mainly the lower part of the uterus that is connected to the vagina. There are two types of cells that covers the cervix, glandular and squamous cells that meet at the transformation zone. Changes of transformation zone occurs due to childbirth and aging. Cervical cancer is known to commonly originate in the transformation zone (Kashyap et al., 2019).

Cervical lesions are classified as cervix intraepithelial neoplasia (CIN), divided as CIN1, CIN2, and CIN3 based on the percentage of epithelium replaced by abnormal appearing, proliferating, and immature cells (Wentzensen et al., 2009). CIN1 refers to dysplasia which involves one third of the thickness of epithelium, CIN2 shows the abnormal changes from one-third to two-third of epithelial layer, and the CIN3 which is the most severe grade when it affect more than two-third of epithelia (Cervical Intraepithelial Neoplasia (CIN), 2014).

Ortashi et al., (2013) reported in a study on the awareness and knowledge of HPV infection and vaccination among women in the UAE, that the main cause of cervical cancer is a virus called HPV. Furthermore, HPV is the most common sexually transmitted infection worldwide, and 12% of all women could be infected at any time (Ortashi et al., 2013). The prevalence of HPV in gulf countries are the same as the rest of the world, which ranges from 2 - 44%. Unfortunately, there is no data on HPV prevalence in the UAE. Moreover, an analysis study by Elbarazi et al., (2016) in the UAE about HPV vaccination, declared that different strains of HPV leads to different types of genital cancers. However, the two strains that lead to cervical cancer are from genotype 16 and 18, which is claimed to cause approximately 70% of cervical cancer cases and pre-cancerous cervical lesions. This study also stated that 99.7% of cervical

cancer cases are linked to HPV (Elbarazi et al., 2016). In addition, there are risk factors that might enhance the development of cervical cancer, such as sexual transmitted disease (STD), sexual habits, reproductive factors, co-infection with Human Immunodeficiency Virus (HIV), smoking, and having multiple children (Khanna et al., 2019). In 2017, A study by Akinlotan and colleagues on cervical cancer screening barriers and risk factors knowledge among uninsured women stated that the respondents were aware of several key risk factors that were attributed to sex, but had lower knowledge about non-sexual risk factors such as smoking, taking contraceptive over a long period of time and un-healthy diet (Akinlotan et al., 2017).

According to American Cancer Society (2019) cervical cancer has no symptoms during its early stages as signs and symptoms appear in more advanced stages of the disease. Furthermore, a study about the knowledge, attitudes, and practices towards cervical cancer and screening amongst female healthcare professionals indicated that the most common symptoms of cervical cancer are abnormal vaginal bleeding, foul- smelling vaginal discharge, and contact bleeding, and in many cases, women with cervical cancer report no symptoms (Heena et al., 2019).

There are two main types of tests to diagnose cervical cancer; Papanicolaou test (Pap test) and the HPV test. Pap test is used to detect early precancerous and cancerous lesions. Saslow et al. (2012), stated that early cervical cancer screening is recommended especially in women who have a family history of cervical cancer. He also emphasized that testing for cervical cancer should begin at the age of 21 years old. On the other hand, HPV tests for the type of HPV infection that lead to cervical cancer (Saslow et al., 2012). Although early stages of cervical cancer are asymptomatic and somewhat difficult to examine even in deeply invasive tumours, other invasive techniques are used to aid in the diagnosis of cervical cancer (Marth et al., 2017). For the invasive diagnosis of cervical cancer, there are imaging methods called colposcopy, the biophysical methods such as fluorescence spectroscopy and polar probe. Molecular detection involves HPV DNA test, which is considered as the gold standard for HPV identification (Tsikouras et al., 2016).

There are many cervical cancer treatment strategies are available. For example, Surgery or the surgical removal of the uterus is considered as the primary treatment and it is reported that it has the greatest effect on long term survival (Fader, 2018). Moreover, chemotherapy, radiotherapy along with surgery or any combination of these options are the main proposed treatments of cervical cancer (Fernandes & Kimura, 2010). Furthermore, there are other less known treatments for cervical cancer such as immunotherapy. Cancer immunotherapy is a treatment that strengthens or triggers the patient's own immune system to elicit anti-tumor effects. Such treatment has been through clinical trials and has been approved by the Food and Drug Administration (FDA) to treat cervical cancer (Kagabu et al., 2019). Another less known cervical cancer treatment is cryotherapy. Cryotherapy is an ablative technique that uses refrigerated gas to cool a probe to a very cold temperature (-90°C) and then it is applied to the cancerous cells within the cervical tissue. Freezing tissue cells induces cell necrosis, which destroys abnormal cervical tissue cells (Castle et al., 2017). This type of treatment is used for women with precancerous lesions in the cervix as recommended by WHO (Organization, 2015). Another treatment used for cervical cancer is known as targeted therapy. Targeted therapy drugs or anti-angiogenesis treatment affects specific molecules within the cells and block cell growth. The most frequently utilized anti-angiogenesis treatment for cervical cancer is called bevacizumab (Crafton & Salani, 2016).

In 2019, according to the American Cancer Society guidelines, females should start screening for cervical cancer three year after their first sexual intercourse. Moreover, women may be screened annually for the first three years, and if three consecutive screening test results are normal, then they are screened once every two to three years. Additionally, women above 70 years old who had three or more consecutive normal cervical cytology tests may elect to cease cervical cancer screening. However, women with history of cervical cancer must be screened yearly until there is a 10-year history of no abnormal cervical cytology tests. Other recommendation or prevention methods toward cervical cancer are to avoid the use of tobacco, having healthy diet and lifestyle (Smith et al., 2011). Similarly kashyap et al. (2019) added that bathing daily and during menstruation can also be a preventive factor for cervical cancer (Kashyap et al. 2019).

A published study on Cancers in the Arab countries, stated that since 2008 all private and public schools in the UAE launched an optional HPV vaccine for females aged 11-12 years old. The HPV vaccine shows a strong association with reducing cancer rates Abu-Gheida, I., Nijhawan, N. A., & Al-Shamsi, H. O. (2021).

A Study done by Jach et al., (2016) considered that the HPV vaccine is the first anti-cancer vaccine. In 2015, Advisory Committee on Immunization Practices (ACIP) recommended the use of the 9-valent vaccine as a possible vaccine against HPV, this is when the FDA registered the 9-valent vaccine to be used for women between the age of 9- 26 years old (Jach et al., 2016). The 9-valent vaccine includes types of quadrivalent HPV vaccine (6, 11, 16, and 18) with additional oncogenic types (31, 33, 45, 52, and 58) (Giuliano et al., 2019).

Cervical cancer can be curable if diagnosed during the early stages. Unfortunately, the lack of knowledge about the risk factors, screening and ignoring the signs and symptoms due to shyness showed a significant increase in cervical cancer cases (Kashyap et al., 2019). Moreover, it is important for health organizations to organize programs about cervical cancer screening. A study by Mignot et al. (2019) stated that screening programs reduced the incidence of cervical cancer (Mignot et al., 2019). Priyadarshini et al. (2019) clarified the importance of cervical cancer screening strategies and emphasized that they should be simple, safe and acceptable depending on various risk factors such as women's age and screening history (Priyadarshini et al., 2019). Another study carried out in Poland by Homola et al. (2019) about the development of screening, diagnosis and management of Pap test emphasizes on cervical cancer screening in healthy individuals as it will enhance early cervical cancer detection and reduce mortality rates (Homola et al., 2019).

This capstone project targets females of all ages at HCT in the UAE as the numbers of cervical cancer cases are likely to increase if there are no intervention. As AL-Hammadi et al. (2017), reported that the estimated number of cervical cancer cases by 2020 is approximately 0.7 million females, unless screening tests for cervical cancer are performed to ensure early detection and prognosis (AL-Hammadi et al., 2017).

The current capstone project aims to understand the knowledge, attitude towards screening and prevention of cervical cancer among women at HCT in the UAE. The project will identify the gaps towards cervical cancer knowledge, screening and prevention across HCT females. Additionally, this capstone project will act as a starting point towards future educational and awareness programs of cervical cancer, which will aim to enhance early cervical cancer detection leading to better outcomes.

Objective

A quantitative cross-sectional study that assess the knowledge, attitude toward screening and prevention of cervical cancer among women at HCT in the UAE.

LITERATURE REVIEW

Cervical Cancer (Knowledge and Attitude, Risk Factors, Treatments)

Knowledge and awareness toward cervical cancer have been proven to be essential toward decreasing the number of cervical cancer cases. In fact, adequate knowledge towards cervical cancer screening will help in early diagnosis and good prognosis outcome towards cervical cancer. A study carried out at a United Kingdom (UK) university on the knowledge, attitudes, and experience of cervical cancer among Subsaharan African students, reported that approximately 21.0% were not sure about their knowledge of cervical cancer, 10.8% knew about cervical cancer, and the vast majority of the students (68.3%) had poor knowledge of cervical cancer (Ogbonna, 2017).

A cross-sectional study carried out on students in Kingdom of Saudi Arabia (KSA), demonstrated the knowledge of cervical cancer risk factors. Approximately 45% of males and 53.2% of females chose HPV infection as a risk factor. Around 59.5% males and 62.3% females selected infection with HIV, 61% of both genders chose contraceptive pill, and the vast majority of participants 77.4% of males and 72.7% of females chose multiple sexual partners to be the highest risk factor of cervical cancer (Al-Darwish et al., 2014). Another publication carried out on healthcare professionals in KSA indicated that participants thought that the following were cervical cancer risk factors: early sexual intercourse (14.4%), infection with immunodeficiency virus (HIV) (13.7%), contraceptive methods (13.4%), cigarette smoking (12.9%), HPV infection (9.6%) and only 8.9% chose multiple sexual partners (Heena et al., 2019). Ryan et al., (2019) carried out a study about the knowledge of cervical cancer risk factors in Great Britain. In their study they reported that 40.2% of respondent's aged between 25-34 years old thought that HPV is a risk factor, 47.0% mentioned smoking, 45.1% chose many partners and 34.0% chose sex at young age. Participants between the age of 35 and 44 years old indicated that contraceptive pill (32.6%), chlamydia (46.5%), and weakened immune system (42.5%) were cervical cancer risk factors (Ryan et al., 2019).

A study in India, reported that participants thought that women with poor genital habits (62.8%), multiple sexual partners (59.2%), and HPV infection (33.6%) were all linked to developing cervical cancer (Khanna et al., 2019). A study reported on the vulnerability to cervical cancer indicated that healthcare professionals thought that women during specific ages of their lives were at higher risk of developing cervical cancer. Approximately, 15.1% chose women over the age of 50 years old and females during reproductive age. Around 13.9% only chose women during reproductive age and 8.6% thought that women over 50 years old were at higher risk of developing cervical cancer (Heena et al., 2019). In Ethiopia, a study about cervical cancer knowledge and attitudes at Hawassa University among medical female students aged between 17-26 years old, showed that about 68.4% of the participants knew the treatments options of cervical cancer with surgery obtaining 48.4%, chemotherapy 44.7%, and radiotherapy 30.8% participants response (Tsegaye et al., 2018).

Cervical Cancer Screening (Knowledge, Source of Information, Pap Test)

A study in India reported that participants believed the following women should undergo cervical cancer screening: all women irrespective of age and marital status (32.1%), all married

women of any age (34.3%), and women aged between 50 and above (6.9%) (Khanna et al., 2019). Another study carried out by Getachew et al., (2019) about cervical cancer screening knowledge and barrier among women in Ethiopia, indicated that the majority of participants (83.8%) do not know of any types of cervical cancer screening procedures (Getachew et al., 2019). In 2019, a study performed in KSA tested participant's cervical cancer screening knowledge. Approximately 19.0% of participants chose liquid-based cytology, 10.6% chose HPV DNA testing, 6.3% selected visual inspection of the cervix, and Pap smear obtained the lowest respondents (4.3%) (Heena et al., 2019). Khanna et al., (2019) reported that 46.3% of participants thought that Pap test is the method used for cervical screening, while 1.4% thought that there were no cervical cancer screening procedures available (Khanna et al., 2019).

A study at a territory institution in Niger Delta indicated that students (56.2%) were more aware of cervical cancer screening than staff (36%). The most popular screening test identified was Pap test (staff 25.5% and students 44.9%), followed by HPV testing (staff 12.8% and students 20.9%) and blood testing (staff 8.5% and students 16.3%). Shockingly, 48.9% of staff and 9.7% of students did not know of any cervical cancer screening methods (Owoeye & Ibrahim, 2013). In 2014, a study on cervical cancer knowledge was performed on medical students at Medical school in KSA. About 38.7% of males and 31.1% of females mentioned self-learning, followed by the curriculum (32.5% males and 23.3% females), internet (15.3% males and 2.5% of females), and faculty (5.5% males and 31.3% females). The least source of cervical cancer knowledge was hospitals among males (5.4%) and females (3.8%) (Al-Darwish et al., 2014). An Omani paper published in 2016, about the awareness of cervical cancer and Pap test among students, and staff indicated that a vast majority of students (33.1%) and staff (47.4%) selected school/ college as source of cervical cancer knowledge. Radio obtained the lowest source of cervical cancer knowledge among students (5.1%), and staff (0.0%) (Nasar et al., 2016).

A study carried out by Al-Hammadi and colleagues reported that participants heard of Pap test from their family physician/gynecologist (64%), health publication (17%), friends (12%), and social media (8%) (AL-Hammadi et al., 2017). Research carried out on females in KSA showed that 57.1% heard of Pap test during their hospital visit for obstetric/ gynecologic reasons, 15.4% through healthcare facility and staff, 9.9% through media, 9.2% through friends, and 8.4% through posters, leaflets, and pamphlets (Khudairi et al., 2017). Mwaka et al., (2016) assessed the community awareness of risk factors and symptoms of cervical cancer among males and females aged between 18-29 years old. Around 99.1% of both genders had heard about cervical cancer (Mwaka et al., 2016). A study performed in the KSA in 2019, among nurses (66.1%), physicians (16.0%), and technicians (5.8%), where 44.3% of participants thought that Pap test will benefit in early detection of cervical cancer, and 33.4% mentioned that Pap test helps in the detection of any early abnormal changes in the cervix (Heena et al., 2019).

Getachew et al (2019) reported a study on cervical cancer screening knowledge among women in Ethiopia, which identified the participant's awareness of the correct age for cervical cancer screening in women. The response showed that 1.4% mentioned who starts sexual intercourse, 51.0% chose aged 25 and above, 3.6% stated aged 30 and above and 22.0% mentioned that elderly women must do the screening (Getachew et al., 2019). Badrinath et al (2004), published an article on women's knowledge and attitudes toward cervical cancer screening in the UAE. The study indicated female's reasons for needing cervical cancer screening programs, The reasons were as follow: cancer can be detected early (30.1%), cervical cancer is increasing (17.2%), early detection will save lives (11.8%) and only 6.5% believed that the cervical

screening program is an essential part of women's healthcare (Badrinath et al., 2004). AL-Hammadi et al., (2017) reported a study about Pap test understanding to measure participant's knowledge among women in the UAE with the vast majority of participants from Dubai (97%). Approximately 85% of females had heard about the Pap test, around 58% thought Pap tests to detect cervical cancer changes, 13% mentioned that it treats vaginal inflammation and 11% stated that it detects other cancers. In addition, 76% of females agreed that every female should undergo the Pap test while 24% disagreed. The respondents were asked about the frequency of a normal Pap test result 33% agreed it should be repeated yearly, 14% mentioned every two years, 16% stated every three years, and only 4% answered every four years (AL-Hammadi et al., 2017). In KSA, Khudairi et al., (2017) and colleagues published a study about awareness and knowledge of Pap test among Saudi female population. Just over half of the participants (53.8%) had heard of Pap test and only 24.9% had this test. The majority of the participants (75.5%) never obtained Pap test advice from their physician. Participants who knew about Pap test indicated the following options when females should start to have this test: after married (42.4%), at 30 years of age (30.4%), and at 40 years old (27.2%). When asked about Pap test frequency, 50% of participants chose every one year to do Pap test, 41.7% chose every six months, and 8.3% chose every three years is how frequently should women do the Pap tests (Khudairi et al., 2017).

Attitude toward cervical cancer is one of the ways to measure participant's view towards screening. Heena et al., (2019) reported that only 3.8% of respondents agreed that they would have cervical cancer screening, if it was free and caused no harm, while 7.3% of respondents were not sure, and 86.6% were against cervical cancer screening. Participants who decided not undergo cervical screening stated that there were no reasons for the screening (48.4%), they were afraid of the procedure (17.2%), they were scared of bad results (3.4%), and they did not know whom to consult (11.33%) (Heena et al., 2019). In 2013, female staff and students at Niger Delta University in Nigeria were asked if they had cervical cancer screening. Only 13.9% of the staff and 11.6% of students had been screened. Staffs reason for been screened was: it was free/ subsidized, while students mentioned that it was requested by the doctor. Staff and students reasons behind not been screened were painful (staff 0% and students 5%), expensive (staff 47.4% and students 40.2%), embarrassing (staff 18.4% and students 17.6%), and that they were healthy (staff 27.7% and students 26.6%) (Owoeye & Ibrahim ., 2013).

A cross-sectional study carried out on participants mainly over the age 25 in Ethiopia reported that 86.9% had good knowledge of cervical cancer. Participant's reasons for not being screened were fear from the result (26.5%), lack of information about the screening methods (24.9%), religious beliefs (13.3%), and felt shy (13.5%) (Dulla et al., 2017). A study by Rashid et al., (2013) in Malaysia**,** compared the effectiveness of various methods to recall females for a repeat Pap test screening whom previously had normal results. Among the test methods were phone messages and phone calls. Results indicated that females whom received a recall by phone call were more likely to attend a repeated Pap test (Rashid et al., 2013).

Cervical Cancer Prevention (HPV Virus, HPV Vaccine)

In 2013, a study carried out about the awareness and knowledge of HPV infection and HPV vaccination among women in the UAE, reported that only 28.9% of participants heard about HPV, and 75.1% of them heard about the HPV vaccine (Ortashi et al., 2013). In 2019, Heena et al., (2019) carried out a study on the knowledge, attitudes, and practices towards cervical cancer and screening amongst female healthcare professionals. This studied reported that only

5.6% of the participants had been vaccinated against HPV (Heena et al., 2019). A study by Ning et al., (2019)**,** about cervical cancer knowledge, HPV, and HPV vaccination among women in China reported that, 54.4% of participants recommended HPV vaccination in adolescents. However, 45.6% did not recommend HPV vaccination and their concerns were side effects and the long-term effects (21.3%), 4.8% of participants thought that the vaccine was expensive**,** 11.3% thought that the vaccine was not necessary because they did not have sex, and 4.3% of respondents mentioned that they did not recommend this vaccine due to cumbersome vaccination process. Interestingly, around 84% of the participants would like HPV vaccine to be listed within their national immunization program (Ning et al., 2019).

In 2016, a study carried out in northern Uganda, which tested male and female's knowledge of cervical cancer showed that only 8.3% of the total population thought that cervical cancer can be prevented by vaccinating young girls with the HPV vaccine (Mwaka et al., 2016). In 2018, Wymann and colleagues showed that 0% of participants aged between 18-24 years old in Switzerland had the HPV vaccine dose. The major reasons for not having this vaccine were: insufficient information on the vaccine (22.5%), fear of the vaccine's side effects (18.1%), generally against vaccination (14.0%), and they were too old for this vaccine (11.7%) (Wymann et al., 2018). Another study that was carried out in Nigeria reported that 93.8% of participants were willing to take the HPV vaccine and would recommend it to their relatives. Around 6.2% were not willing to take the vaccine or even recommend it. Their reasons for not willing to take this vaccine were adverse health effects (15.8%), may cause promiscuity (5.3%), can cause STD (26.3%), and had no relevant reason (52.6%) (Olubodun et al., 2019).

Post reviewing different studies, it showed that there is a common gap has been identified which is lack of knowledge. The lack of cervical cancer knowledge and prevention has not only been reported in Nigeria, other developing countries such as Ethiopia, Oman, and KSA have also demonstrated poor cervical cancer knowledge (Shiferaw et al., 2018; Nasar et al., 2016; Al-Darwish et al., 2014).

Therefore, the current project was carried out to assess and understand the level of knowledge, attitude toward screening and prevention of cervical cancer among Higher College of Technology (HCT) females in the UAE to improve knowledge and enhance their attitude toward cervical cancer testing.

METHODOLOGY

Study Design

The study design chosen for this research project was a quantitative cross-sectional using an online survey. This study design was chosen due to the fact that it can capture information based on the data gathered at a specific point during a certain time along with any assumptions towards the topic (Wang & Cheng, 2020). It is also efficient as the data must be ready for analysis over a short period of time from obtaining ethical approval from the survey review committee at HCT. Additionally, to avoid bias selection in the data collection process.

The study was divided into four phases. Phase one the proposal was prepared, phase two for distributing the survey to all HCT campuses and collecting data. Phase three analyzes the data along with preparing the results and discussion sections. And phase four for the final report reviewed, submitted and the oral presentation was prepared and presented (Appendix1).

Study Population

The targeted population for this capstone project were all females at HCT. The study population were comprised of undergraduate female students and female staff in all HCT campuses across the UAE. In high schools across the UAE, female students are vaccinated against certain types of HPV. There are six HCT female campuses around the UAE and the aim of this project was to target all of these campuses. To ensure maximal participation within this project, an online survey was used.

Sample Size

This study aimed to target approximately 250-300 respondents. The sample size chosen was based on previous capstone project population size, which was around 5% of women (students, administrative staff, faculty staff, and support staff) among HCT campuses.

Method and Data Collection

Data collection was obtained by using an online survey. The survey was prepared on Office 365 Microsoft Forms, and it was divided into four sections (Demographic, cervical cancer knowledge, cervical cancer screening knowledge and attitude, and cervical cancer prevention). The survey contained 22 multiple choice questions, with a few question that allowed the participant to choose more than one answer. The sampling method used to select the participants was random sampling as it helps in eliminating any selection bias.

A pilot test of the survey was carried out by the project researchers, supervisor and HCT health science faculty members. Additionally, the survey was reviewed by a faculty member from the Arabic department at HCT to ensure that the content of the survey was appropriate for females within a college setting in an Islamic country. The link was then emailed to all females (faculty and administrative staff, support staff, students) at HCT after obtaining ethical approval from the HCT survey review committee. The survey was open for data collection from 23rd of March 2020 - 6th of April 2020. A total of 251 participants completed the survey but only 196 survey results were included in the analysis of the study and 55 were removed as these surveys were incomplete.

Analysis Method

To analyze the data, statistical analysis software program “Statistical Package for Social Sciences” (SPSS) version 25.0 was used. The data was first downloaded from Microsoft Forms into a Microsoft Excel sheet (version 16.36). The data was then imported into SPSS and the frequency, percentage tables were constructed for each section of the survey. Each answer within a question was given scoring of either 1 or 0. Section two, three, and four of the survey were added together which gave each of the participants a total score. The maximum score that a participant may achieve was 29. An overall score of zero to seven indicated poor knowledge; eight to fifteen indicated average knowledge; sixteen to twenty-three indicated good knowledge; and twenty-four to twenty-nine indicated excellent knowledge. These scores were then compared with each question in the demographic section (section one).

In order to determine the correlation between demographic section (section 1) and total score for each section (2, 3, and 4) of the survey, a Chi-squared test was used. The results of this test provided the p-values, which determined the association between the participant’s demographic information and their knowledge, attitude toward screening and prevention of cervical cancer.

Ethical Issues

All required ethics approvals were obtained for this project from the HCT survey committee before the distribution of the survey. As data collection was via an online survey, all participants were presented with a consent form (embedded in the survey) that they agreed to before answering the questionnaire. The participants were informed that their anonymity and confidentiality were maintained throughout the study and that they may discontinue the survey at any time.

RESULTS

A total of 251 women participated in the study, 55 women were removed due to not answering all the required questions. The total of the participants who answered all the questions fully were 196 participants. The survey was divided into four sections each section was designated to a certain topic related to cervical cancer. Section I gathered demographic information, section II assessed cervical cancer knowledge, section III assessed cervical cancer screening knowledge and attitude, and section IV assessed cervical cancer prevention knowledge.

Demographic Information

Generally, the majority of study participants were within the age group of 21-25 years old 55.1% and the 3.1% were aged 46 and above. Most of the participants were Emirati 87.2%. Moreover, over 80% of the participants were single and almost 15% of the participants were married with a variation of none, one, two to three and four or more children. Approximately, 43.4% of the participants had high school qualification and 37.2% percent of the participants had a bachelor's degree. Most of the participants were from Abu Dhabi 91.8% and the rest 10% were distributed between Al Ain, Fujairah and Sharjah 1.0%, 3.1% and 4.1% respectively. Furthermore, the percentage of participants within the field of health science 50.5% was almost equal to the percentage of participants within the non-health science field 49.5% [Table 1].

Table 1: Frequency and Percentage of Participants Demographic Characteristics (n=196)

Survey Questions/Options		Frequency (f)	Percent (%)
Age group (n=196)	Under 20 years old	58	29.6%
	21- 25 years old	108	55.1%
	26- 30 years old	7	3.6%
	31- 35 years old	3	1.5%
	36 - 45 years old	14	7.1%
	46 years old and above	6	3.1%
Nationality (n=196)	Emirati	171	87.2%
	Non-Emirati	25	12.8%
Marital status (n=196)	Single	166	84.7%
	Married	30	15.3%
Number of children (n=196)	None	11	5.6%
	1	6	3.1%
	2-3	11	5.6%
	4 and more	2	1.0%
	Not married	166	84.7%
Level of education (n=196)	High school	85	43.4%
	Diploma's degree	21	10.7%
	Bachelor's degree	73	37.2%
	Master's degree	11	5.6%
	Doctorate's degree	6	3.1%
Location of HCT campus (n=196)	Abu Dhabi	180	91.8%
	Al Ain	2	1.0%
	Fujairah	6	3.1%
	Sharjah	8	4.1%
Field of education (n=196)	Health science	99	50.5%
	Non- health science	97	49.5%

Cervical Cancer Knowledge

Most of the participants had no family history of cervical cancer 92.9%. Only 14.4% of the participants felt that they had enough knowledge about cervical cancer while approximately 44% of the participants mentioned that they did not have enough knowledge about cervical cancer. Furthermore, 31.1% of the participants agreed that family history is one of the main risk factors of cervical cancer and 18.9% agreed that long term use of contraceptives is also a risk factor. About 17.9% of the participants believed that HPV infection is a risk factor of cervical cancer and 14.5% of the participants agreed that weak immune system is a risk factor of cervical cancer, while only 6.9% thought that an unhealthy diet is also a risk factor. On the

other hand, 10.7% of the participants did not know any of risk factors associated with cervical cancer. In addition, only 5.6% of the participants agreed that the risk of developing cervical cancer increases in women after marriage in comparison to women before marriage 18.9%, women after menopause 24.5% and all women regardless of age 34.7%. Approximately 16% of the participants did not know of whom was at higher risk of developing cervical cancer. When participants were asked about the treatments options for cervical cancer, most of the participants chose excision (cut out) surgery 32.1% followed by chemotherapy 28.2%, while few of the participants selected radiation 15.0%, immunotherapy 8.3%, targeted therapy 3.7% and cryotherapy 3.2%. Just under 10 percent of the participants had no knowledge of cervical cancer treatment options [Table 2].

Table 2: Frequency and Percentage of Participants Cervical Cancer Knowledge (n=196)

Survey Questions/Options		**Frequency (f)**	**Percent (%)**
Do you have family history? (n=196)	No	182	92.9%
	Yes	14	7.1%
Do you have enough knowledge about cervical cancer? (n=196)	Yes, I know enough about it	28	14.3%
	Yes, but I still want to know more	82	41.8%
	No, I don't have enough knowledge	86	43.9%
Risk factors of cervical cancer (n=392)	Family history	122	31.1%
	HPV infection	70	17.9%
	Un-healthy diet	27	6.9%
	Weak immune system	57	14.5%
	Long term use contraceptives	74	18.9%
	I don't know	42	10.7%
Who do you think is more at risk of cervical cancer? (n=196)	Women before marriage	37	18.9%
	Women after marriage	11	5.6%
	Women after menopause	48	24.5%
	All women, regardless of age	68	34.7%
	I do not know	32	16.3%
Treatments of cervical cancer (n=408)	Excision (cut out) surgery	131	32.1%
	Radiation	61	15.0%
	Chemotherapy	115	28.2%
	Targeted therapy	15	3.7%
	Immunotherapy	34	8.3%
	Cryotherapy	13	3.2%
	I don't know	39	9.6%

In this study, the significant variable related to cervical cancer knowledge was field of education (p=0.002, p<0.05). The rest of the variables: age group, nationality, marital status, level of education and location showed no knowledge associated significance [Table 3].

Table 3: Illustrates the Correlation Using P-Value between Part I (Demographic) and Part II (Total Cervical Cancer Knowledge)

Variable	P-Value
Age group vs Total knowledge of CC	0.074 > 0.05
Nationality vs Total knowledge of CC	0.439 > 0.05
Marital status vs Total knowledge of CC	0.471 > 0.05
Level of education vs Total knowledge of CC	0.212 > 0.05
Location of HCT vs Total knowledge of CC	0.155 > 0.05
Field of Education vs Total knowledge of CC	0.002 < 0.05 *

*Correlation is significance where p-value <0.05

Cervical Cancer Screening Knowledge and Attitude

Regarding cervical cancer screening knowledge and attitude, over third of the participants 34.0% agreed that Pap test is a screening method for cervical cancer, and 31.0% of the participants agreed that cervical cancer inspection by gynecologist is also a screening method of cervical cancer. Approximately 14.3% and 11.3% of the participants agreed that blood test and HPV testing were cervical cancer screening methods respectively. Almost 10.0% of the participants had not heard of any cervical cancer screening methods. When participants were asked about the facts that they knew about Pap tests, 25.1% of the participants agreed that all married women should have regular Pap tests, 21.2% of the participants agreed that Pap test should be repeated every 2-3 years, 16.5% of the participants agreed that Pap test can detect early cervical cell abnormality, 13.8% of the participants agreed that Pap test can detect cervical cancer before signs and symptoms appear, 9.4% of the participants believe that Pap test should be done after menopause and only 14.0% have not heard about Pap test. Participants were then asked whether they would consider having a Pap test, just over half of the participants 50.5% agreed that they would consider having a Pap test while 49.5% disagreed. Furthermore, most of the participants 77.0% thought it would be good if all married women in the UAE received a text notification reminder to have Pap test [Table 4].

Table 4: Frequency and Percentage of Participants Cervical Cancer Screening Knowledge and Attitude

Survey Questions/Options		Frequency (f)	Percent (%)
Screening methods (n=335)	Cervical cancer inspection	104	31.0%
	Blood test	48	14.3%
	Pap test	114	34.0%
	HPV test	38	11.3%
	I have not heard of any screening method	31	9.3%
Facts about Pap tests (n=363)	All married women	91	25.1%
	Pap test should be repeated very 2-3 years	77	21.2%
	Pap test should be done after menopause	34	9.4%
	Pap test can detect early cervix cell abnormality	60	16.5%
	Pap test can detect can cervical cancer before signs and symptoms appear	50	13.8%
	I have not heard about Pap test.	51	14.0%
Pap test is free in the UAE, would you consider doing this test? (n=196)	Yes	99	50.5%
	No	97	49.5%
Do you think that all married women in the UAE should receive text notification? (n=196)	Yes	151	77.0%
	No	44	22.4%

In this study, the significant variable related to cervical cancer screening knowledge and attitude was field of education (p=0.002, p<0.05) and age group (p=0.022, p<0.05) The rest of the variables: nationality, marital status, level of education and location showed no knowledge associated significance [Table 5]

Table 5: Illustrates the Correlation Using P-Value between Part I (Demographic) and Part III (Total Cervical Cancer Screening Knowledge and Attitude)

Variable	P-Value
Age group vs Total CC screening knowledge and Attitude	0.022 < 0.05 *
Nationality vs Total CC screening knowledge and Attitude	0.122 > 0.05
Marital status vs Total CC screening knowledge and Attitude	0.385 > 0.05
Level of education vs Total CC screening knowledge and Attitude	0.063 > 0.05
Location of HCT vs Total CC screening knowledge and Attitude	0.348 > 0.05
Field of Education vs Total CC screening knowledge and Attitude	0.02 0.05 *

*Correlation is significance where p-value <0.05

Cervical Cancer Prevention

Participants were then asked whether they had heard that the HAAD approved the HPV vaccine for all females between 15 to 26 years old. Most of the participants 52.6% had heard that HAAD approved the HPV vaccine for all girls from the age of 15 to 26 years old. Moreover, only 38.8% of the participants had the HPV vaccine, whereas 61.2% of the participants did not have it. When participants were asked whether they would consent their daughter to have the HPV vaccine, 62.8% of the participants said yes, while 37.2% said no [Table 6].

Table 6: Frequency and Percentage of Participants Cervical Cancer Prevention (N=196)

Survey Questions/Options		Frequency (f)	Percent (%)
Have you heard that the Health Authority of Abu Dhabi approved the HPV vaccine for all girls from the age of 15 to 26 years old? (n=196)	No	93	47.4 %
	Yes	103	52.6%
Have you had the HPV vaccine? (n=196)	No	120	61.2%
	Yes	76	38.8%
Would you consent your daughter to have HPV vaccine? (n=196)	No	73	37.2%
	Yes	123	62.8%
	Total	196	100.0%

Global Journal of Health Sciences
ISSN 2519-0210 (Online)
Vol 9, Issue 3, No.1, pp 1 - 31, 2024

www.iprjb.org

In this study, the significant variables related to cervical cancer prevention were age group, nationality and field of education were significantly related to higher total of cervical cancer prevention (*p=0.007, p<0.05*), (*p=0.004, p<0.05*) and (*p=0.000, p<0.05*) respectively, whereas marital status, level of education and location were not related to total of cervical cancer prevention [Table 7].

Table 7: Illustrates the Correlation Using P-Value between Part I (Demographic) and Part IV (Total Cervical Cancer Prevention)

Variable	P-Value
Age group vs Total CC prevention	0.007 < 0.05 *
Nationality vs Total CC prevention	0.004 < 0.05 *
Marital status vs Total CC prevention	0.591 > 0.05
Level of education vs Total CC prevention	0.378 > 0.05
Location of HCT vs Total CC prevention	0.485 > 0.05
Field of Education vs Total CC prevention	0.000 < 0.05 *

*Correlation is significance where p-value <0.05

Overall, women's cervical cancer knowledge scoring results were as follow; 29.59% had poor knowledge of cervical cancer (score zero to seven); 54.08% had average knowledge of cervical cancer (score eight to fifteen); 14.80% had good knowledge of cervical cancer (score sixteen to twenty-three); and only 1.53% had excellent knowledge of cervical cancer [Figure 1].

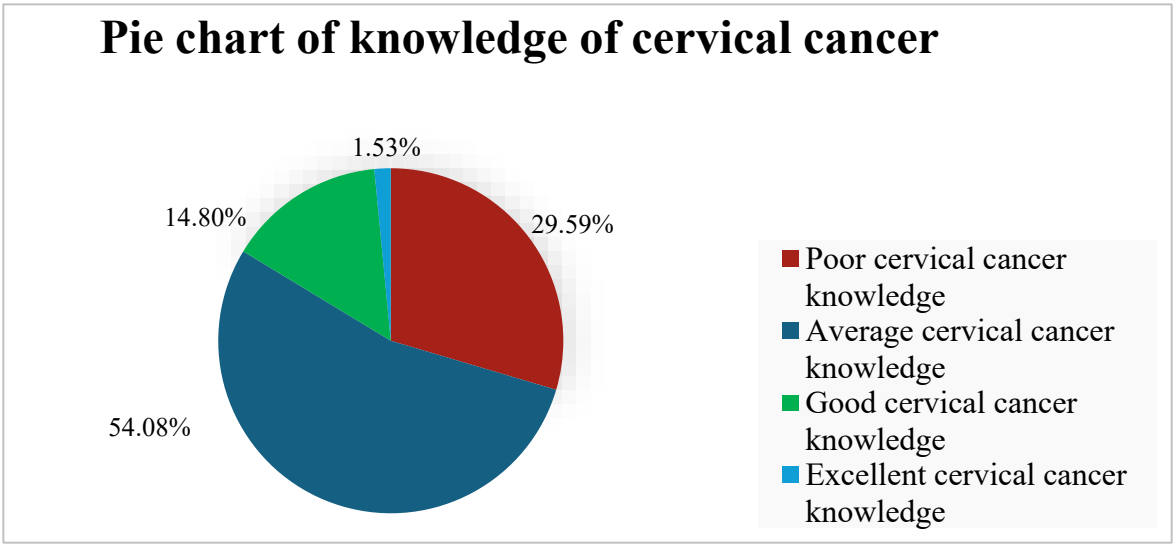

Figure 1: Pie chart illustrating the total knowledge of the participants. A score of zero to seven indicate poor total knowledge, eight to fifteen indicate average total knowledge, sixteen to twenty-three indicate good knowledge and twenty-four to twenty-nine indicate excellent total knowledge.

Discussion

Cervical Cancer Demographic

Cervical cancer is preventable, but it requires good knowledge and attitude from the society to acknowledge its significance (Alnafisah et al., 2019).This capstone project addresses the knowledge, attitude toward screening and prevention of cervical cancer among women at HCT

in the UAE. The population of this study was 196 participants most were aged from 21-25 years old 55.1% and 29.6% of the participants were under the age of 20. The increase percentage in these age groups could be due to the fact that this study was mostly on college students. On the other hand, 1.5% of the participants were between the age of 31-35 years old, 7.1% of the participants were aged between 36-45 years old, and 3.1% of the participants were above the age of 46 years old. Since this capstone project was carried out at HCT in the UAE, which mainly involve Emirati students, most of the participants in this study were Emirati 87.2%. When checking the martial status of this capstone it indicated that 84.7% of the participants were single whereas only 15.3% were married. This can be explained by the majority of the participants were students aged between 21-25 years old. Additionally, participant's level of education in this project varied from high school 43.4%, diploma's degree 10.7% and bachelor's degree 37.2%. Only a few of the participants had a master's degree 5.6% and doctorate's degree 3.1%. This is due to the low number of female staff and instructors who participated in this capstone project with higher post graduate degrees. This study aimed to target all campuses of HCT across the UAE. The Emirates of Abu Dhabi had the highest level of participants 91.8%. This high number could be attributed to the increased level of communication in which they received from Abu Dhabi Students' Life in comparison to other campuses. Field of education among the participants were almost equal between health science field 50.5% and non- health science 49.5%. This indicates that this study has a good distribution among the health science and the non- health science field.

Cervical Cancer Knowledge

Understanding the knowledge that HCT participants had toward cervical cancer will help in recognizing and acknowledging the misunderstanding of certain information toward it. As mentioned earlier, studies in developing countries have shed light on the level of knowledge and attitude towards screening and prevention of cervical cancer, which may provide useful information towards adjusting the educational institute curriculum in order to prepare our students for the future (Moudatsou, 2022).

The relationship between family history of cancer and knowledge toward any type of cancer is direct, as this capstone participants will have a better understanding of this topic. A study about family history of cervical cancer among African American and white women states that there is a direct association between having family history of cervical cancer and women's knowledge toward Pap screening behavior (Williams et al., 2009). The responses in the current capstone project show that only 7.1% of the participants had history of cervical cancer and 92.9% had no history of cervical cancer. Our results were similar to a study carried out on healthcare professionals in KSA on the knowledge, attitude and practice towards cervical cancer and screening mentioned that only 9% of their participants reported yes toward having history of cervical cancer (Heena et al., 2019). On the other hand, our results were lower than a study performed in the USA on the knowledge of uninsured women and their screening barriers and risk factors toward cervical cancer as. A 68.4% of their participants had no family history of cervical cancer and approximately 16% of the participants had a family history of cervical cancer (Akinlotan et al., 2017). In the current capstone project, over half of the participants' (56.1%) mentioned that they had the knowledge about cervical cancer, while 43.9% stated that they did not have enough knowledge. The current study contradicts a study performed in UK by Ogbonna, (2017) on university students about the knowledge, attitudes, and experience of cervical cancer. Where the UK study reported that 10.8% of participants claimed to have knowledge of cervical cancer and 68.3% of their participants had poor

knowledge toward cervical cancer (Ogbonna, 2017). Although the settings of Ogbonna study and the current capstone are similar, participants within the capstone project seemed to be much more confident towards their knowledge of cervical cancer. This may be attributed to the different countries that these studies were carried out. Over confidence that the participants had compared to the reality could be seen as an issue for not being diagnosed in the early stages of cervical cancer.

Based on previous studies, several risk factors such as family history, HPV infection, un-healthy diet, weak immune system and long-term use of contraceptives can be associated with cervical cancer. Participants knowledge in this capstone project on risk factors illustrated that family history had the highest risk factor (31.1%), this percentage was higher than a study performed on Saudi female participants in KSA where only 6.7% chose that family history of cervical cancer is a risk factor (Alnafisah et al., 2019). The variation in the results between these studies demonstrates that the current capstone projects participants have much more knowledge on the correlation between cancer and family history in comparison to Saudi women who had poor knowledge. Additionally, capstone project participants' selection of family history as one of the risk factors of cancer indicates a minimum knowledge that the general public should be aware of about cancer.

Moreover, participants of this capstone project selected HPV infection (17.9%) and long-term use of contraceptives (18.9%) as cervical cancer risk factors. Studies carried out at Qassim region and King Fahad Medical City (KFMC) illustrated that participants had lower knowledge about the HPV infection (3.2% and 9.6% respectively) and long-term use of contraceptives (12.9% and 13.4% respectively) as a risk factors of cervical cancer (Alnafisah et al., 2019; Heena et al., 2019).

Another study carried out at Al-Ahsa medical school in KSA about cervical cancer risk factors contradicts the current capstone project, as a higher percentages of participated females within their study knew that HPV infection (53.2%) and long term use of contraceptives (61%) are risk factors of cervical cancer (Al-Darwish et al., 2014). The knowledge difference between this capstone project and Al-Ahsa medical school could possibly be attributed to the fact that their students had a medical background giving them higher knowledge within a health-related topic.

Approximately 14.5% of participants within this capstone project chose weak immune system as a risk factor of cervical cancer. This opposes results reported by Ryan and colleagues in Great Britain as they indicated that 44.7% of their participants strongly agree with the fact that having weak immune system is a risk factor of cervical cancer (Ryan et al., 2019). This difference may be due to the poor knowledge about the relation between the weak immune system and cervical cancer among female with participants at HCT. Similarly this can also be compared with earlier mentioned surveys which reported high levels of response from their participants indicating that HIV infection is a risk factor Al-Ahsa (62.3%), and KFMC (13.7%), as HIV is known to weaken the immune system (Al-Darwish et al., 2014; Alnafisah et al., 2019). The least cervical cancer risk factor chosen by the participants in this capstone project was un-healthy diet (6.9%). Similarly, a study done by Elhoweris and colleagues on Sudanese women showed that only 13.2% of their participants knew that diet was a risk factor for cervical cancer (Elhoweris et al., 2016). The result of both the Sudanese women and this capstone participants illustrates the fact that there's lack of knowledge between cervical cancer and un-healthy diet. Referring to a study done in Italy, which claimed that great western dietary pattern

(un-healthy diet) was associated with higher risk of HPV infection development hence increased risk of cervical cancer (Barchitta et al., 2018).

The vast majority of the participants in this capstone project selected that all women regardless of age are at risk of developing cervical cancer (34.7%) and only 5.6% of females agreed that women after marriage are higher risk of developing cervical cancer. In contrast to a study carried on healthcare workers in India which demonstrated that a high percentage (57.4%) of their participants chose that young age onset of sexual intercourse can develop cervical cancer (Khanna et al., 2019). This difference could be attributed to the fact that women in UAE are more reserved and shyer towards sensitive topics. This may lead to lower knowledge among females in the UAE about STD and its consequences. Approximately 25.5% of females within the current capstone project chose that women after menopause are at higher risk of developing of cervical cancer which contradicts results obtained from participants at KFMC (8.6%) (Heena et al., 2019). This difference could be due to the assumption that the capstone project females had about the risk of developing cancer increases with age.

Cervical cancer treatments like surgery, chemotherapy and radiation were selected by the majority of participants in this capstone project (32.1%, 28.2%, and 15.0% respectively). Referring to a similar study performed in Ethiopia, which claimed that only 10.3% of participants chose surgery, 9.1% chose chemotherapy and 18.9% chose radiation as cervical cancer treatments options (Shiferaw et al., 2018). Another study carried out on medicine and health science students at the University of Hawassa in Ethiopia stated that 48.4% of participants chose surgery, 44.7% chose chemotherapy and 30.8% chose radiation as treatment options of cervical cancer. Nonetheless, the minority of participants in this capstone project chose targeted therapy (3.7%), immunotherapy (8.3%) and cryotherapy (3.2%) in addition to the previously mentioned cervical cancer treatment options. As most of the participants within this capstone project were HCT students, choosing surgery, chemotherapy and radiation were the expected treatment options to be chosen. The low response towards targeted therapy, immunotherapy and cryotherapy may be due to the fact that these treatment options are new, advanced and less likely to be known among young students.

In the current capstone project, there was a strong association between the field of education and knowledge ($p=0.002, p<0.05$) toward cervical cancer. Other studies have proven that there is a correlation between health science background and cervical cancer knowledge. As study performed at a university in the USA reported a positive correlation between the medical field background and the knowledge toward cervical cancer (Clay et al., 2019). Moreover, a study carried out on Sudanese women indicated that women working in a medical field had higher knowledge, attitude and prevention toward cervical cancer than women working in a non-medical field (Elhoweris et al., 2016).

Cervical Cancer Knowledge Screening and Attitudes

Screening is the principle measure used to reduce the risk of cervical cancer. The main purpose of screening is to identify the early stages of cervical cancer. In the current project, Pap test was the highest screening method chosen among females (34.0%). In contrast, a study performed by Khanna et al., (2019) where 46.3% of participants thought that Pap test was the method used for cervical cancer screening (Khanna et al., 2019). Similarly, another study carried out in Nigeria, stated that Pap test was considered as the most popular test mentioned by females' students and staff participants (41.2%) (Owoeye & Ibrahim, 2013). In the current capstone project, as mentioned most of the participants chose Pap test as a screening method

for cervical cancer, this could be due to the usage of Arabic terms while conducting the survey, which made it easier for the participants to recognize the different tests. Additionally, unlike other cervical screening methods, Pap test is a well-known test that has been used over 60 years (Owoeye & Ibrahim, 2013).

In the current capstone project, cervical cancer inspection (31%) was the second most common screening method chosen, followed by blood test (14.3%) and HPV test (11.3%). These results oppose a study in Nigeria among female students and staff were screening methods obtained the following percentages: visual inspection (staff: 4.3%, students: 8.2%), blood test (staff: 8.5% and students: 16.3%), and HPV test (staff: 12.8% and students: 20.9%). Around 9.3% of this capstone project participants had never heard of any screening methods. Similarly, in KSA, 7.9% of participants thought that there was no way of screening for cervical cancer (Heena et al., 2019). In contrast, a study by Getachew and colleagues in Africa reported that 83.8% of participants were not aware of any cervical cancer screening methods (Getachew et al., 2019). This high percentage of unaware participants could be attributed to the fact that the study was carried out in Africa, a developing country were healthcare system and knowledge toward cancer in general might be lower compared to the UAE and KSA.

The vast majority of participants within the current capstone project had heard about cervical cancer screening through educational institutes (31.4%) followed by healthcare professional (18.9%). Similarly, multiple studies agreed that either educational institutes or healthcare were one of the most common source of cervical cancer screening (Al-Darwish et al., 2014; AL-Hammadi et al., 2017.; Khudairi et al., 2017; Nasar et al., 2016).

Referring to the facts about Pap test, the majority of participants in this capstone project agreed that all married women should undergo Pap test. These results align with a previously Emirati study, which reported that most of their participants agreed that all females must have a Pap test (76%) (AL-Hammadi et al., 2017). Moreover, 9.4% of this capstone participants thought that Pap test should be done after menopause. These results were lower than a study in KSA were 27.2% of participants thought that Pap test should be done at the age of 40 (Khudairi et al., 2017). In addition, a study on women in Serbia 83.3% agreed that it should be done after menopause (Al-Darwish et al., 2014; AL-Hammadi et al., 2017; Nasar et al., 2016). Also, approximately 21.2% of participants in this capstone project agreed that a normal Pap test should be repeated every 2 -3 years. AL-Hammadi et al (2017), also reported that approximately 30% of participants in the UAE agreed on repeating Pap test every 2-3 years (AL-Hammadi et al., 2017). Although a high percentage of the participants knew that Pap test is a screening method for cervical cancer their knowledge about Pap test frequency was low. This opposes a study on women in Serbia who had higher knowledge about Pap test application were 68% agreed that it should be done every 3 years (Jovanovic et al., 2017). This difference in Pap test knowledge may be due to the perception that women have toward Pap test. Studies have indicated that participants agree that only women who experience symptoms of cervical cancer should have Pap test. As cervical cancer has no early symptoms, these symptoms that the participants are talking about are advance stages of cervical cancer (Jovanovic et al., 2017), which might be too late to treat. This clearly emphasize on the importance of educating all women on the significance of regular cervical cancer screening. Around 16.5% of this capstone project thought that Pap test can detect early cervical cell abnormality, and 13.8% thought that Pap test can detect cervical cancer before the appearance of its sign and symptoms. A study in KSA indicated that 33.4% of participants thought that Pap test can detect any early abnormal changes in the cervix, and 44.3% agreed that Pap test is used for early cervical cancer detection

(Heena et al., 2019). In 2004, a study by Badrinath and colleagues showed that 30.1% of participants thought that Pap test helps in early cervical cancer detection (Badrinath et al., 2004). AL-Hammadi et al (2017), reported that 58% of their participants agreed that the aim of a Pap test is to detect cervical cancer changes (AL-Hammadi et al., 2017). All these studies indicate good participants knowledge about the aims of Pap test, which supports the results of the current capstone project.

About half of the participants (50.5%) in this capstone project agreed to have Pap test which contradicts an earlier mentioned study were only 3.8% agreed to have a Pap test (Heena et al., 2019). The higher percentage of willingness to have a Pap test among participants in the capstone project indicates a positive attitude toward screening of cervical cancer. However, more knowledge about cervical cancer increases the attitude of women within the society toward screening. The vast majority of participants who refused to undergo doing Pap test mentioned that culture barriers (30.8%) and scared to be diagnosed with cancer (30.8%) as being the reasons. A study by Dulla et al., (2017), showed that religious belief (13.3%) and fear from the results (26.5%) were common reasons for not wanting to have a Pap test (Dulla et al., 2017). Similar reasons have been mentioned in other studies (Heena et al., 2019; Ogbonna, 2017).

Furthermore, cultural barriers and religious believes play an important role in attitude towards cervical cancer screening. The UAE is an Islamic country with a society that has strict traditions and religious believes, this has been shown to have a big impact on cervical cancer screening attitude in the UAE (Dulla et al., 2017). Additionally, a study on healthcare workers from Protestant religion in Ethiopia reported low acceptance to cervical cancer screening. The reasoning behind this was that they might have felt shy to be screened by their colleagues and fear from positive result (Dulla et al., 2017). Another study reported in Nigeria where 18.4% of staff and 17.6% of students who did not want to undergo the Pap test was because they felt embarrassed to be screened for cervical cancer (Owoeye & Ibrahim, 2013). A shared reason that has been mentioned in different studies is afraid from procedure or it is painful (Heena et al., 2019; Owoeye & Ibrahim, 2013). The fear of pain is a normal reaction towards a new procedure, this can be easily addressed by educating individuals on the exact procedure from a well experienced healthcare professional.

Approximately 77.0% of the participants in the current capstone project thought that all married females should receive a Pap test text notification, while 22.4% thought that it was not required. In an earlier mentioned study by Rashid et al (2013), indicted that only 21.6% of their participants who received text messages notification attended the screening, while 34.4% responded to the phone call. This demonstrates the fact that direct communication between healthcare providers and the public could be an efficient way of providing knowledge to women on the importance of screening, which might towards increasing the cervical cancer screening attitude (Rashid et al., 2013).

In the current capstone project, there was an association between the age group and knowledge of screening and attitude (p=0.022, p<0.05) toward cervical cancer. A study performed in Kuwait mentioned that there was an association between women's age and their practices of cervical cancer screening (Al Sairafi & Mohamed, 2009). This association between the age and screening knowledge indicates that young women with a college educational level might have a better attitude towards cervical cancer screening. Similarly, there was a strong association between the field of education and screening knowledge and attitude (p=0.002,

p<0.05) toward cervical cancer. A study carried out in Malaysia stated that there was a strong association between the participants field of education and their knowledge of cervical cancer screening (Al-Naggar et al., 2010). These findings emphasize on the importance of educating individuals from a non-health science background on cervical cancer to enhance their knowledge within this area.

Cervical Cancer Prevention

Cervical cancer can be prevented by increasing its awareness among women and ensuring that the healthcare system provides their public with adequate knowledge. In the UAE, DOH has recommended that all females between the age of 15-26 get vaccinated against HPV. In the current capstone project, just over half of the participants (52.6%) had heard about the HPV vaccine. These results oppose a previous study performed in the UAE, which showed higher percentage of participants (75.1%) who had heard about the HPV vaccine (Ortashi et al., 2013). A published study carried out in the UAE emphasized on HAAD's effort towards spreading the knowledge and awareness of HPV vaccine within the society. This was done through campaigns and educational workshops, which aimed to overcome cultural barriers within the society towards HPV vaccine (Ortashi et al., 2012). The decline in the percentage of being vaccinated against HPV in the current capstone project was due to the more campaigns that HAAD organized for the HPV vaccine. Although, the period of the campaign was from 2007 until 2013. The coverage of HPV vaccine had been reached to almost 95% in the Emirate of Abu Dhabi (Ortashi et al., 2013).

In the current study the vast majority of participants were aged between 21-25 years old (55.1%), 38.8% stated that they had the HPV vaccine. In contrast, a study in KSA indicated that only 5.6% of their participants had the HPV vaccine (Heena et al., 2019). Interestingly, over half (62.8%) of the capstone project participants agreed to consent their daughters in the future to have HPV vaccine. In contrast, a study by Olubodun and colleagues in Nigeria, reported that around 93.8% of participants were willing to have the HPV vaccine (Olubodun et al., 2019). Additionally, two other studies showed high participants acceptance towards permitting their daughters to be vaccinated against HPV in KSA (70.8%) and Bahrain (90.9%) (Alnafisah et al., 2019; Jassim et al., 2018). The reason behind the increased agreement towards the HPV vaccine was associated with their positive attitude towards the vaccine (Alnafisah et al., 2019). Within this capstone project, there were various reasons behind participants not permitting to their daughters to have the HPV vaccine such as: worried of side effects (24.5%), not necessary (18.4%), the vaccine is recent and long-term effects unknown (16.3%), not safe (14.3%), not recommended by doctors (14.3%), and do not have enough knowledge (12.2%). Similar reasons were reported in a study carried out in China were 21.3% of their participants were concerned about the side effects and the long-term effects, and 11.3% thought that the vaccine was not necessary (Ning et al., 2019). Wymann and colleagues published a cross-sectional study about HPV vaccine uptake, which indicated that 18.1% of their participants were afraid of the vaccine's side effects (Wymann et al., 2018). Similarly, the current capstone project and other studies also reported that side effects of the HPV vaccine were the most common reason behind participant's opposition to the vaccine (Ning et al., 2019; Wymann et al., 2018). The capstone project participant's refusal towards consenting their daughters to be vaccinated against HPV might be due their lack of HPV infection and its correlation to cervical cancer. It has been shown that HPV vaccine is an effective measurement that can be taken to protect individuals against HPV infection, which causes approximately 70% of all cervical cancer cases (Shiferaw et al., 2018).

Furthermore, in the current study there was a significant association between age and cervical cancer prevention *(p=0.007, p<0.05*). A study performed in Cambodia reported that younger women were more likely to be vaccinated against HPV (Touch & Oh, 2018). In the current capstone project, most participants were young, indicating that the majority more likely knew about the benefits of the HPV vaccine. This explains the participant's willingness towards consenting the HPV vaccine to their daughters despite most participants not been vaccinated against HPV. Furthermore, there was a strong association between nationality and cervical cancer prevention *(p=0.004, p<0.05*). As a study carried out in UK found that migrated women to the UK were overdue for cervical cancer screening than those who were born in the UK (Ekechi et al., 2014). Remarkably, field of education and cervical cancer prevention *(p=0.000, p<0.05*) had a strong association. As mentioned earlier, field of education has been proven to be associated with knowledge of cervical cancer, cervical cancer screening and attitude. A study carried out in Iran revealed that occupation was statistically significant with cervical cancer prevention knowledge (Asgarlou et al., 2016). This correlation further proves the significance of healthcare topics to women, as encourages them to take early preventive measures.

Participants Overall Knowledge

The overall knowledge and attitude toward cervical cancer screening and prevention among women in HCT was average (54.08%). This level of knowledge illustrates that the awareness and attitude toward screening and prevention of cervical cancer has improved in comparison to earlier studies reported in the UAE. These studies illustrate poor knowledge and attitude towards cervical cancer screening and prevention (AL-Hammadi et al., 2017; Ortashi et al., 2013). This increase of cervical cancer knowledge over the years, indicates that female's acceptance levels towards understanding the significance of cervical cancer is improving. In order to support women further, the DOH must take this as an opportunity to elevate the knowledge in the society and encourage them to undergo early screening.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The aim of this capstone project was to assess the knowledge, attitude toward screening and prevention of cervical cancer among female (faculty and administrative staff, support staff, students) across HCT campuses in the UAE, which was proven to be average. This study acted as a baseline in assessing the knowledge and attitude towards screening and prevention of cervical cancer among females at HCT campuses in the UAE.

Recommendations

This project can be further extended to investigate the perspective of women in the UAE towards receiving a home HPV self-sampling kit, which will identify HPV positive females, therefore estimating her chances of developing cervical cancer. Moreover, conducting a study across the country that involve Emirati females from different regions and assessing their knowledge about cervical cancer and early screening. The takeaway messages from this capstone project was that health education programs must be included in the curriculum in all HCT majors as it will help in increasing their cervical cancer knowledge and attitude. Moreover, enhancing the level of knowledge towards one of the leading causes of mortality rates of females in the UAE will help in spreading the importance of cervical cancer screening and prevention among different generations. Therefore, it is critical that the UAE government

along with educational institutions are involved in enhancing cervical cancer screening and prevention among UAE residence. This can be achieved through awareness campaigns and educational programs across the country, which emphasizes on the importance of cervical cancer screening and HPV vaccinations. In addition to developing multiple cervical cancer educational sessions across different institutes about HPV to enrich their knowledge on HPV and their understanding of the importance of the HPV vaccine.

Limitations

The limitations that this project may have faced are the accessibility to good internet connection among the participants. The low response rates might be because the target population may not check their emails regularly, which would affect the sample size of the current study. Furthermore, due to COVID-19 pandemic many emails were sent across HCT campuses asking participants to complete other surveys; which also may have affected the study sample size. On the other hand, the strengths of our project are the collaborative efforts made by our college, the participants to succeed during the pandemic, and the availability of a detailed literature review that we provide.

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Global Journal of Health Sciences
ISSN 2519-0210 (Online)
Vol 9, Issue 3, No.1, pp 1 - 31, 2024

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Appendix 1: Capstone Timeline