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## Abstract

**Study Objective:** Human papillomavirus (HPV) infection is estimated to play an etiologic role in 99.7% of cervical cancer. Vaccines can prevent up to 70% of the cervical cancer caused by HPV 16 and 18. The present study was designed to define the knowledge of HPV and HPV vaccine acceptability among Moroccan youth.

**Design, Setting, Participants, Interventions, and Main Outcome Measures:** A nationwide anonymous questionnaire with a sample of 688 adolescents (12-17 years) and 356 young adults (18-30 years) was organized, that asked about HPV, origin of cervical cancer, Papanicolaou (Pap) test, and acceptability of HPV vaccine. Data were analyzed using univariate and multivariate logistic regression methods.

**Results:** Overall, a low frequency (213/1044 5 20%) of HPV knowledge was observed among the studied population. A multivariate model analysis showed that age, educational level, and knowledge of the Pap test remained significantly associated factors with HPV knowledge. Additionally, only 27% (282/1044) of participants were willing to accept HPV vaccination. Highest acceptability was observed among young adults compared with adolescents (166/356 5 46.6% vs 116/688 5 16.9%). Sixty-two percent (103/165) of male participants accepted the HPV vaccine compared with only 20.4% (179/879) of female participants. Educational level, type of school, and knowledge of the Pap test were associated factors with HPV vaccine acceptability in a multivariate model analysis.

**Conclusion:** The present study showed a low level of HPV knowledge and HPV vaccine acceptability among Moroccan youth. Promotion of activities and sensitization are required to maximize public awareness in the future. This objective can be achieved with the use of media, active efforts by health care providers, and introduction of sexual education in school programs.

**Key Words:** Human papillomavirus vaccine, Adolescents, Knowledge, Acceptability

## INTRODUCTION

Cervical cancer (CxCa) rates third as the most common cause of cancer among women worldwide. Human papillomavirus (HPV) is estimated to play an etiologic role in 99.7% of CxCa worldwide. More than 70% of these cancers are caused by HPV 16 and HPV 18 genotypes [1].

In Morocco, CxCa is considered a major public health problem and it is the second most common cancer among women after breast cancer with approximately 2258 new cases and 1076 deaths each year [2]. The incidence of CxCa could be much higher than reported, because published data are limited to a number of cases registered in some oncology centers in the absence of a national cancer registry [3]. The initiation of a National Cancer Control Plan was implemented in 2010, to start organized screening programs for CxCa detection [4].

Two prophylactic HPV vaccines, Gardasil (Merck & Co, White House Station, NJ) and Cervarix (GlaxoSmithKline Biologicals, Rixensart, Belgium) were approved in the United States and Europe, respectively, and have been introduced in more than 100 countries worldwide to offer protection against HPV types 16 and 18, which are responsible for most CxCa [2]. The HPV vaccine has been licensed in Morocco since 2008 to reduce the incidence of HPV. The HPV vaccine cost approximately \$147 US (price of 3-dose) constitutes approximately half a month's income for 40% of Moroccan families. In the absence of any state funded vaccination program, it is beyond the means of many people [5].

To date, there is an absence of data regarding the overall awareness of HPV and the acceptance of the HPV vaccine among adolescents and young adults aged 12-30 years in Morocco. Despite the high prevalence of HPV infection among Moroccan women and the availability of a prophylactic HPV vaccine, we expected a low level of HPV awareness and vaccine acceptability among adolescents and young adults because of socioreligious and cultural barriers, and non introduction of the vaccine in the Expanded Program on Immunization. The present study was designed to outline the HPV knowledge level, the acceptance of HPV vaccine, and factors associated with them among adolescents and young adults in Morocco.

## Materials and Methods

**Study Participants:** 1290 unmarried subjects aged 12-30 years selected randomly from schools and work or universities.

**Study Instruments:** Two methods were adopted to collect data : face to face interviews and completion of an electronic version of the questionnaire. Participants were interviewed about their sociodemographic and cultural data. The knowledge and the acceptability of HPV and HPV vaccine was also assessed.

**Statistical Analyses:** The relation between HPV knowledge, acceptability of the HPV vaccine, and the possible associated factors were evaluated. All variables for which a P value of <0.05 was obtained in the univariate analysis were included in the multivariate logistic model.

## Conclusion

Our findings show a low level of HPV knowledge and acceptance of the vaccine among Moroccan youth. There is an urgent need to inform the Moroccan population about HPV risks and the HPV vaccine. Thus, activities to promote vaccine acceptance and awareness of HPV are required and can be achieved using media and introduction of health education in scholarly programs to maximize public awareness of CxCa prevention.

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## Results

**Table 1: Demographic and Cultural Variables among Adolescents and Young Adults**

Variables	Adolescents Effective n P (%)		Young adults Effective n P (%)	
		n	P	n
<b>Gender</b>				
Male	65 (9.4)		100 (28.1)	
Female	623 (90.6)		256 (71.9)	
	16.01		25.39	
<b>School</b>				
Private	30 (4.4)		92 (25.8)	
Public	658 (95.6)		264 (74.2)	
<b>Educational level</b>				
Secondary	542 (78.8)		168 (47.2)	
High school	146 (21.2)		188 (52.8)	
<b>Heard of HPV</b>				
Yes	93 (13.5)		120 (33.7)	
No	595 (86.5)		236 (66.3)	
<b>Origin of cervical cancer</b>				
Yes	88 (12.8)		102 (28.7)	
No	600 (87.2)		254 (71.3)	
<b>HPV infected males and females*</b>				
Yes	58 (62.3)		54 (45)	
No	35 (37.7)		66 (55)	
<b>Heard of Pap test</b>				
Yes	72 (10.5)		74 (20.8)	
No	616 (89.5)		282 (79.2)	
<b>HPV prophylactic vaccine exist*</b>				
Yes	65 (69.9)		80 (66.6)	
No	28 (30.1)		40 (33.4)	
<b>Accepted the vaccination against HPV</b>				
Yes	116 (16.9)		166 (46.6)	
No	572 (83.1)		190 (53.4)	
<b>Parents recommended vaccination against HPV*</b>				
Yes	14 (15.1)		2 (1.6)	
No	79 (84.9)		118 (98.4)	

**Table 2: Positive Answers About HPV Knowledge and Vaccine Acceptability on the Basis of Variables among all Participants**

Variables	Knowledge N %		Acceptability N %	
		N	%	N
<b>Gender</b>				
Male	61 (36.9)		103(62.4)	
Female	152(17.3)		179 (20.4)	
<b>Age</b>				
Adolescent	93(13.5)		116(16.9)	
Young Adult	120(33.7)		166(46.6)	
<b>School</b>				
Private	29(23.7)		56(45.9)	
Public	184(19.9)		226(24.5)	
<b>Educational level</b>				
Secondary	20(2.8)		76(10.7)	
High school	193(57.7)		206(61.7)	
<b>Origin of cervical cancer</b>				
Yes	175(92.1)		120(63.2)	
No	38(4.4)		162(19)	
<b>Heard of Pap test</b>				
Yes	111(76)		100(68.5)	
No	102(11.3)		182(20.3)	
<b>HPV knowledge</b>				
Yes	-		132(62)	
No	-		150(18.1)	

- HPV:Human papillomavirus, Pap: Papanicolaou
- Data are given as n (%).
- The percentage was calculated only for the participants who had knowledge of HPV.

**Table 3: HPV Knowledge among Moroccan Youth (Adolescent & Young Adults; N 5 1044)**

Age	Adolescent	688	65.9	1		1		
Young adults	356	34.1	3.253	2.386-4.435	<0.001	2.073	1.108-3.879	0.023
<b>Gender</b>								
Female	879	84.2	1					
Male	165	15.8	2.805	1.955-4.026	<0.001			
<b>School</b>								
Public	922	88.3	1					
Private	122	11.7	1.251	0.800 -1.956	0.327			
<b>Educational level</b>								
Secondary	910	68	1			1		
High school	334	32	47.223	28.793-77.451	<0.001	21.008	10.262-43.008	<0.001
<b>Origin of cervical cancer</b>								
Yes	190	18.2	250.526	134.829-465.503	<0.001	131.602	64.382-269.007	<0.001
No	854	81.8	1			1		
<b>Heard of Pap test</b>								
Yes	146	14	24.750	16.063-38.133	< 0.001			
No	898	86	1					

**Table 4 HPV Acceptability of Vaccine among Moroccan Youth (Adolescent & Young Adults; N 5 1044)**

Variable	Effective Number %		Univariate analysis OR (95%CI)		p-Value	Multivariate analysis OR (95%CI)		p-Value
		Number	%	OR		(95%CI)	OR	
<b>Age</b>								
Adolescent	688	65.9	1		1			
Young adults	356	34.1	4.308	3.229-5.749	<0.001	1.906	1.321-2.751	0.001
<b>Gender</b>								
Female	879	84.2	1		1			
Male	165	15.8	6.497	4.554-9.268	<0.001	3.092	2.051-4.662	<0.001
<b>School</b>								
Public	922	88.3	1		1			
Private	122	11.7	2.613	1.776 -3.846	<0.001	3.994	2.390-6.675	<0.001
<b>Educational level</b>								
Secondary	910	68	1		1			
High school	334	32	13.426	9.706-18.571	<0.001	9.537	6.141-14.812	<0.001
<b>Origin of cervical cancer</b>								
Yes	190	18.2	7.323	5.208-10.296	<0.001			
No	854	81.8	1					
<b>Heard of Pap test</b>								
Yes	146	14	8.552	5.818-12.571	< 0.001	2.092	1.299-3.368	0.002
No	898	86	1					
<b>Heard of HPV</b>								
Yes	213	20.4	7.399	5.328-10.274	< 0.001			
No	831	79.6	1					