

Women Perception About Cervical Cancer and its Prevention in Qassim Region, Saudi Arabia: A Cross-Sectional Study

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ABSTRACT

Background: Knowledge about cervical cancer (CC) is a major determinant of women's practice and attitudes to do Pap tests. Yet, little is known about such a topic in Saudi Arabia.

Objectives: To assess the knowledge, attitudes and practice of Saudi women towards CC and its screening/preventive approaches.

Methods: A cross-sectional study was held at 5 public places selected randomly in Alrass city, Qassim Province, Saudi Arabia. Eligible females were asked to respond to a 34-item questionnaire regarding their knowledge about CC, disease risk factors and treatment, screening and prevention approaches, as well as their attitudes and practice towards Pap testing and receiving the HPV vaccination and providing it to their daughters. Data were analyzed by SPSS. The odds ratio (OR) of the logistic regression analysis was used to express the predictors of good knowledge.

Results: Responses were obtained from 396 females, the mean age \pm standard deviation of participants was 35.45 ± 11.01 . Only 23.0% of the participants had heard about CC, 18.4% about the Pap smear test, and 19.7% about the HPV vaccine. Knowledge about CC risk factors was predicted by Nulliparity (OR=3.15, P=0.030). Factors such as nulliparity (OR=4.93, P<0.0001), giving 1-3 births (OR = 2.60, P=0.013), and being employed (OR = 3.73, P<0.0001) or retired (OR = 5.36, P=0.002) had an effect on the prediction of the knowledge about CC screening and prevention. The

importance of Pap smear was appreciated by 92.2%; however, only 14.9% of subjects had undergone the Pap test. No significant predictors were identified for participants' attitudes towards HPV vaccination.

Conclusion: We found a poor knowledge about CC and poor practice of Pap testing although the majority of women had a positive attitude towards CC screening and prevention. Health education and national awareness programs are highly required to improve women's knowledge and practice.

Keywords: Cervical Cancer; Pap Smear; HPV Vaccination; Women; Saudi Arabia.

Abbreviations:

CC: Cervical Cancer; **Pap:** Papanicolaou; **HPV:** Human Papilloma Virus.


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INTRODUCTION

Notwithstanding the wide scale adoption of cytology-based screening tests of cervical cancer (CC) after the first introduction of the Pap test in the 1940s,¹ the disease remains a leading cause of female malignancy incidence and mortality worldwide. More than 570,000 confirmed cases and 311,000 deaths attributable to CC have been reported in 2018, and the disease was ranked fourth among the most common malignancies after cancers of the breast, colon and lungs.² The annual age-standardized incidence rate of CC was 15 per 100,000 women worldwide, and it is higher than that reported regionally in Western Asian countries, such as Saudi Arabia (<5 per 100,000 women).² The fact that the majority of CC cases are triggered by a persistent infection with high-risk human papillomavirus (HPV) types has paved the way for the

implementation of effective primary prevention efforts via prophylactic HPV vaccination.³ Besides, secondary prevention, primarily via Pap smear screening, has permitted the identification of curable cervical intraepithelial neoplasia (CIN) that can be progressively managed.⁴

According to the United States Preventive Services Task Force (USPSTF), women aging 21-65 years old are recommended to have a CC screening every 3-5 years depending on the age and the detection method used.⁵ Compared to opportunistic screening, it has been shown that only organized mass screening of women at risk can be an effective intervention to reduce the incidence, morbidity and mortality of CC.^{6,7} Nevertheless, there is no routine screening programs for CC in Saudi Arabia so far. Therefore,

despite the low incidence of CC, it has been reported that 40% of patients in Saudi Arabia present at advanced stages with poor prognosis.⁸ The research panel of the Guidelines on Cervical Cancer for Health Workers in Saudi Arabia⁹ has emphasized the need to promote women's awareness regarding the preventive approaches to CC by avoiding disease risk factors.⁸ However, low levels of awareness and knowledge regarding CC and its prevention might represent a major hurdle even for opportunistic screening and Pap test uptake. In light of the limited evidence regarding CC knowledge and attitudes in Qassim region, Saudi Arabia, we aimed to investigate the awareness and knowledge of Saudi women about CC and its screening. Additionally, we sought to investigate the attitudes and practice towards the current screening and preventive approaches in the Kingdom.

MATERIALS AND METHODS

Study Design and Eligibility Criteria

A cross-sectional study was carried out in 5 public places selected randomly in Alrass city, Qassim Province, Saudi Arabia. The study procedures were performed during the period between October 2019 and April 2021. Eligible participants included females aged 21-65 years with any educational level, and voluntarily agreed to participate in the study. Females with a mental illness or those speaking a language other than English, or Arabic were excluded.

Survey Instrument

The study tool was developed based on a review of relevant studies in the literature.^{10,11} The survey consisted of 34 items under five domains. These included: 1) Demographic and reproductive characteristics (8 items), including age, educational level, employment status, marital status, etc.; 2) knowledge regarding CC and its risk factors and management (4 items); 3) knowledge regarding CC screening and prevention (16 items); 4) attitudes and barriers towards cervical cancer and its screening/prevention (5 items); 5) practice towards the Pap smear (undergoing a Pap smear ever). The questionnaire items were uploaded on an online survey administration software (Google Forms). Participants providing negative responses to one of the knowledge domains were informed that they would skip the subsequent items under the same domain. For instance, participants who answered "No" to the knowledge regarding CC were not eligible to answer questions about the risk factors and management of the disease. These skip pattern questions included "Have you ever heard of the cancer of the cervix before?" and "Have you ever heard about the Pap smear?".

Study Definitions

In the present study, participants' knowledge was defined as the awareness of females regarding the topic under investigation. Knowledgeable subjects were those who provided self-reported positive responses regarding their awareness. Attitude was referred to as the way of thinking and self-perceptions regarding CC screening and prevention. Practice was assessed by asking the participants about undergoing a Pap smear test.¹²

Sampling and Sample Size Calculation

A convenient, non-probability sampling technique was employed for participants' recruitment in each of the public places. At the time of conducting the study, it has been estimated that the number of females in Alrass city was 48821, with approximately 59.4% aged 21-65 years.¹³ Therefore, about 29,000 females constituted the target population. Participants' optimal knowledge

regarding CC had been estimated at 50% with an absolute precision of $\pm 5\%$, a design effect (DEFF) of 1, and a 95% confidence interval. Accordingly, using the OpenEpi electronic software,¹⁴ the required sample size was estimated at 380 subjects. Considering a 5% nonresponse rate, the target sample size was 400 females.

Study Procedure

A special booth was designed and developed for the purpose of the study, where the participants were invited to fill out the questionnaire by our trained data collectors. The booth located in each public place contained an advertising poster depicting the objectives of the study. Data was collected directly by eligible participants on a dedicated mobile phone or by a dedicated data collector who recorded participants' responses on the online form during the interview. Subjects had been allowed to participate until the sample size was reached.

Ethical Considerations and Quality Control Measures

Ethical approval to the study conduct was obtained from the national Research Ethics Committee (REC) in Qassim. All included subjects have voluntarily agreed to participate after discussing the study objectives with them. The completed questionnaires were checked on a daily basis for their consistency and completeness by members of the study team. Participants' data was kept confidential, and it was exclusively employed for the purposes of the study.

Statistical Analysis

Qualitative variables were expressed as frequencies and percentages, whereas quantitative variables were presented as means \pm standard deviations (SDs). To get deep insights into participants' knowledge, we computed raw knowledge scores by summing up the correct responses for items related to CC risk factors (the score ranged between 0 and 6), CC prevention and treatment (score 0-2) and Pap smear testing (score 0-14). Subsequently, those raw scores were converted to percentage scores to be easily interpreted. A Chi-square test was applied to assess the univariate associations between the relevant primary outcomes (participants' knowledge and Pap test performance) and the demographic and reproductive characteristics of the participants. Binary logistic regression models were developed to assess the independent predictors of knowledge and practice. More specifically, the variables of knowledge and practice were entered as dependent variables (in separate models) and the significantly associated demographic/reproductive characteristics (as revealed by the univariate analysis) were used as independent variables. We employed the "enter" method in regression models, and the results were expressed as odds ratios (ORs) and their respective 95% CIs. A P value of < 0.05 was considered significant statistically.

RESULTS

Demographic and Reproductive Characteristics of the Participants

In general, 400 eligible women were invited. of them, 396 women agreed to participate (a response rate of 99%). The mean \pm standard deviation of participants was 35.45 ± 11.01 , and half of the respondents aged 21-34 years. The majority of respondents had attained a university degree or higher (84.1%), had given birth at least once (61.6%), and had no previous miscarriages (69.9%). A family history of cervical cancer was present among 2.8% of

participants. Other demographic and reproductive characteristics are listed in Table 1.

Knowledge Regarding Cervical Cancer

Of all the participants, 91 women (23.0%) indicated that they had a previous knowledge about CC. The mean ± SD percentage scores of participants' knowledge about were 39.01 ± 17.43 for CC risk factors and 88.46 ± 21.18 for CC treatment and prognosis. The most perceived risk factors for CC were sexual

relationships (86.8%), followed by sexual perversion (58.2%) and being married to someone with multiple wives/sexual partners (46.2%). In contrast, small proportions of participants have identified diet, marriage at young age, and smoking as risk factors for CC (4.4%, 14.3%, and 24.2%, respectively, Figure 1). The majority of participating women have acknowledged the role of early diagnosis for a good prognosis (98.9%) and that CC treatment is possible (78.0%).

Table 1: Demographic & reproductive characteristics of the participants, (n=396)

Category	Parameter	Number	Percentage
Age	21-34 y	198	50.0
	35-44 y	109	27.5
	45-54 y	64	16.2
	55-65 y	25	6.3
Education	Illiterate	1	0.3
	Preparatory	6	1.5
	Secondary	56	14.1
	University or equivalent	333	84.1
Employment status	Employed	192	48.5
	Unemployed	165	41.7
	Retired	39	9.8
Marital status	Single	130	32.8
	Married	246	62.1
	Divorced	18	4.5
	Widowed	2	0.5
Husband's educational level*	Primary	11	2.8
	Preparatory	16	4.0
	Secondary	74	18.7
	University or equivalent	163	41.2
Parity	0	152	38.4
	1-3	116	29.3
	≥ 4	128	32.3
Number of previous miscarriages	0	277	69.9
	1	59	14.9
	2	34	8.6
	≥ 3	26	6.6
Family history of cervical cancer	No	317	80.1
	Yes	11	2.8

*Data was available for 264 responses.

Figure 1: The distribution of participants' responses regarding their knowledge levels about the risk factors of cervical cancer (n=91).

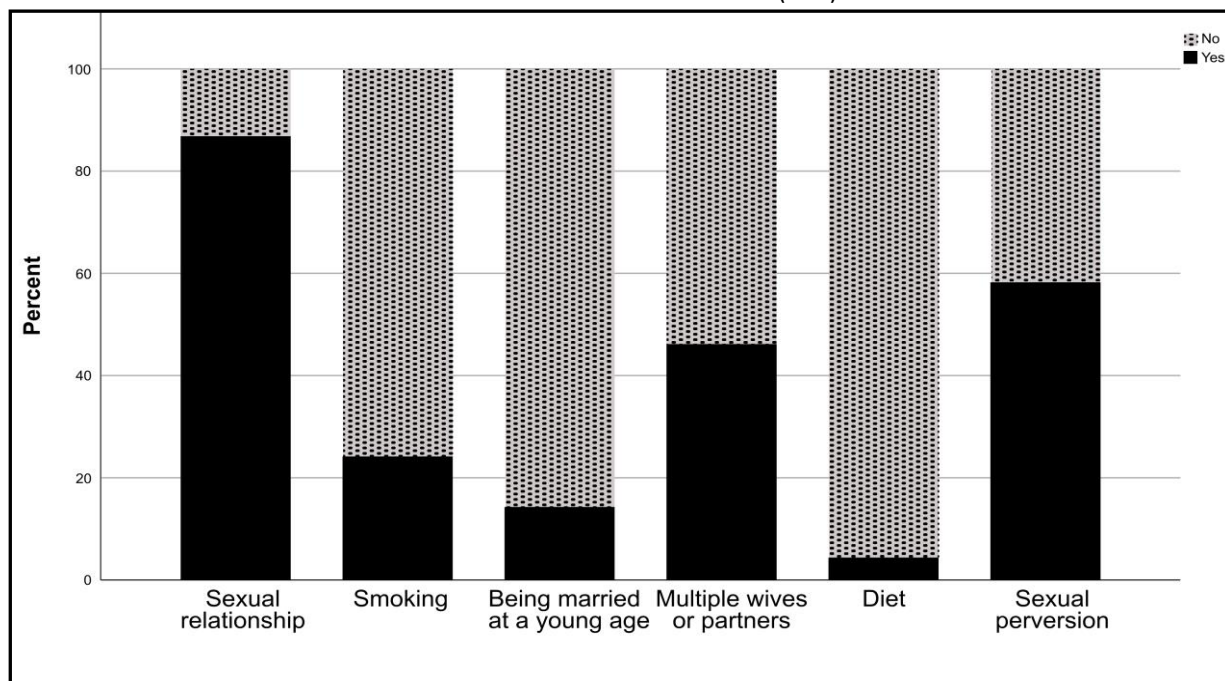


Figure 2: the distribution of participants' responses regarding their knowledge levels about the Pap test (n=73).

* An asterisk indicates that the correct response is "no".

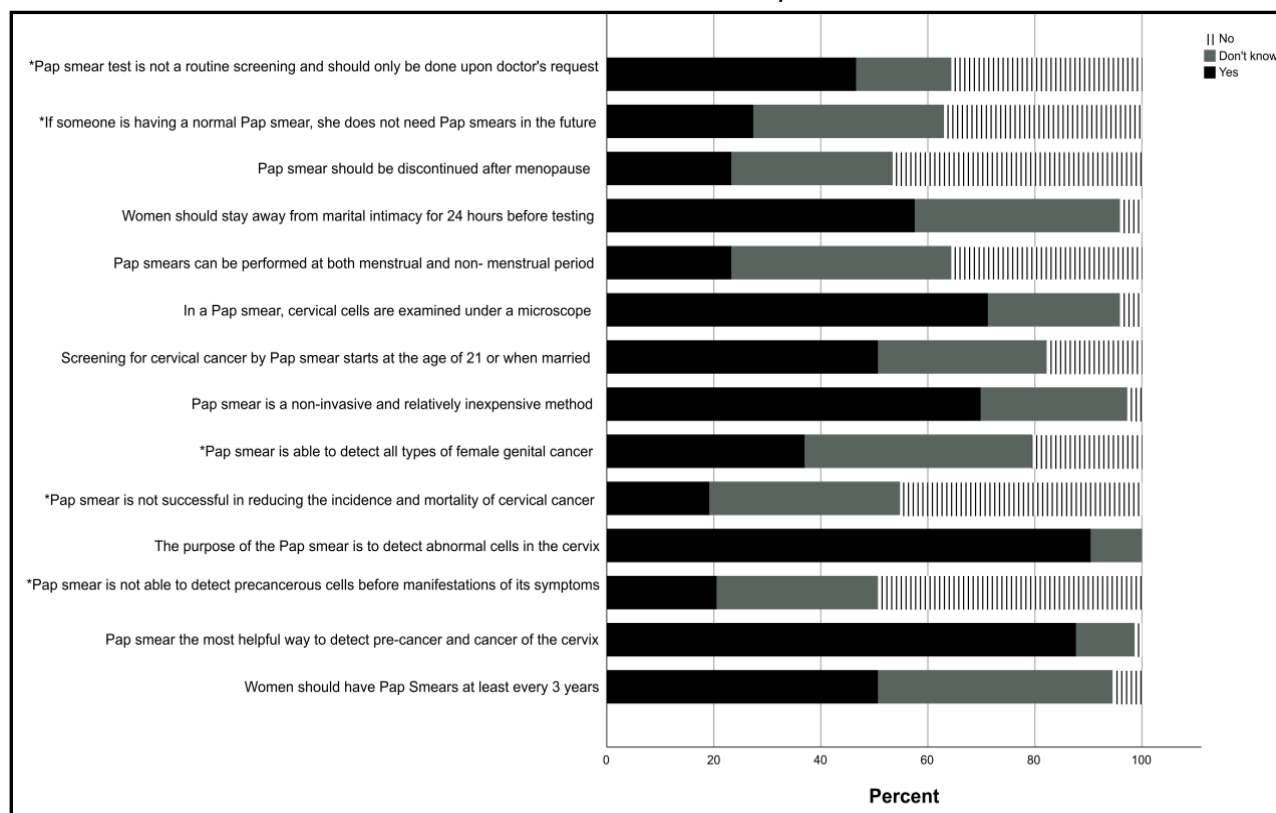


Table 2: The correlation between personal characteristics and knowledge about cervical cancer and its preventive approaches.

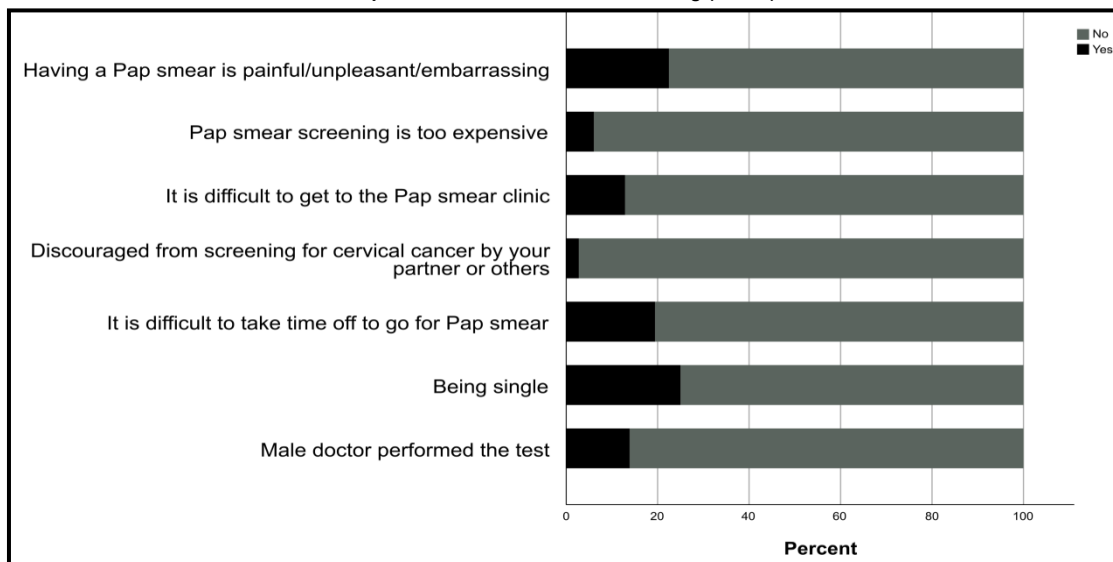
Parameter	Category	Knowledge about cervical cancer			Knowledge about Pap smear			Knowledge about HPV vaccine		
		No	Yes	p	No	Yes	p	No	Yes	p
Age	21-34 y	145 (73.23)	53 (26.77)	0.153	159 (80.3)	39 (19.7)	0.733	145 (73.23)	53 (26.77)	0.002
	35-44 y	84 (77.06)	25 (22.94)		88 (80.73)	21 (19.27)		91 (83.49)	18 (16.51)	
	45-54 y	54 (84.38)	10 (15.63)		54 (84.38)	10 (15.63)		60 (93.75)	4 (6.25)	
	55-65 y	22 (88)	3 (12)		22 (88)	3 (12)		22 (88)	3 (12)	
Educational level	Illiterate	1 (100)	0 (0)	0.909	1 (100)	0 (0)	0.968	1 (100)	0 (0)	0.540
	Preparatory	5 (83.33)	1 (16.67)		5 (83.33)	1 (16.67)		6 (100)	0 (0)	
	Secondary	44 (78.57)	12 (21.43)		46 (82.14)	10 (17.86)		43 (76.79)	13 (23.21)	
	University or equivalent	255 (76.58)	78 (23.42)		271 (81.38)	62 (18.62)		268 (80.48)	65 (19.52)	
Employment status	Unemployed	135 (81.82)	30 (18.18)	0.100	145 (87.88)	20 (12.12)	0.021	130 (78.79)	35 (21.21)	0.018
	Employed	139 (72.4)	53 (27.6)		147 (76.56)	45 (23.44)		150 (78.13)	42 (21.88)	
	Retired	31 (79.49)	8 (20.51)		31 (79.49)	8 (20.51)		38 (97.44)	1 (2.56)	
Marital status	Never married	91 (70.0)	39 (30.0)	0.049	103 (79.23)	27 (20.77)	0.226	95 (73.08)	35 (26.92)	0.019
	Married	200 (81.3)	46 (18.7)		206 (83.74)	40 (16.26)		203 (82.52)	43 (17.48)	
	Divorced	12 (66.67)	6 (33.33)		12 (66.67)	6 (33.33)		18 (100)	0 (0)	
	Widowed	2 (100)	0 (0)		2 (100)	0 (0)		2 (100)	0 (0)	
Husband's educational level	Primary	7 (63.64)	4 (36.36)	0.042	8 (72.73)	3 (27.27)	0.104	10 (90.91)	1 (9.09)	0.565
	Preparatory	11 (68.75)	5 (31.25)		12 (75)	4 (25)		15 (93.75)	1 (6.25)	
	Secondary	54 (72.97)	20 (27.03)		56 (75.68)	18 (24.32)		61 (82.43)	13 (17.57)	
	University or equivalent	139 (85.28)	24 (14.72)		142 (87.12)	21 (12.88)		133 (81.6)	30 (18.4)	
Parity	0	105 (69.08)	47 (30.92)	0.006	117 (76.97)	35 (23.03)	0.047	109 (71.71)	43 (28.29)	0.003
	1-3	91 (78.45)	25 (21.55)		93 (80.17)	23 (19.83)		98 (84.48)	18 (15.52)	
	≥ 4	109 (85.16)	19 (14.84)		113 (88.28)	15 (11.72)		111 (86.72)	17 (13.28)	
Number of miscarriages	0	211 (76.17)	66 (23.83)	0.636	229 (82.67)	48 (17.33)	0.509	216 (77.98)	61 (22.02)	0.342
	1	44 (74.58)	15 (25.42)		44 (74.58)	15 (25.42)		50 (84.75)	9 (15.25)	
	2	28 (82.35)	6 (17.65)		28 (82.35)	6 (17.65)		30 (88.24)	4 (11.76)	
	≥ 3	22 (84.62)	4 (15.38)		22 (84.62)	4 (15.38)		22 (84.62)	4 (15.38)	
Family history of cervical cancer	No	246 (77.6)	71 (22.4)	0.704	262 (82.65)	55 (17.35)	0.396	260 (82.02)	57 (17.98)	0.022
	Yes	8 (72.73)	3 (27.27)		8 (72.73)	3 (27.27)		6 (54.55)	5 (45.45)	

Table 3: Assessment of independent associations between personal characteristics and knowledge regarding cervical cancer and its preventive methods.

PARAMETER	Category	OR (95%CI)	p
KNOWLEDGE ABOUT CERVICAL CANCER			
Marital status	Never married	Ref	
	Married	1.06 (0.16-6.82)	0.955
	Divorced	3.4 (0.36-31.93)	0.284
	Widowed	NA	NA
Husband's educational level	Primary	Ref	
	Preparatory	1.05 (0.19-5.7)	0.956
	Secondary	0.71 (0.18-2.81)	0.628
	University or equivalent	0.32 (0.08-1.22)	0.094
Parity	0	3.15 (1.12-8.84)	0.030
	1-3	1.57 (0.79-3.15)	0.201
	≥ 4	Ref	
KNOWLEDGE ABOUT PAP SMEAR			
Employment status	Unemployed	Ref	
	Employed	3.73 (1.96-7.07)	< 0.0001
	Retired	5.36 (1.85-15.53)	0.002
Parity	0	4.93 (2.27-10.74)	< 0.0001
	1-3	2.6 (1.22-5.52)	0.013
	≥ 4	Ref	
KNOWLEDGE ABOUT HPV VACCINE			
Age	21-34 y	2.14 (0.18-25.08)	0.544
	35-44 y	1.09 (0.11-10.51)	0.944
	45-54 y	0.1 (0.01-2.06)	0.135
	55-65 y	Ref	
Employment status	Unemployed	Ref	
	Employed	1.67 (0.86-3.22)	0.128
	Retired	1.02 (0.10-10.53)	0.998
Marital status	Never married	Ref	
	Married	1.55 (0.5-4.83)	0.453
	Divorced	NA	NA
	Widowed	NA	NA
Parity	0	1.78 (0.36-8.88)	0.481
	1-3	0.77 (0.26-2.27)	0.639
	≥ 4	Ref	
Family history of cervical cancer	No	Ref	
	Yes	8.09 (1.78-36.74)	0.007

NA: results are not available due to null cases. Ref: the reference category. CI: confidence interval; OR: odds ratio.

Figure 3: the distribution of participants' responses regarding the perceived barriers to undergo a Pap test for cervical cancer screening (n=396).



Knowledge Regarding CC Screening and Prevention

Regarding CC screening, 73 participants (18.4%) were aware about the Pap test. Based on the correct answers of the participants, the mean percentage knowledge score was 50.88 ± 20.17 . Almost all respondents agreed that the main purpose of the Pap smear is detect abnormal cells in the cervix (90.4%) and that it is the most helpful screening method to detect precancerous lesions and cervical cancer of the cervix (87.7%). However, only 20.5% of participants provided correct responses for the item indicating that the Pap smear can detect all types of female genital cancer, and 23.3% of them stated wrongly that the Pap test should be discontinued after the menopause (Figure 2). As for participants' knowledge about the HPV vaccine, only 19.7% (n = 78) of respondents declared that they had ever heard about the vaccine.

Factors Associated with Knowledge Regarding CC and the Screening/Preventive Methods

Univariate association analysis indicated significant differences in knowledge regarding CC by marital status ($p = 0.049$), husband's educational levels ($p = 0.042$), and parity ($p = 0.006$). Furthermore, knowledge regarding the Pap test was significantly associated with the employment status ($p = 0.021$) and parity ($p = 0.047$), whereas knowledge regarding the HPV vaccine was associated with age ($p = 0.002$), employment status ($p = 0.018$), marital status ($p = 0.019$), parity ($p = 0.003$), and having a family history of CC ($p = 0.022$, Table 2). These significantly associated factors were further entered in logistic regression models to reveal

the independent predictors of participants' knowledge (Table 3). Results revealed that nulliparous women were more likely to be knowledgeable about CC (OR = 3.15, 95%CI, 1.12-8.84, $p = 0.030$). Additionally, knowledge regarding the Pap smear was significantly more likely to exist among women who had never given birth (OR = 4.93, 95%CI, 2.27-10.74, $p < 0.0001$) and those who had given 1-3 births (OR = 2.60, 95%CI, 1.22-5.52, $p = 0.013$), as well as employed (OR = 3.73, 95%CI, 1.96-7.07, $p < 0.0001$) and retired women (OR = 5.36, 95%CI, 1.85-15.53, $p = 0.002$). Moreover, having a family history of CC was a significant predictor of knowledge regarding the HPV vaccine (OR = 8.09, 95%CI, 1.78-36.74, $p = 0.007$, Table 3).

Attitudes and Barriers Towards Cervical Cancer and its Screening/Prevention

Almost half of women felt nervous or uncomfortable when talking about cancer (51.8%), and more than three-quarters of them (83.3%) declared that they would be worried upon having early signs of cancer. Besides, a great proportion of the respondents denied that something wrong would be revealed by the Pap smear result (76.0%), and that the result would not be important for future implications (92.2%). Regarding the perceived barriers to CC screening, only 2.8-25% of respondents have reported at least one barrier to having a Pap test. The most frequent reasons for not getting tested included being single (25.0%), self-perceptions of the test being painful or embarrassing (22.5%), and the lack of time to perform the test (19.4%, Figure 3).

Table 4: The correlation between personal characteristics and attitude towards receiving an HPV vaccine for participants and giving it to their daughters in the future.

Parameter	Category	Attitudes towards HPV vaccination				Attitudes towards HPV vaccination for daughters			
		Yes	Not sure	No	p	Yes	Not sure	No	p
Age	21-34 y	104 (52)	74 (45.12)	20 (62.5)	0.064	94 (51.09)	88 (50)	16 (44.44)	0.191
	35-44 y	60 (30)	40 (24.39)	9 (28.13)		51 (27.72)	42 (23.86)	16 (44.44)	
	45-54 y	26 (13)	36 (21.95)	2 (6.25)		29 (15.76)	33 (18.75)	2 (5.56)	
	55-65 y	10 (5)	14 (8.54)	1 (3.13)		10 (5.43)	13 (7.39)	2 (5.56)	
Educational level	Illiterate	1 (0.5)	0 (0)	0 (0)	0.311	1 (0.54)	0 (0)	0 (0)	0.114
	Preparatory	1 (0.5)	5 (3.05)	0 (0)		1 (0.54)	5 (2.84)	0 (0)	
	Secondary	33 (16.5)	19 (11.59)	4 (12.5)		20 (10.87)	27 (15.34)	9 (25)	
	University or equivalent	165 (82.5)	140 (85.37)	28 (87.5)		162 (88.04)	144 (81.82)	27 (75)	
Employment status	Unemployed	84 (42)	64 (39.02)	17 (53.13)	0.067	73 (39.67)	78 (44.32)	14 (38.89)	0.178
	Employed	102 (51)	76 (46.34)	14 (43.75)		97 (52.72)	75 (42.61)	20 (55.56)	
	Retired	14 (7)	24 (14.63)	1 (3.13)		14 (7.61)	23 (13.07)	2 (5.56)	
Marital status	Never married	72 (36)	42 (25.61)	16 (50)	0.046	62 (33.7)	55 (31.25)	13 (36.11)	0.561
	Married	117 (58.5)	114 (69.51)	15 (46.88)		113 (61.41)	113 (64.2)	20 (55.56)	
	Divorced	11 (5.5)	6 (3.66)	1 (3.13)		9 (4.89)	6 (3.41)	3 (8.33)	
	Widowed	0 (0)	2 (1.22)	0 (0)		0 (0)	2 (1.14)	0 (0)	
Husband's educational level	Primary	4 (3.08)	5 (4.17)	2 (14.29)	0.095	3 (2.48)	6 (4.92)	2 (9.52)	0.197
	Preparatory	6 (4.62)	10 (8.33)	0 (0)		7 (5.79)	8 (6.56)	1 (4.76)	
	Secondary	30 (23.08)	39 (32.5)	5 (35.71)		26 (21.49)	41 (33.61)	7 (33.33)	
	University or equivalent	90 (69.23)	66 (55)	7 (50)		85 (70.25)	67 (54.92)	11 (52.38)	
Parity	0	85 (42.5)	51 (31.1)	16 (50)	0.078	74 (40.22)	65 (36.93)	13 (36.11)	0.783
	1-3	55 (27.5)	51 (31.1)	10 (31.25)		48 (26.09)	56 (31.82)	12 (33.33)	
	≥ 4	60 (30)	62 (37.8)	6 (18.75)		62 (33.7)	55 (31.25)	11 (30.56)	
Number of miscarriages	0	142 (71)	108 (65.85)	27 (84.38)	0.484	130 (70.65)	122 (69.32)	25 (69.44)	0.969
	1	27 (13.5)	30 (18.29)	2 (6.25)		28 (15.22)	26 (14.77)	5 (13.89)	
	2	18 (9)	14 (8.54)	2 (6.25)		16 (8.7)	14 (7.95)	4 (11.11)	
	≥ 3	13 (6.5)	12 (7.32)	1 (3.13)		10 (5.43)	14 (7.95)	2 (5.56)	
Family history of cervical cancer	No	157 (96.32)	133 (97.08)	27 (96.43)	0.934	149 (96.13)	140 (97.22)	28 (96.55)	0.871
	Yes	6 (3.68)	4 (2.92)	1 (3.57)		6 (3.87)	4 (2.78)	1 (3.45)	

Table 5: Factors associated with Pap test performance among the participating women.

Parameter	Category	No	Yes	
Age	21-34 y	188 (94.95)	10 (5.05)	<0.0001
	35-44 y	82 (75.23)	27 (24.77)	
	45-54 y	48 (75)	16 (25)	
	55-65 y	19 (76)	6 (24)	
Educational level	Illiterate	1 (100)	0 (0)	0.004
	Preparatory	2 (33.33)	4 (66.67)	
	Secondary	49 (87.5)	7 (12.5)	
	University or equivalent	285 (85.59)	48 (14.41)	
Employment status	Unemployed	147 (89.09)	18 (10.91)	0.022
	Employed	162 (84.38)	30 (15.63)	
	Retired	28 (71.79)	11 (28.21)	
Marital status	Never married	130 (100)	0 (0)	<0.0001
	Married	191 (77.64)	55 (22.36)	
	Divorced	15 (83.33)	3 (16.67)	
	Widowed	1 (50)	1 (50)	
Husband's educational level	Primary	8 (72.73)	3 (27.27)	0.726
	Preparatory	14 (87.5)	2 (12.5)	
	Secondary	59 (79.73)	15 (20.27)	
	University or equivalent	125 (76.69)	38 (23.31)	
Parity	0	150 (98.68)	2 (1.32)	<0.0001
	1-3	91 (78.45)	25 (21.55)	
	≥ 4	96 (75)	32 (25)	
Number of miscarriages	0	248 (89.53)	29 (10.47)	0.0003
	1	47 (79.66)	12 (20.34)	
	2	22 (64.71)	12 (35.29)	
	≥ 3	20 (76.92)	6 (23.08)	
Family history of cervical cancer	No	269 (84.86)	48 (15.14)	0.783
	Yes	9 (81.82)	2 (18.18)	
Knowledge about cervical cancer	No	257 (84.26)	48 (15.74)	0.391
	Yes	80 (87.91)	11 (12.09)	
Knowledge about Pap smear	No	274 (84.83)	49 (15.17)	0.75
	Yes	63 (86.3)	10 (13.7)	
Knowledge about the HPV vaccine	No	272 (85.53)	46 (14.47)	0.625
	Yes	65 (83.33)	13 (16.67)	

Table 6: Assessment of independent associations between personal characteristics and Pap test performance among the respondents.

Parameter	Category	OR (95%CI)	p
Age	21-34 y	Ref	
	35-44 y	2.25 (0.8-6.35)	0.126
	45-54 y	1.58 (0.41-6.11)	0.509
	55-65 y	0.99 (0.16-6.27)	0.992
Education	Illiterate	NA	NA
	Preparatory	4.98 (0.69-35.88)	0.111
	Secondary	0.5 (0.19-1.33)	0.164
	University or equivalent	Ref	
Employment	Unemployed	Ref	
	Employed	0.55 (0.24-1.24)	0.148
	Retired	1.41 (0.39-5.13)	0.599
Marital status	Never married	NA	NA
	Married	0.6 (0.03-12.15)	0.738
	Divorced	0.37 (0.01-9.81)	0.555
	Widowed	Ref	
Parity	0	0.45 (0.08-2.45)	0.357
	1-3	1.09 (0.5-2.42)	0.825
	≥ 4	Ref	
Number of miscarriages	0	Ref	
	1	0.81 (0.36-1.82)	0.615
	2	1.75 (0.69-4.43)	0.241
	≥ 3	1.16 (0.39-3.43)	0.788

NA: results are not available due to null cases. Ref: the reference category. CI: confidence interval; OR: odds ratio.

Concerning the HPV vaccine, approximately half of the respondents were willing to be vaccinated (50.5%) and intended to get their daughters vaccinated (46.5%). A significantly higher proportion of married participants intended to get vaccinated (58.5%) compared to those who never married (36.0%) and divorced women (5.5%, $p = 0.046$, Table 4). However, based on the regression analysis model the marital status was not a significant predictor of women's attitudes towards vaccination.

Practice Towards the Pap Smear and the Associated Factors

A small proportion of the participants (59; 14.9%) were screened for CC by the Pap smear. Multiple demographic and reproductive characteristics were associated with performing the screening test, including age ($p < 0.0001$), educational level ($p = 0.004$), employment status ($p = 0.022$), marital status ($p < 0.0001$), parity ($p < 0.0001$) & number of past miscarriages ($p = 0.0003$). However, based on the regression analysis model, no independent predictors of test performance were identified (Table 5, 6).

DISCUSSION

Awareness and knowledge regarding CC are important aspects of disease prevention since approximately 50-90% of women who experience CC or die due to the disease have never been screened, and a significant proportion of them had no previous knowledge about the Pap smear test.¹⁵ In Saudi Arabia, where there is no dedicated mass screening program for CC, it is necessary to assess women's awareness and knowledge to help in decision making regarding future plans for screening and prevention campaigns. In the present study, small proportions of women in Alrass city had knowledge about CC (23.0%), Pap testing (18.4%), and the HPV vaccine (19.7%). Interestingly, the participating women had favorable attitudes towards CC screening, and approximately one-quarter of participants have reported at least one barrier to get tested. However, less than 15% of them had ever undergone Pap testing.

Notably, participants' knowledge was generally lower than that reported in other studies in the literature. For example, the proportions of aware women about CC were 74.6% in India,¹⁶ 53.3% in Nepal,¹⁷ 52.6% in China,¹⁸ and 63.0% in Korea.¹⁹ Consistent results were also reported among women from similar cultural and religious backgrounds, such as in Kuwait (52.3%),²⁰ and Oman (38.7%).²¹ In Saudi Arabia, Malibari et al.²² investigated CC knowledge among 412 participants, and they found a good level of knowledge about CC (78.6%), a moderate knowledge about Pap smear testing (35.9%), and a low knowledge level about HPV (16.4%). In Qassim, Alnafisah et al.¹¹ have previously revealed relatively high knowledge levels among women from the general population for CC (70.0%), the Pap smear test (52.5%) and the HPV vaccine (68.6%). The low levels of awareness and knowledge in our study may reflect a significant deficiency in information sources that target women in the general public.

Even among aware women, the calculated knowledge scores based on the provided correct answers indicate low to moderate knowledge levels regarding CC risk factors of CC and the Pap smear test (mean percentage scores of 39.01 and 50.88, respectively). Indeed, extramarital sexual relations are prohibited among Muslims, and many aspects of sexual health knowledge are not readily available in Islamic media, particularly for women.²³ This might explain the low knowledge levels in our study, and this was reflected on their screening practices due to modesty and

embarrassment.²⁴ It is therefore imperative to promote women's knowledge in Saudi Arabia, considering the religious and cultural barriers that may impact their awareness, knowledge, and future practices. In our study, women with a low number of previous births (0-3) were more likely to be knowledgeable about CC risk factors and the methods of primary and secondary prevention. It has been previously reported that sexual and reproductive knowledge levels were generally higher among younger women, and this was explained by the more frequent use of social media as a knowledge source among younger women.²⁵ The ease of access to information and the wide availability of social media platforms would act as a significant facilitator of sexual-related health discussions that enrich women's knowledge regarding CC and other sexual disorders. Nevertheless, as indicated in our analysis, the actual practice of Pap testing was not independently associated with age or parity. This might be consistent with participants' hesitance regarding Pap smear testing, particularly those who had never been married. Intriguingly, being single was the most cited barrier to perform the screening test, and this supports test reluctance among nulliparous women.

Collectively, we found that women's awareness, knowledge, and practices regarding CC and its prevention/screening methods were poor in Saudi Arabia. At the national level, despite the lower prevalence rates of CC and the lower rates of abnormal smears than those reported in the Western populations, CC might represent an important threat of women's public health owing to the subsequent morbidity and mortality. Importantly, based on the recently published Guidelines on Cervical Cancer for Health Workers in Saudi Arabia,⁹ CC is not a priority disease for the development of a national prevention plan due to the low incidence of the disease, uncommon routes of transmission, and lack of knowledge about the cost-effectiveness of a dedicated program across the kingdom. Furthermore, national authorities have declared that the effectiveness and the long-lasting benefits of the HPV vaccine remain elusive, especially in the context of the nationally-prevalent HPV types which have the potential of transforming cervical cells.^{9, 26} As such, promoting CC knowledge has been integrated in the national comprehensive plan of the National Program for Cancer Prevention. Our findings would stress the necessity of conducting national dedicated programs to raise women's awareness and knowledge regarding CC via social media channels and awareness campaigns.

STUDY LIMITATIONS

In the present study, we employed a conditional branching technique on response-contingent questions in the knowledge domains. This means that the different items pertinent to knowledge about CC and the Pap test were only answered by those who were aware about the domain under investigation to ensure that the obtained responses were not subject to response bias. However, the small number of responses in such domains might have limited obtaining significant associations between demographic and knowledge variables. Another limitation of the present study was the cross-sectional nature of the questionnaire, which might have limited yielding causal inferences. Moreover, our research study was only limited to mall visitors; thus, the participants might belong to middle and high economic classes. In conclusion, only less than one-quarter of women under study were aware about CC risk factors and management (23.0%),

screening using the Pap smear (18.4%), and prevention using the HPV vaccine (19.7%). Nulliparity was a significant predictor of being aware of CC risk factors and management as well as the awareness about the Pap test, whereas having a family history of CC was independently associated with HPV vaccine awareness. Although participants had positive attitudes towards CC screening, only 14.9% of them had undergone Pap testing. It is necessary to conduct dedicated national programs to promote women's awareness and knowledge to improve the rates of screening and prevention practices, which would ultimately help reduce disease-related morbidity and mortality across the Kingdom.

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