ORIGINAL RESEARCH ARTICLE

Predictors of cervical cancer knowledge and attitude among Saudi women in Najran city: A cross-sectional study

DOI: 10.29063/ajrh2022/v26i7s.3

Wafaa T. Elgzar[1], DaifAllah D. Al-Thubaity[1], Mohammed A. Alshahrani[2], Mohammed H. Nahari[2], Heba A. Ibrahim[1], Samiha H. Sayed[3,4], Hanan A. El Sayed[5,6]*

Department of Maternity and Childhood Nursing, Nursing college, Najran University, Saudi Arabia[1]; Department of Clinical Laboratory Sciences, Najran University Najran, Saudi Arabia[2]; Department of Community Health Nursing, Faculty of Nursing, Damanhour University, Egypt[3]; Department of Public Health, College of Health Sciences, Saudi Electronic University, Saudi Arabia[4]; Applied College, Tabuk University, Saudi Arabia[5]; Department of Community Health Nursing, Faculty of Nursing, Benha University, Egypt[6]

***For Correspondence:** Email: *ddalthubaity@nu.edu.sa*; Phone: +66506721182

Abstract

This study explores the predictors of cervical cancer (CC) knowledge and attitude among Saudi women in Najran city. A descriptive cross-sectional study was conducted in Najran/ KSA to recruit 1085 participants from June to September 2021. An online self-reported questionnaire was used for data collection; it consisted of basic data and health history, a CC knowledge quiz, and a CC attitude scale. Data analysis was performed using the Statistical IBM software, version 23 (IBM Corp., Armonk, N.Y., USA)'. The findings revealed that more than half of the participants (57.7%) had insufficient knowledge regarding CC. At the same time, 59.4% of them had a positive attitude toward CC screening. According to binary logistic regression analysis, University-educated participants had increased odds of sufficient knowledge (OR: 1.774, 95%CI1.101-2.856) and positive attitude (OR: 4.246, 95%CI 1.545-11.669) about CC compared to the participant with secondary education. Moreover, participants with no family history of CC were less likely to have sufficient knowledge (OR: 0.554, 95%CI 0.102-2.745) and positive attitude (OR: 0.867, 95%CI 0.776 - 0.968) about CC compared to participants with positive family history. Also, sufficient knowledge was statistically associated with a positive attitude (OR: 1.754, 95%CI 1.112-2.849). Among all basic variables, participants' educational qualifications and positive family history of CC are significant socio-demographic predictors of CC knowledge and attitude. Specific educational interventions to enhance women's knowledge and attitude toward CC screening should be developed and implemented in the community without delay, particularly for less-educated women. *(Afr J Reprod Health 2022; 26[7s]: 23-32).*

Keywords: Cervical cancer, knowledge, attitude, predictors, Saudi Arabia

Résumé

Cette étude explore les prédicteurs de la connaissance et de l'attitude du cancer du col de l'utérus (CC) chez les femmes saoudiennes de la ville de Najran. Une étude transversale descriptive a été menée à Najran/KSA pour recruter 1 085 participants de juin à septembre 2021. Un questionnaire autodéclaré en ligne a été utilisé pour la collecte de données; il se composait de données de base et d'antécédents de santé, d'un quiz sur les connaissances en matière de CC et d'une échelle d'attitude en matière de CC. L'analyse des données a été effectuée à l'aide du logiciel Statistical IBM, version 23 (IBM Corp., Armonk, N.Y., USA)'. Les résultats ont révélé que plus de la moitié des participants (57,7 %) avaient des connaissances insuffisantes sur le CC. Dans le même temps, 59,4 % d'entre eux avaient une attitude positive envers le dépistage du CC. Selon l'analyse de régression logistique binaire, les participants ayant fait des études universitaires avaient des chances accrues d'avoir des connaissances suffisantes (OR : 1,774, IC à 95 % 1,101-2,856) et une attitude positive (OR : 4,246, IC à 95 % 1,545-11,669) à propos du CC par rapport aux participant ayant fait des études secondaires. De plus, les participants sans antécédents familiaux de CC étaient moins susceptibles d'avoir des connaissances suffisantes (OR : 0,554, IC à 95 % 0,102-2,745) et une attitude positive (OR : 0,867, IC à 95 % 0,776 - 0,968) à propos du CC par rapport aux participants ayant des antécédents positifs. histoire de famille. De plus, une connaissance suffisante était statistiquement associée à une attitude positive (OR : 1,754, IC à 95 % : 1,112-2,849). Parmi toutes les variables de base, les qualifications scolaires des participants et les antécédents familiaux positifs de CC sont des prédicteurs sociodémographiques significatifs de la connaissance et de l'attitude en matière de CC. Des interventions éducatives spécifiques pour améliorer les connaissances et l'attitude des femmes envers le dépistage du CC doivent être développées et mises en œuvre dans la communauté sans délai, en particulier pour les femmes moins éduquées. *(Afr J Reprod Health 2022; 26[7s]: 23-32).*

Mots-clés: Ancer du col de l'utérus, connaissances, attitude, prédicteurs, Arabe saoudien

Introduction

Cervical cancer (CC), considered a significant public health issue, ranks as the 4th most prevalent cause of cancer-related incidence and deaths among females globally. In 2018, a global study reported an incidence of 570,000 CC cases and 311,000 related mortality worldwide[1]. In Saudi Arabia (SA), CC is the ninth most common type of cancer among reproductive-age females[2]. While the incidence of CC has shown a steady decrease internationally, the incidence in SA has increased since 1990, with approximately 358 new cases and 179 annual deaths[3].

Cervical cancer is one of the few cancers that can be prevented with primary and secondary preventive strategies. This is because most CC cases are due to repeated infection with the human papillomavirus (HPV) high-risk type. HPV is the most prevalent sexually transmitted infection globally, so about 80% of males and females will be infected with it at some point in their lives[4]. Therefore, emphasis should be directed on implementing public health programs for CC screening, reporting HPV infections, and maintaining HPV vaccination activities. Awareness programs are always necessary to increase the effectiveness of such interventions[5].

There is no comprehensive CC screening program in Saudi Arabia, which is expected to be recommended after marriage when a female becomes sexually active. Also, most Saudi females do not seek medical help until the late stages of CC. Pap smear screening often depends on the health care provider's recommendations for suspected cases. Therefore, 43% of CC cases in Saudi Arabia are diagnosed at the late stages (3rd and 4th stages), which increases the possibility of poor outcomes and mortality, compared to 25% in British Columbia, where they have efficient screening strategies[6,7]. At the same time, the HPV vaccination is available in Saudi Arabia from 9 to 26 years. It has only lately been added to the immunization record for young girls and boys from 9 to 12 years of age, which will reduce CC cases in women and penile cancer in men in the future[8].

Effectual screening and immunization programmes have influenced the international trend. For example, after introducing the HPV vaccination programme in the United Kingdom, a significant decrease in the incidence of CC was observed[9]. In addition, after implementing the regulated CC screening programmes in Europe, a 51-92% reduction in CC mortality was noted in different regions of Europe[10]. However, these outcomes mainly depend on the population's awareness and acceptance of performing a screening test or HPV vaccine. This was verified in a systematic review where educational interventions of breast or cervical cancer screening significantly enhanced the participants' knowledge, attitude, and Pap smear screening[11]. Hence, several studies have highlighted insufficient knowledge and negative attitude regarding CC screening in different populations inside and outside Saudi Arabia[12-14]. Therefore, this study explores the predictors of cervical cancer knowledge and attitude among Saudi women in Najran city as a strategy to guide future interventions.

Methods

Study design and setting

A descriptive cross-sectional design was utilized in this research. The study was conducted in Najran/ SA, Najran is the biggest city in the Najran region and comprises 136,090 females in the age ranging from 20 to 60 years representing 53.6% of the total females in the Najran region and 23.9% of the total population according to the 2016 Saudi Demographic and Health Survey[15].

Participants and sample size

Epi-info, a free sample size calculator, was used to determine the sample size according to the following parameters: population size = 136,090; anticipated population frequency has low perceived CC screening barriers 50%, absolute precision 5%, and design effect 1%. The total sample size was based on a 99.9% confidence interval was 1075 participants. A total of 1150 females were included to compensate for the anticipated loss of participants or questionnaire exclusion due to incomplete data. Sixty-five sheets were excluded due to incongruent data, so data analysis was conducted with 1085 participants. The researchers used a convenience sampling technique to recruit

participants. Any participants accessed the questionnaire and fit to the inclusion criteria were included in the study. Inclusion criteria were women aged 18 to 65 years, married (sexually active), can read and write to be able to answer the electronic questionnaire, are free from mental illness, and agree to participate in the study.

Data collection instrument

The researchers developed a 20-minute online self-reported questionnaire. It consisted of three main parts: basic data and health history, a CC knowledge quiz, and a CC attitude scale.

Part I: basic data and health history included age, residence, education, marital status, monthly income, family history of cancer/CC, current contraceptives use, history of Pap smear and HPV vaccine, history of gynecologic operations, age at marriage, marriage duration, gravidity, and parity.

Part II: CC knowledge quiz: It was adapted from prior studies[16,17], and comprises 14 dichotomous (yes/no) questions to assess the participants' knowledge regarding CC risk factors, symptoms, and screening measures. The incorrect answer scored zero, and the correct answer scored one; therefore, the overall quiz score was14. The sum of items obtained the overall knowledge score; then, it was categorized as insufficient (≤7) and sufficient (>7). The reliability of the knowledge quiz was assessed using Cronbach's alpha, and its result indicated good internal consistency (r= 0.776).

Part III: CC screening attitude scale was adapted from the previous study[18]. The scale comprises nine items ranked on a 5-points Likert scale from strongly agree (5) to strongly disagree (1). The overall scale score ranged from 9-45. The participant was considered to have a negative attitude if her overall score fell between (9 -27) and a positive attitude if her overall score was ≥ (28 - 45). The reliability of the attitude scale was assessed using Cronbach's alpha, and its result indicated good internal consistency (r= 0.785). In addition, the self-reported questionnaire was examined for face, content, and construct validity by a jury of four experts in the obstetrics nursing specialty.

Data collection and analysis

The data was collected from June to September 2021. An online self-reported questionnaire was first disseminated to the university colleagues and students; later, they had it disseminated to their relatives, friends, and others who fitted the inclusion criteria through social media, e.g. (Facebook, Twitter, Telegram, WhatsApp, and Instagram). Data analysis were performed using the Statistical IBM software, version 23 (IBM Corp., Armonk, N.Y., USA)'. The participants' basic data, CC knowledge items, and CC attitude scale were presented using numbers and percentages for categorical variables and mean and standard deviation (SD) for continuous variables. A binary logistic regression was utilized to determine CC cancer knowledge and attitude predictors. Among the basic variables, the participant age, age at marriage, marriage duration, gravidity, and parity are continuous. The remaining variables were categorical such as marital status, residence, education, monthly income, and family history of cancer/CC. The first category was taken as a reference for all categorical variables. A P-value <0.05 was considered statistically significant.

Results

Table 1 shows that 91.7% and 93.9% of the study participants were married and urban area residents, respectively. Besides, 65.3% of the study participants were highly educated, and 85.7% of them reported sufficient monthly incomes. History of gynecologic operation, genital infection, contraceptive use and family history of cancer/CC were reported by 17.9%, 47.6%, 74.6%, and 3.3% of the study participants, respectively. Almost all study participants did not have the Pap smear test (99%) or HPV vaccine (98%). The study participants' mean age, age at marriage, marriage duration, gravidity, and parity were 37.79, 23.03, 15.17, 4.34, and 3.59, respectively.

Table 2 shows that only 26.6% of the participants correctly indicate that HPV is the leading cause of CC. In addition, 45.2% and 17.9% of them indicated that multiple sexual partners and early sexual initiation increase the risk for CC, respectively. Less than half of the participants

Table 1: Participants' basic data (n= 1085)

Basic data	No	%
Marital status		
Married	995	91.7
Divorced	68	6.3
Widow	22	2.0
Residence		
Rural	66	6.1
Urban	1019	93.9
Education		
Secondary school	377	34.7
University or postgraduate	708	65.3
Monthly income		
Not enough	155	14.3
Enough	930	85.7
History of gynecologic operations		
Yes	194	17.9
No	891	82.1
History of genital infection		
Yes	517	47.6
No	568	52.4
History of contraceptive use		
Yes	809	74.6
No	276	25.4
Family history of cancer/CC		
Yes	36	3.3
No	1049	96.7
History of taking human papilloma virus vaccine		
Yes	11	1.0
No	1074	99.0
History of pap smear screening		
Yes	22	2.0
No	1063	98.0
Age	37.79(7.41)	
Age at marriage mean (SD)	23.03(4.95)	
Marriage duration mean (SD)	15.17(9.73)	
Gravidity mean (SD)	4.34(2.89)	
Parity mean (SD)	3.59(2.35)	

mentioned irregular menstrual bleeding (46.4%) and post-coital bleeding (47.5%) as CC symptoms. About two-thirds of the participants knew difficulty urination and vaginal secretion stained with blood are CC symptoms 62.5% and 71.5%, respectively. Only 28.6% of the participants indicated weight loss as a CC symptom. The majority of the participants correctly answered that CC is fatal if it is not early detected (88.8%), Pap smear screening can prevent advanced CC (80.3%), and CC screening measures are available in Saudi Arabia (81.5%).

Table 3 clarifies that the highest percentage (81.0%) of the participants agreed with the statement "it is useful to detect CC early". Less than one-quarter of them thought that they were susceptible to CC (22.1%), and the statement "any woman may acquire CC" (24.8%). More than half (56. 4%) of them believed in the seriousness of CC. The majority of the participants (79.4%) agreed that there are effective measures to decrease the CC risk. Furthermore, nearly an equal percentage of them strongly agreed with the statements "CC can be treated" and "screening helps in CC prevention" 47.6% and 47.4%, respectively. At the same time, only 27.6% of them were willing to undergo CC screening.

The overall assessment of CC knowledge and attitude is illustrated in Table 4 and revealed that more than half of the participants (57.7%) had insufficient knowledge regarding CC. At the same time, 59.4% of them had a positive attitude about CC.

Table 5 summarizes binary logistic regression analysis of the associations between participants' basic variables and their CC knowledge and attitude. The association of educational qualification with CC knowledge and attitude were statistically significant. The University educated participants had increased odds of sufficient knowledge (OR: 1.774, 95%CI1.101-2.856) and positive attitude (OR: 4.246, 95%CI 1.545-11.669) about CC compared to the participant with secondary education. Moreover, participants with no family history of CC were less likely to have sufficient knowledge (OR: 0.554, 95%CI 0.102-2.745) and positive attitude (OR: 0.867, 95%CI 0.776 - 0.968) about CC compared to participants with positive family history. Also, sufficient knowledge was statistically associated with a positive attitude (OR: 1.754, 95%CI 1.112-2.849). Among those variables, the association of age, marital status, residence, monthly income, age at marriage, marriage duration, gravidity, and parity with CC knowledge and attitude were not statistically significant (P>0.05).

Discussion

The availability of valuable early detection methods and an effective vaccine have made CC prevention easy. In order to achieve these benefits and reduce CC mortality, community knowledge about CC screening and the HPV vaccine must be enhanced to

Table 2: Participants' knowledge regarding CC (n= 1085)

knowledge regarding CC	Correct answer	
	No	%
Multiple sexual partners may cause CC.	490	45.2
HPV is the main cause of CC.	289	26.6
Early sexual initiation increase the risk for CC.	214	19.7
A family history of CC increases the risk of developing CC.	438	40.4
Irregular menstrual bleeding is one of the of CC symptoms.	503	46.4
Post-coital bleeding is one of the of CC symptoms.	515	47.5
Loss of weight is one of the of CC symptoms.	310	28.6
Difficulty urination is one of the of CC symptoms.	678	62.5
Vaginal secretion stained with blood is one of the of CC symptoms.	776	71.5
A woman can get CC without any symptoms.	351	32.4
CC is fatal if it is not early detected.	964	88.8
Pap smear screening can prevent advanced CC	871	80.3
All women between the ages of 30 and 49 should be screened for CC	419	38.6
CC screening measures are available in Saudi Arabia.	884	81.5

Table 3: Participants' attitude toward CC screening (n=1085)

Attitude items	Strongly disagree		disagree		Neutral		Agree		Strongly agree	
	No	%	No	%	No	%	No	%	No	%
It is useful to detect CC at an early stage.	11	1.0	45	4.1	150	13.8	450	41.5	429	39.5
Do you think you susceptible to CC	155	14.3	341	31.4	349	32.2	151	13.9	89	8.2
Do you think having CC is dangerous for you?	20	1.8	190	17.5	262	24.1	415	38.2	198	18.2
There are effective measures to decrease the CC risk	11	1.0	43	4.0	169	15.6	507	46.7	355	32.7
Cervical cancer causing death	156	14.4	345	31.8	285	26.3	167	15.4	132	12.2
Any women may acquire CC	110	10.1	316	29.1	390	35.9	172	15.9	97	8.9
Cervical cancer can be treated	7	.6	18	1.7	124	11.4	420	38.7	516	47.6
screening helps in CC prevention	9	.8	27	2.5	112	10.3	423	39.0	514	47.4
Willingness for CC screening	156	14.4	345	31.8	285	26.3	167	15.4	132	12.2

Table 4: Participants' overall knowledge and attitude toward CC (n=1085)

	No	%
Overall knowledge		
Insufficient (≤7)	622	57.3
Sufficient (>7)	463	42.7
Overall attitude		
Negative	441	40.6
Positive	644	59.4

increase acceptance of screening or vaccine receipt. Although all participants in the current study were educated (secondary or university or above), only 2.0% of them ever-performed CC screening (Pap smear test); these findings are consistent with similar researches conducted in Saudi Arabia; Al Hassa, Qassim, and Riyadh, these researches have shown a low CC screening rate[19-21].

Although screening rates in these studies are slightly higher than the current study, they are still much lower than the global rates. The low screening rate in Saudi Arabia may be attributed to the lack of CC awareness. In addition, HPV is the major cause of CC, which is a sexually transmitted disease. Thus, multiple sexual relations are a significant risk factor for HPV infection and consequent CC. The conservative culture in Saudi Arabia is an obstacle to discussing this health problem in the required depth, as a person feel embarrassed when talking about their sexuality or believe that risk factors do not apply to them due to their commitment to Islamic values and instructions that forbid them from having sexual relations outside marriage framework. Therefore, a limited CC screening rate was expected in the current study.

Our findings revealed that more than half of the participants had insufficient knowledge regarding CC. At the same time, only 42.7% of them obtained sufficient levels. Similarly, several studies in different Saudi Arabia regions found insufficient knowledge levels concerning CC and its screening

Table 5: Binary logistic regression of participants' basic variables and their CC knowledge and attitude toward CC screening

Variables	Knowledge predictors OR [95%CI]	P value	Attitude predictors OR [95%CI]	P value
Age	1.038 [0.796 -1.355]	0.781	1.055 [0.907- 1.105]	0.054
Age at marriage	1.008 [0.948 - 1.072]	0.794	0.954[0.895 - 1.017]	0.148
Marital status				
Married		0.226	Reference	0.664
Divorced	0.608 [0.346 -1.070]	0.085	0.931[0.526 -1.648]	0.807
Widowed	0.949 [0.388 -2.323]	0.909	1.540 [0.580 - 4.091]	0.387
Residence				
Rural	Reference		Reference	
Urban	1.044 [0.667 -1.635]	0.851	1.080 [0.615 -1.894]	0.789
Education				
Secondary school	Reference		Reference	
University or postgraduate	1.774 [1.101-2.856]	0.018*	4.246 [1.545- 11.669]	0.039*
Monthly income				
Not enough	Reference		Reference	
Enough	1.053 [0.717 -1.545]	0.793	1.015 [0.688 - 1.497]	0.942
Family history of CC				
Yes	Reference		Reference	
No	0.554 [0.102-2.745]	0.017*	0.867 [0.776 - 0.968]	0.011*
Overall knowledge			1.754 [1.112-2.849]	0.023*
Marriage duration	1.020 [0.979- 1.062]	0.350	0.964[0.922 - 1.009]	0.112
Gravidity	0.997 [0.899 - 1.106]	0.958	0.837 [0.406 -1.728]	0.631
Parity	0.910 [0.785 -1.055]	0.210	1.040 [0.891 - 1.212]	0.620

* Statistically significant (P-value <0.05)

and preventive measures[14,22-25]. Data received from other Arab countries are not far from what we found in the current study. Gamaoun conducted a systematic review to assess knowledge and awareness regarding HPV infection and its vaccine. She found that the overall level of HPV knowledge was low to moderate in Bahrain, Egypt, Sudan, and the United Arab Emirates[26]. Accordingly, it is necessary to improve the role of primary health care centers to raise women's awareness toward CC screening programmes.

The current study results are consistent with studies in southwestern Ethiopia and Gondar Ethiopia[27,28]. Both of them reported that only 31% of their study participants obtained good knowledge about CC. The results from the current study found that overall CC knowledge is lower than the study performed by Mukama *et al*. in Uganda (55.4%) and Aweke *et al*. in Hossana, Ethiopia (53.7%)[29,30]. This difference seemed to be caused by society's socio-economic and cultural differences and the difference in the method used to evaluate knowledge.

Despite the insufficient knowledge, more than half (59.4%) of the participants expressed a positive attitude toward CC and its screening test. More than half (56.4%) of them believed in the seriousness of CC, and more than three-quarters of them (79.4%) agreed that there are effective measures to decrease the CC risk; a similar attitude results (63.8 %) is reported from a recent study in North Central Ethiopia[31] and (67.7%) in the University of Gondar, Northwest Ethiopia[18]. On the other hand, the studies of Javaeed *et al.* and Alnafisah *et al.* contradict the study results, which stated that most of their participants had a negative attitude toward CC screening[20,32]. This discrepancy may be attributed to the difference in socio-demographic background and different tools used in data collection.

The binary logistic regression analysis revealed that the association of age, marital status, residence, monthly income, age at marriage, marriage duration, gravidity, and parity with CC knowledge and attitude were not statistically significant. Contradictory reports have been from Weng *et al.* found that age, parity, and marital status were important predictors of women's CC awareness[33]. Furthermore, Ruddies *et al.* showed that residence and contraceptive use were associated with a positive attitude[34]. The difference may be attributed to the nature of the participants and socio-cultural differences.

Our results indicated that participants' educational qualification was an independent predictor significantly associated with CC knowledge and attitude when compared with the other factors in binary logistic regression analysis. The University-educated participants had increased odds of sufficient knowledge and positive attitude about CC compared to the secondary-educated participant. These results are in accordance with other studies done in Saudi Arabia and other countries[16,21]. This may be because highly educated females may have numerous chances to gain knowledge about CC. Therefore, specific educational interventions to enhance CC knowledge, attitude, and screening willingness should be developed and implemented in the community without delay, particularly for low-educated women.

Moreover, our study demonstrated that the family history of CC was significantly associated with CC knowledge and attitude. A woman with no family history of CC was less likely to have sufficient knowledge and a positive attitude about CC than a woman with a positive family history. These results are in the same line with several studies[33,35,36.]

Our findings demonstrated that sufficient CC knowledge was a predictor of a positive attitude towards CC. A previous study conducted in Ethiopia also found adequate knowledge significant determinant for a positive attitude toward CC screening[37]. Similarly, a cross-sectional survey of 395 female health care professionals in Saudi Arabia supports the thought that adequate knowledge played an important role in women's attitude toward CC screening[38]. Consequently, enhancing the women's knowledge regarding CC screening is one of the most necessary actions in improving women's attitudes toward CC screening.

Ethical considerations

The ethical committee of Najran University approved the study (NU/RG/MRC/11/1 issued at April 2021). Informed consent was taken from each participant before data collection on the first page of the self-reported questionnaire, and participant anonymity was applied. The participants were informed that all data was confidential and used only for the research objective.

Conclusion

The current study's findings indicate that more than half of the participants (57.7%) had insufficient knowledge regarding CC. At the same time, 59.4% of them had a positive attitude about CC. Among all basic variables, participants' educational qualifications and positive family history of CC are significant socio-demographic predictors associated with CC knowledge and attitude. Furthermore, our findings demonstrated that adequate knowledge is a significant determinant for a positive attitude toward CC. Therefore, specific educational interventions to enhance women's knowledge and attitude toward CC screening should be developed and implemented in the community without delay, particularly for less-educated women.

Acknowledgments

The authors are thankful to the Deanship of Scientific Research at Najran University for funding this work under the General Research Funding program grant code (NU/RG/MRC/11/1).

Authors' contributions

Elgzar- The conception and design of the study and analysis and interpretation of data, drafting the article and revising it critically for important intellectual content, final approval of the version to be submitted. *Al-Thubaity*- Drafting the article and revising it critically for important intellectual content, final approval of the version to be submitted. *Alshahrani*-Drafting the article or revising it critically for important intellectual

content, final approval of the version to be submitted. *Nahari*- The conception and design of the study and analysis and interpretation of data, drafting the article and revising it critically for important intellectual content, final approval of the version to be submitted. *Ibrahim*- The conception and design of the study, drafting the article or revising it critically for important intellectual content, and final approval of the version to be submitted. *Sayed*- drafting the article and revising it critically for important intellectual content, and final approval of the version to be submitted. *El Sayed*- The conception and design of the study and analysis and interpretation of data, drafting the article and revising it critically for important intellectual content.

Limitation

A descriptive cross-sectional design was utilized in this study so that no causal relationships could be drawn; therefore, further longitudinal studies are needed to confirm our findings. Furthermore, the data were collected using a self-administrated online questionnaire, which lead exclusion of illiterate women. So, further study was recommended to be conducted through a structured interview schedule. The current study included married and educated women using nonrandom sample in Najran city of Saudi Arabia, and may not be generalizable to all Saudi women.

Consent for publications

The authors have read and approve the publication of the manuscript in its current form.

Competing interests

No conflict of interest

References

1. Arbyn M, Weiderpass E, Bruni L, de Sanjosé S, Saraiya M, Ferlay J and Bray F. Estimates of incidence and mortality of cervical cancer in 2018: a worldwide analysis. Lancet Glob Health. 2020 Feb; 8(2):e191-e203. Doi: 10.1016/S2214-109X (19)30482-6. Epub 2019 Dec 4. Erratum in: Lancet Glob Health. 2022 Jan; 10(1):e41. PMID: 31812369; PMCID: PMC7025157.
2. Bruni L, Albero G, Serrano B, Mena M, Collado JJ, Gómez D, Muñoz J, Bosch FX and de Sanjosé S. ICO/IARC Information Centre on HPV and Cancer (HPV Information Centre). Human Papillomavirus and Related Diseases in Saudi Arabia. Summary Report 22 October 2021. [Date Accessed, May 4, 2022]. Available from URL: https://hpvcentre.net/statistics/reports/SAU.pdf
3. Zhang X, Zeng Q, Cai W and Ruan W. Trends of cervical cancer at global, regional, and national level: data from the Global Burden of Disease study 2019. BMC Public Health. 2021 May 12;21(1):894. doi: 10.1186/s12889-021-10907-5. PMID: 33975583; PMCID: PMC8114503.
4. Lopez MS, Baker ES, Maza M, Fontes-Cintra G, Lopez A, Carvajal JM, Nozar F, Fiol V and Schmeler KM. Cervical cancer prevention and treatment in Latin America. J Surg Oncol. 2017 Apr;115(5):615-618. doi: 10.1002/jso.24544. Epub 2017 Feb 7. PMID: 28168717; PMCID: PMC5990960.
5. Farahat FM, Faqih NT, Alharbi RS, Mudarris RI, Alshaikh SA and Al-Jifree HM. Epidemiological characteristics of cervical cancer in a tertiary care hospital, western Saudi Arabia: A retrospective record-based analysis from 2002-2018. Saudi Med J. 2021 Mar;42(3):338-341. doi: 10.15537/smj.2021.42.3.20200603. PMID: 33632914; PMCID: PMC7989268.
6. Manji M. Cervical cancer screening program in Saudi Arabia: action is overdue. Ann Saudi Med. 2000 Sep-Nov;20(5-6):355-7. doi: 10.5144/0256-4947.2000.355. PMID: 17264620.
7. Alhamlan F, Obeid D, Khayat H, Asma T, Al-Badawi IA, Almutairi A, Almatrrouk S, Fageeh M, Bakhrbh M, Nassar M and Al-Ahdal M. Prognostic impact of human papillomavirus infection on cervical dysplasia, cancer, and patient survival in Saudi Arabia: A 10-year retrospective analysis. Ann Saudi Med. 2021 Nov-Dec;41(6):350-360. doi: 10.5144/0256-4947.2021.350. Epub 2021 Dec 2. PMID: 34873934; PMCID: PMC8650596.
8. Zahid HM, Qarah AB, Alharbi AM, Alomar AE and Almubarak SA. Awareness and Practices Related to Cervical Cancer among Females in Saudi Arabia. Int J Environ Res Public Health. 2022 Jan 27;19(3):1455. doi: 10.3390/ijerph19031455. PMID: 35162471; PMCID: PMC8835229.
9. Falcaro M, Castañon A, Ndlela B, Checchi M, Soldan K, Lopez-Bernal J, Elliss-Brookes L and Sasieni P. The effects of the national HPV vaccination programme in England, UK, on cervical cancer and grade 3 cervical intraepithelial neoplasia incidence: a register-based observational study. Lancet. 2021 Dec 4;398(10316):2084-2092. doi: 10.1016/S0140-6736(21)02178-4. Epub 2021 Nov 3. PMID: 34741816.

10. Jansen EEL, Zielonke N, Gini A, Anttila A, Segnan N, Vokó Z, Ivanuš U, McKee M, de Koning HJ and de Kok IMCM; EU-TOPIA consortium. Effect of organised cervical cancer screening on cervical cancer mortality in Europe: a systematic review. Eur J Cancer. 2020 Mar; 127:207-223. doi: 10.1016/j.ejca.2019.12.013. Epub 2020 Jan 21. PMID: 31980322.
11. Chan DN and So WK. A systematic review of randomised controlled trials examining the effectiveness of breast and cervical cancer screening interventions for ethnic minority women. Eur J Oncol Nurs. 2015 Oct;19(5):536-53. doi: 10.1016/j.ejon.2015.02.015. Epub 2015 Apr 1. PMID: 25840817.
12. Shekhar S, Sharma C, Thakur S and Raina N. Cervical cancer screening: knowledge, attitude and practices among nursing staff in a tertiary level teaching institution of rural India. Asian Pac J Cancer Prev. 2013;14(6):3641-5. doi: 10.7314/apjcp.2013.14.6.3641. PMID: 23886159.
13. Yahya A and Mande AT. Qualitative Assessment of Cervical Cancer Awareness among Primary Health-Care Providers in Zaria, Nigeria. Niger Med J. 2018 Sep-Oct;59(5):50-54. doi: 10.4103/nmj.NMJ_157_18. PMID: 31293288; PMCID: PMC6593897.
14. Jradi H and Bawazir A. Knowledge, attitudes, and practices among Saudi women regarding cervical cancer, human papillomavirus (HPV) and corresponding vaccine. Vaccine. 2019 Jan 14;37(3):530-537. doi: 10.1016/j.vaccine.2018.11.065. Epub 2018 Nov 28. PMID: 30503079.
15. General Authority for Statistics. Demography Survey 2016. Available online at https://www.stats.gov.sa
16. Wakwoya EB, Gemechu KS and Dasa TT. Knowledge of Cervical Cancer and Associated Factors Among Women Attending Public Health Facilities in Eastern Ethiopia. Cancer Manag Res. 2020 Oct 14; 12:10103-10111. doi: 10.2147/CMAR.S262314. PMID: 33116866; PMCID: PMC7569063.
17. Mwaka AD, Orach CG, Were EM, Lyratzopoulos G, Wabinga H and Roland M. Awareness of cervical cancer risk factors and symptoms: cross-sectional community survey in post-conflict northern Uganda. Health Expect. 2016 Aug;19(4):854-67. doi: 10.1111/hex.12382. Epub 2015 Jul 23. PMID: 26205470; PMCID: PMC4957614.
18. Getaneh A, Tegene B and Belachew T. Knowledge, attitude and practices on cervical cancer screening among undergraduate female students in University of Gondar, Northwest Ethiopia: an institution based cross sectional study. BMC Public Health. 2021 Apr 23;21(1):775. doi: 10.1186/s12889-021-10853-2. PMID: 33888094; PMCID: PMC8063279.
19. Salem MR, Amin TT, Alhulaybi AA, Althafar AS and Abdelhai RA. Perceived Risk of Cervical Cancer and Barriers to Screening among Secondary School Female Teachers in Al Hassa, Saudi Arabia. Asian Pac J Cancer Prev. 2017 Apr 1;18(4):969-979. doi: 10.22034/APJCP.2017.18.4.969. PMID: 28545195; PMCID: PMC5494247.
20. Alnafisah RA, Alsuhaibani R, Alharbi MA, Alsohaibani AA and Ismail AA. Saudi Women's Knowledge and Attitude toward Cervical Cancer Screening, Treatment, and Prevention: A Cross-Sectional Study in Qassim Region (2018-2019). Asian Pac J Cancer Prev. 2019 Oct 1;20(10):2965-2969. doi: 10.31557/APJCP.2019.20.10.2965. PMID: 31653142; PMCID: PMC6982676.
21. Akkour K, Alghuson L, Benabdelkamel H, Alhalal H, Alayed N, AlQarni A and Arafah M. Cervical Cancer and Human Papillomavirus Awareness among Women in Saudi Arabia. Medicina (Kaunas). 2021 Dec 17;57(12):1373. doi: 10.3390/medicina57121373. PMID: 34946318; PMCID: PMC8707990.
22. Almazrou S, Saddik B and Jradi H. Knowledge, attitudes, and practices of Saudi physicians regarding cervical cancer and the human papilloma virus vaccine. J Infect Public Health. 2020 Apr;13(4):584-590. doi: 10.1016/j.jiph.2019.09.002. Epub 2019 Sep 27. PMID: 31570271.
23. Al Khudairi H, Abu-Zaid A, Alomar O and Salem H. Public Awareness and Knowledge of Pap Smear as a Screening Test for Cervical Cancer among Saudi Population in Riyadh City. Cureus. 2017 Jan 17;9(1):e984. doi: 10.7759/cureus.984. PMID: 28286720; PMCID: PMC5318149.
24. Almehmadi MM, Salih MM and Al-Hazmi AS. Awareness of human papillomavirus infection complications, cervical cancer, and vaccine among the Saudi population. A cross-sectional survey. Saudi Med J. 2019 Jun;40(6):555-559. doi: 10.15537/smj.2019.6.24208. PMID: 31219489; PMCID: PMC6778758.
25. Aldohaian AI, Alshammari SA and Arafah DM. Using the health belief model to assess beliefs and behaviors regarding cervical cancer screening among Saudi women: a cross-sectional observational study. BMC Women's Health. 2019 Jan 8;19(1):6. doi: 10.1186/s12905-018-0701-2. PMID: 30621680; PMCID: PMC6323726.
26. Gamaoun R. Knowledge, awareness and acceptability of anti-HPV vaccine in the Arab states of the Middle East and North Africa Region: a systematic review. East Mediterr Health J. 2018 Jul 29;24(6):538-548. doi: 10.26719/2018.24.6.538. PMID: 30079949.
27. Chali K, Oljira D, Sileshi T and Mekonnen T. Knowledge on cervical cancer, attitude toward its screening, and associated factors among reproductive age women in Metu Town, Ilu Aba Bor, South West Ethiopia, 2018: community-based cross-sectional study. Cancer Rep (Hoboken). 2021 Oct; 4(5):e1382. doi: 10.1002/cnr2.1382. Epub 2021 May 2. PMID: 33934571; PMCID: PMC8552000.
28. Getahun F, Mazengia F, Abuhay M and Birhanu Z. Comprehensive knowledge about cervical cancer is low among women in Northwest Ethiopia. BMC

Cancer. 2013 Jan 2; 13:2. doi: 10.1186/1471-2407-13-2. PMID: 23282173; PMCID: PMC3559275.

29. Mukama T, Ndejjo R, Musabyimana A, Halage AA and Musoke D. Women's knowledge and attitudes towards cervical cancer prevention: a cross sectional study in Eastern Uganda. BMC Women's Health. 2017 Jan 31;17(1):9. doi: 10.1186/s12905-017-0365-3. PMID: 28137260; PMCID: PMC5282746.
30. Aweke YH, Ayanto SY and Ersado TL. Knowledge, attitude and practice for cervical cancer prevention and control among women of childbearing age in Hossana Town, Hadiya zone, Southern Ethiopia: Community-based cross-sectional study. PLoS One. 2017 Jul 25; 12(7):e0181415. doi: 10.1371/journal.pone.0181415. PMID: 28742851; PMCID: PMC5526548.
31. Tafere Y, Jemere T, Desalegn T and Melak A. Women's knowledge and attitude towards cervical cancer preventive measures and associated factors In South Gondar Zone, Amhara Region, North Central Ethiopia: a cross-sectional study. Arch Public Health. 2021 Jul 23;79(1):136. doi: 10.1186/s13690-021-00659-4. PMID: 34301336; PMCID: PMC8299606.
32. Javaeed A, Shoukat S, Hina S, Hameed Z, Ghauri SK and Ahmed MM. Knowledge, Attitude, and Practices Related to Cervical Cancer Among Adult Women in Azad Kashmir: A Hospital-based Cross-sectional Study. Cureus. 2019 Mar 11;11(3):e4234. doi: 10.7759/cureus.4234. PMID: 31123656; PMCID: PMC6510573.
33. Weng Q, Jiang J, Haji FM, Nondo LH and Zhou H. Women's knowledge of and attitudes toward cervical cancer and cervical cancer screening in Zanzibar, Tanzania: a cross-sectional study. BMC Cancer. 2020 Jan 28;20(1):63. doi: 10.1186/s12885-020-6528-x. PMID: 31992250; PMCID: PMC6988189.
34. Ruddies F, Gizaw M, Teka B, Thies S, Wienke A, Kaufmann AM, Abebe T, Addissie A and Kantelhardt EJ. Cervical cancer screening in rural Ethiopia: a cross- sectional knowledge, attitude and practice study. BMC Cancer. 2020 Jun 17;20(1):563. doi: 10.1186/s12885-020-07060-4. PMID: 32552740; PMCID: PMC7298871.
35. Mabelele MM, Materu J, Ng'ida FD and Mahande MJ. Knowledge towards cervical cancer prevention and screening practices among women who attended reproductive and child health clinic at Magu district hospital, Lake Zone Tanzania: a cross-sectional study. BMC Cancer. 2018 May 16;18(1):565. doi: 10.1186/s12885-018-4490-7. PMID: 29769124; PMCID: PMC5956852.
36. Low EL, Simon AE, Lyons J, Romney-Alexander D and Waller J. What do British women know about cervical cancer symptoms and risk factors? Eur J Cancer. 2012 Nov;48(16):3001-8. doi: 10.1016/j.ejca.2012.05.004. Epub 2012 Jun 7. PMID: 22683170.
37. Tekle T, Wolka E, Nega B, Kumma WP and Koyira MM. Knowledge, Attitude and Practice Towards Cervical Cancer Screening Among Women and Associated Factors in Hospitals of Wolaita Zone, Southern Ethiopia. Cancer Manag Res. 2020 Feb 11;12:993-1005. doi: 10.2147/CMAR.S240364. PMID: 32104081; PMCID: PMC7023884.
38. Heena H, Durrani S, AlFayyad I, Riaz M, Tabasim R, Parvez G and Abu-Shaheen A. Knowledge, Attitudes, and Practices towards Cervical Cancer and Screening amongst Female Healthcare Professionals: A Cross-Sectional Study. J Oncol. 2019 Oct 17; 2019:5423130. doi: 10.1155/2019/5423130. PMID: 31772579; PMCID: PMC6854973.