Original Article

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FACTORS ASSOCIATED WITH ADOLESCENT COMPLIANCE WITH HUMAN PAPILLOMAVIRUS VACCINE: A CROSS-SECTIONAL STUDY

Ayla Maria Calixto de Carvalho[1]
Telma Maria Evangelista de Araújo[2]

[1]Fundação Municipal de Saúde, Coordenadoria Regional de Saúde Norte. Teresina, Piauí, Brasil.
[2]Universidade Federal do Piauí, Pós-Graduação de Enfermagem. Teresina, Piauí, Brasil.

ABSTRACT

Objective: to identify the factors associated with adolescent compliance with the human papillomavirus vaccine.
Method: this is a cross-sectional study, developed through a school survey, in Teresina, Piauí, Brazil, whose data collection occurred in 2018. A scale was used to assess decision-making, attitudes, feelings and knowledge about the human papillomavirus, in addition to a questionnaire to collect sociodemographic, economic and vaccination status data. The variables were submitted to the multivariate model of logistic regression to explain factors associated with vaccination adeforemen.
Results: the study sample consisted of 624 adolescents, 15 years old, attending the first year of high school, of which 22.8% received the human papillomavirus vaccine. Being male decreases the chance of complying with the vaccine by 50% (aOR=0.05). Moreover, disagreeing or disagreeing with or disagreeing with parents to make the decision to vaccinate their children also reduced the chances of vaccination by 66% (aOR=0.34), respectively, as well as disagreeing with or disagreeing that men do not take human papillomavirus, minimized the chances of vaccination complying with vaccination by 66% (aOR=0.34), when compared to those who disagreed with this statement.
Conclusion: low adolescent compliance with human papillomavirus vaccine was identified. Adolescents remain susceptible to diseases related to the human papillomavirus. Therefore, vaccination strategies need to be rethought, with the offer of vaccination in schools, mediated by educational campaigns.

DESCRIPTORS: Papillomaviridae. Vaccines. Immunization. Adolescent. Primary nursing. Socioeconomic factors.

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FATORES ASSOCIADOS À ADESÃO DE ADOLESCENTE À VACINA CONTRA PAPILOMAVÍRUS HUMANO: ESTUDO TRANSVERSAL

RESUMO

Objetivo: identificar os fatores associados à adesão de adolescentes à vacina contra o papilomavírus humano.
Método: estudo transversal, desenvolvido por meio de inquérito escolar, em Teresina, Piauí, Brasil, cuja coleta de dados ocorreu em 2018. Utilizou-se de escala para avaliar a tomada de decisão, as atitudes, os sentimentos e o conhecimento sobre o papilomavírus humano, além de questionário para levantar os dados sociodemográficos, econômicos e a situação vacinal. As variáveis foram submetidas ao modelo multivariado de regressão logística para explicar fatores associados à adesão à vacinação.
Resultados: a amostra do estudo se constituiu de 624 adolescentes, de 15 anos de idade, cursando o primeiro ano do ensino médio, dos quais,22,8% receberam a vacina contra o papilomavírus humano. Ser do sexo masculino diminui em 50% a chance de aderir à vacina (ORa =0,05). Além disso, discordar ou não concordar nem discordar que os pais tomem a decisão de vacinar os filhos também reduziu as chances de adesão (ORa=0,15 e 0,34), respectivamente, bem como nem concordar nem discordar que os homens não pegam papilomavírus humano, minimizou as chances de adesão à vacinação em 66% (ORa=0,34), quando comparados aos que discordaram desta afirmativa.
Conclusão: identificou-se baixa adesão dos adolescentes à vacina contra papilomavírus humano. Os adolescentes continuam suscetíveis às doenças relacionadas ao papilomavírus humano. Logo, as estratégias de vacinação necessitam ser repensadas, com oferta da vacinação nas escolas, mediadas por campanhas educativas.

DESCRITORES: Papillomaviridae. Vacinas. Imunização. Adolescente. Enfermagem primária. Fatores socioeconômicos.

FACTORES ASOCIADOS CON LA ADHERENCIA DE LOS ADOLESCENTES A LA VACUNA CONTRA EL VIRUS DEL PAPILOMA HUMANO: UN ESTUDIO TRANSVERSAL

RESUMEN

Objetivo: identificar factores asociados con la adherencia de los adolescentes a la vacuna contra el virus del papiloma humano.
Método: estudio transversal, desarrollado a través de una encuesta escolar, en Teresina, Piauí, Brasil, cuya recolección de datos se realizó en 2018. Se utilizó una escala para evaluar la toma de decisiones, actitudes, sentimientos y conocimientos sobre el virus del papiloma humano, además de un cuestionario para recopilar datos sociodemográficos, económicos y de vacunación. Las variables se sometieron al modelo multivariado de regresión logística para explicar los factores asociados a la adherencia a la vacunación.
Resultados: la muestra del estudio estuvo constituida por 624 adolescentes de 15 años que cursaban el primer año de secundaria, de los cuales el 22,8% recibió la vacuna contra el virus del papiloma humano. Ser hombre disminuye la posibilidad de adherirse a la vacuna en un 50% (ORa = 0.05). Además, estar en desacuerdo o en desacuerdo con que los padres tomen la decisión de vacunar a sus hijos también redujo las posibilidades de adherencia (ORa = 0,15 y 0,34), respectivamente, además de no estar de acuerdo ni en desacuerdo con que los hombres no tomen el virus del papiloma, minimizó las posibilidades de adherencia a la vacunación en un 66% (ORa = 0,34), en comparación con aquellos que no estaban de acuerdo con esta afirmación.
Conclusión: se identificó una baja adherencia de los adolescentes a la vacuna contra el virus del papiloma humano. Los adolescentes siguen siendo susceptibles a enfermedades relacionadas con el virus del papiloma humano. Por tanto, es necesario repensar las estrategias de vacunación, ofreciendo vacunación en las escuelas, mediada por campañas educativas.

DESCRIPTORES: Papillomaviridae. Vacunas. Inmunización. Adolescente. Enfermería primaria. Factores socioeconómicos.

INTRODUCTION

Human Papillomavirus (HPV) comprises 202 different genotypes, five types infect, preferably, the mucosa of the genitals, the upper respiratory tract and the skin. They are recognized as important pathogenic factors of cervical cancer and precancerous lesions. Based on the association of HPV with cancer or the risks of carcinogenesis, they are classified into three groups: high risk, low risk and probable high risk[1].

The prevalence of HPV infection is high, becoming worrisome because it is a virus capable of developing cervical cancer in the third and fourth decade of life, or even earlier. It is among the most frequent sexually transmitted infections among adolescents, associated with the onset of sexual relations before the age of 15, non-use of condoms, inadequate knowledge about sexual health, the history of three or more sexual partners, sexual partners ten years older than them[2].

About 90% of HPV infections are transient and last from one to two years. However, some infections persist and can cause cervical cancer, anogenital warts and precancerous lesions. They are associated with anogenital, vaginal, vulva, anal, penile, oropharynx, mainly tonsillar and tongue-based cancer[3].

HPV infects sexually active men and women throughout life. Several risk factors are associated with this infection, such as number of sexual partners, anal penetration, genital contact, being single, sexual orientation and being a smoker[4].

Thus, the sexual behavior of adolescents and young adults influences HPV infection. The age of 15 to 24 years defines the transition to adulthood, being a moment of exploration, experimentation and instability, in many areas of life, particularly regarding sexuality. Generally, this group engages in early sexual relationships with multiple partners, unprotected sexual relations and casual sex, which favor HPV infection[5].

Cervical cancer is the fourth most common cancer among women and the third leading cause of death from female cancer worldwide. Persistent high-risk HPV infection, especially HPV 16 and 18, is causally associated with more than 70% of cervical cancers, and HPV types 31,33,45,52, and 58 account for 20%[6].

In view of this scenario, the quadrivalent vaccine against HPV 6,11,16, 18 was implemented in Brazil in 2014, with the objective of promoting prevention against this group of viruses and reducing the burden of cervical cancer and other related diseases[7]. It is incorporated into the official calendar of the Brazilian National Immunization Program, offered for girls and adolescents from nine to 14 years, and male adolescents, aged 11 to 14 years, with minimum coverage recommended of 80%[8].

In Brazil, particularly in the city of Teresina, there is a high prevalence for HPV at high risk for the development of cancer, which reinforces the need to introduce vaccination in the younger public, anticipating any increase in HPV prevalence that may occur with the liberalization of social attitudes and the beginning of sexual life[9].

The recommended vaccine for girls and adolescents, before the onset of sexual activity, may decrease the burden of HPV infection. In the US, the vaccine introduced in 2006 decreased the prevalence from 53.6% to 28.4% in women who received at least one dose of the vaccine. And in England, the prevalence of HPV 16 and 18 decreased from 19.1% to 6.5% after the vaccine[10].

Thus, the vaccine offers the benefit of protecting adolescents against cervical cancer, vulva cancer, vagina, penis and oropharynx, associated with persistent infection by oncogenic types of HPV[11]. In this sense, vaccination must be complied with the beginning of vaccination until the scheme is completed[12].

When considering the prevalence of HPV infection, the high incidence of cervical cancer and the challenges of vaccine implantation worldwide, aimed to identify the factors associated with adolescent compliance with the human papillomavirus vaccine.

METHOD

This is a cross-sectional study, developed through a school survey conducted by the STROBE tool.

The study had as a scenario high schools. In Teresina, Piauí, Brazil, there are 204 high schools, of which 37 offer high school in the modality Education of Youth and Adults, eleven are located in the rural area and 156 of regular high school in the urban area.

Urban schools offering regular or full high school were included. Of the 139 existing public schools, 91 met this inclusion criterion. As for private schools, the 65 existing ones met the inclusion criteria. The schools in the rural area were excluded, considering the geographical dispersion of the establishments and the difficulty of access to the villages.

In the definition of the sample of schools, the geographical area was considered, according to the location (north, south, east and southeast), and, from this, the selection was made according to the four areas. Three public and three private schools were randomly selected for each geographical area, making a total of 24 schools.

As for the population, it was defined that it would be represented by students at 15 years of age, since the vaccine is available until the age of 14. Thus, those who, according to the calendar of the Brazilian Ministry of Health, should be vaccinated, consisting of 14,456 15-year-old adolescents of both sexes, enrolled in high school, attending the first year in the 2018 school year, according to data from the register of information provided by the 2017 School Census. In the definition of the sample of students, proportional stratified probabilistic sampling was used.

The sample size was calculated, considering a 95% confidence interval (95% CI), presumed prevalence of the event of 50% (since there are no data in the literature regarding it and this value maximizes the sample), accuracy of 5%, design effect (Deff) of 1.5 and significance level of 5%, in which a minimum sample of 562 adolescents was obtained. A rate of 11% was applied to recompose the sample, assuming that 10% of it would be lost during the research, thus, the final sample size was at least 624 participants. It was adopted as a criterion for the inclusion of students: to be attending school regularly, public or private.

The distribution of the sample in the schools drawn was proportional to the number of students in them. The 624 students were initially divided into two groups: one with students from private schools and the other with students belonging to public schools.

Data collection occurred from October to December 2018, using two instruments: a questionnaire elaborated by the researchers to collect sociodemographic data, sexual orientation and vaccination status. The economic characteristics of adolescents' families were represented by means of an indicator constructed from information on the possession of durable assets in the household, called Asset Indicator (AI)[13].

The second instrument consisted of a version of the HPV Adolescent Vaccine Intervention Questionnaire (HAVIQ), developed and validated in English, in 2012[14], and adapted for Portuguese[15]. The scale covers a structurally coherent set of items about important knowledge about HPV, comprising four measures, with 25 items in total, in four subscales: decision making, attitudes, feelings and knowledge about HPV and vaccine.

The scale reliability is high ($\alpha = 0.838$) as well as its internal consistency for 16 items of the HPV knowledge subset ($\alpha = 0.849$). The subsets of HPV tests and vaccination items showed

reasonable test-retest, reliability (test-retest = 0.62 and 0.69), but moderate internal consistency (α = 0.52 and 0.56).

The scale presents five answers to the subscales: decision – feeling – knowledge: disagree, disagree strongly, neither disagree nor agree, agree and agree fully. The attitude subscale, with a score from 0 to 100, combined in three categories: no (0-30), partly (40-60) and yes (70-100).

In data analysis and treatment, the variables were organized and coded in a dictionary called codebook. This data was then entered in a Microsoft Office Excel for Windows 2010 spreadsheet and, after double typing, exported to the Statistical Package for the Social Sciences (SPSS) program, version 20.00.

AI was calculated by: $AI = \sum_i (1 - fi)bi$, in which: i ranges from 1 to 7 assets; bi is equal to 1 or zero, respectively, in the presence or absence of landline, cell phone, internet, automobile, motorcycle, computer (desktop, netbook, laptop), bathroom with shower[16].

Adolescents were classified into two categories: with greater and lesser possession of assets. It was considered that students with values above the first quintile (0.605) had greater possession of property.

Regarding the vaccination status, it was considered adequate vaccination to receive two doses, respecting the minimum interval of six months between them and proven by presentation of a vaccination card. Thus, the dependent variable was HPV vaccination, considered from the appropriate vaccination situation, with the outcomes yes/no.

The concept that supports compliance, in this study, as the act of initiating vaccination and completing the[12]scheme, will be discussed based on collective health, which includes treatment as "a process that depends on a series of intermediations that involve a person's daily life, the organization of health work processes and accessibility in a broad sense"[16].:1329

In the univariate analysis, absolute and relative frequencies of sociodemographic data, sexual orientation and vaccination situation were calculated. In the bivariate analysis, the association between decision-making, knowledge about the vaccine and about HPV and attitude towards compliance with vaccination, through simple logistic regression, with the use of unadjusted Odds Ratio (OR), was investigated. The variables that obtained $p \leq 0.20$ were submitted to the multivariate logistic regression model, for the production of odds ratio (Adjusted OR), in search of the final explanatory model, to investigate factors associated with HPV vaccine. Statistical significance was set at 5%. The Variance Inflation Factor (IVF) test was used to test the colinearity between the variables. The cut-off point for multilinearity was adopted: IVF ≥ 4. The test showed lack of multilinearity among the independent variables included in the model. The Hosmer-Lemeshow test was performed in the final model, which sets the ideal value for a good logistic regression model at p = 0.150.

Regarding ethical aspects, the research was carried out after approval by the Institutional Review Board (IRB) of *Universidade Federal do Piauí*. The ethical precepts contained in Resolution 466/2012 of the Brazilian National Health Council (*Conselho Nacional de Saúde*) were respected. Using the scale was authorized by the authors who built and validated it. On the first visit to the school, students were invited to participate in the research, those who accepted, received the Informed Consent Form (ICF), asking parents for authorization to participate in the research and the need to present the vaccination card on the day scheduled for applying the instrument. On that date, the ICF was requested with parental authorization, and a Brazilian consent form (TALE) was presented.

RESULTS

The study was conducted with 624 adolescents, aged 15 years, 60.5% (378) female and 39.5% (246) male. With regard to education, they were in the first year of high school and were mostly studying in a public school, 75.6% (472).

Regarding the distribution of adolescents by the presence of assets at home, it was observed that the most frequently found good was a bathroom with shower (98.2%), followed by internet access at home (90.9%), cell phone (90.5%), computer (59.9%), automobile (57.9%), motorcycle (46.5%) and landline (26.4%). The relative frequencies described served as the basis for calculating adolescents' asset indicator (IB), which were classified into two groups, 78.5% (490) with higher possession of assets and 21.5% (134) with less possession.

As for sexual orientation, 554 (88.8%) adolescents declared themselves heterosexual, 46 (7.4%), bisexual and 24 (3.9%), homosexual. Among the 150 (24.0%) with sexual life, the initiation occurred between nine and 15 years of age, with predominance at 14 years (41.4%).

Regarding the vaccination status of adolescents of both sexes, vaccination coverage was 22.8%. Among the adolescents, 4% was 18.7% and among male adolescents (Table 1).

Table 1 – Human Papillomavirus vaccination status among adolescents participating in the study. Teresina, PI, Brazil, 2018. (n=624)

Vaccination status	Public education network			Private education network			Total n (%)
	Ma.† n (%)	Fem.‡ n (%)	Total n (%)	Ma.† n (%)	Fem.‡ n (%)	Total n (%)	
Vaccinated*	20 (3.2)	82 (13.1)	102 (100)	5 (0.8)	35 (5.6)	40 (100)	142 (22.8)
Not vaccinated	165 (26.4)	205 (32.9)	370 (100)	56 (9%)	56 (9.0)	112 (100)	482 (77.2)

*Vaccinated with two doses of HPV vaccine; †Ma. = Male; ‡Female = female.

There was a statistically significant association between HPV vaccine membership and the following decision-making variables: neither agree ing nor disagreeing that parents have decided on vaccination; agree or agree or disagree with the fact that you have not decided on vaccination; not to agree or disagree with the influence of religion (p<0.05) (Table 2).

Table 2 – Association between papillomavirus vaccine membership and decision-making variables and feelings. Teresina, PI, Brazil, 2018. (n†=624)

Decision-making and feelings about the vaccine	HPV vaccine compliance*		Total n(%)	gOR‡ (95% CI) §	p value‖
	Yes	No			
	n(%)	n(%)			
Decision-making					
My parents decided					
Disagree	17(2.7)	54(8.7)	71(11.4)	1.084 (0.604-1.946)	0.604
Neither agree nor disagree	11(1.8)	94(15.1)	105(16.8)	2.917 (1.508-5.642)	0.001
Agree	114(18.3)	334(53.5)	448(71.8)	1	

Table 2 – Cont.

Decision-making and feelings about the vaccine	HPV vaccine compliance*		Total n(%)	gOR‡ (95% CI) §	p value‖
	Yes	No			
	n(%)	n(%)			
I haven't decided on vaccination					
Disagree	67(10.7)	155(24.8)	222(35.6)	1	
Neither agree nor disagree	22(3.5)	106(17.0)	128(20.5)	2.083 (1.212-3.578)	0.008
Agree	53(8.5)	221(35.4)	274(43.9)	1.802 (1.191-2.729)	0.005
I was involved in the decision					
Disagree	42(6.7)	173(27.7)	215(34.5)	1.527 (0.996-2.342)	0.052
Neither agree nor disagree	24(3.8)	104(16.7)	128(20.5)	1.607 (0.959-2.691)	0.072
Agree	76(12.2)	205(32.9)	281(45.0)	1	
Friends influenced me					
Disagree	109(17.5)	323(51.8)	432(69.2)	0.750 (0.443-1.268)	0.283
Neither agree nor disagree	12(1.9)	76(12.2)	88(14.1)	1.602 (0.739-3.476)	0.233
Agree	21(3.4)	83(13.3)	104(16.7)	1	
I made the decision					
Disagree	43(6.9)	125(20.0)	168(26.9)	0.842 (0.545-1.302)	0.283
Neither agree nor disagree	28(4.5)	112(17.9)	140(22.4)	1.159 (0.709-1.894)	0.233
Agree	71(11.4)	245(39.3)	316(50.6)	1	
My religion influenced					
Disagree	134(21.5)	435(69.7)	569(91.2)	1	
Neither agree nor disagree	2(0.3)	37(0.5)	39(6.3)	5.699 (1.356-23.957)	0.018
Agree	6(1.0)	10(1.6)	16(2.6)	0.513 (0.183-1.439)	0.025
I value my health					
Disagree	3(.5)	13(0.2)	16(2.6)	1.338 (0.376-4.765)	0.653
Neither agree nor disagree	5(.8)	35(0.5)	40(6.4)	2.161 (0.83-5.627)	0.114
Agree	134(21.5)	434(69.6)	568(91.0)	1	
I value prevention					
Disagree	2(0.3)	12(0.1)	14(2.2)	1.840 (0.407-8.321)	0.428
Neither agree nor disagree	2(0.3)	20(0.3)	22(3.5)	3.067 (0.708-13.284)	0.134
Agree	138(22.1)	450(72.1)	588(94.2)	1	

Table 2 – Cont.

Decision-making and feelings about the vaccine	HPV vaccine compliance*		Total n(%)	gOR‡ (95% CI) §	p value‖
	Yes	No			
	n(%)	n(%)			
Feelings					
Being pierced by a needle is bothering					
Disagree	197 (74.9)	66 (25.1)	263 (100)	1	
Neither agree nor disagree	92 (76.0)	29 (24.0)	121 (100)	1.06 (0.64-1.75)	0.812
Agree	182 (75.8)	58 (24.2)	240 (100)	1.05 (0.70-1.57)	0.809
I am afraid the vaccine is very painful					
Disagree	203 (79.0)	54 (21.0)	257 (100)		
Neither agree nor disagree	112 (71.8)	44 (28.2)	156 (100)	0.67 (0.42-1.07)	0.097
Agree	156 (73.9)	55 (26.1)	211 (100)	0.75 (0.49-1.15)	0.199
I am not afraid of getting vaccines					
Disagree	151 (76.3)	47 (23.7)	198 (100)	1.07 (0.71-1.62)	0.729
Neither agree nor disagree	69 (75.8)	22 (24.2)	91 (100)	1.05 (0.61-1.80)	0.860
Agree	251 (74.9)	84 (25.1)	335 (100)	1	
Concern with side effects					
Disagree	212 (78.5)	58 (21.5)	270 (100)	1	
Neither agree nor disagree	125 (76.7)	38 (23.3)	163 (100)	0.90 (0.56-1.43)	0.657
Agree	134 (70.2)	57 (29.8)	191 (100)	0.64 (0.42-0.98)	0.052

* HPV = Human Papillomavirus; ‡gOR=Gross Odds Ratio; § 95% CI = 95% Confidence Interval; ‖p value = p≤0.05.

Table 3 found that HPV vaccine compliance among adolescents was negatively associated with knowledge-related variables: neither agree ing nor disagreeing with the purchase of HPV in sexual intercourse (p=0.040) and that HPV causes cervical cancer (p=0.035), reducing the chances of complying by 41.5% and 35.7%, respectively.

The variables related to attitude, statistically associated with HPV vaccine compliance among the adolescents in the study were: confidence in receiving both doses of the vaccine, comfortable talking about the vaccine and knowing what happens when taking the vaccine (p<0.05) (Table 4).

In the multivariate analysis, the sex category remained associated with compliance with the vaccine. Being male decreased the chances of complying with the HPV vaccine by 50% (aOR=0.05). Moreover, disagreeing or neither agreeing nor disagreeing that parents make the decision to vaccinate their children also reduced the chances of compliance (aOR=0.15 and 0.34), respectively, as well as neither agreeing nor disagreeing that men do not take HPV, reduced the chances of compliance with vaccination by 66% (aOR=0.34), when compared to those who disagreed with this statement (Table 5).

Table 3 – Association between human papillomavirus vaccine and knowledge variables about Human Papillomavirus and vaccine. Teresina, PI, Brazil, 2018. (n=624)

Knowledge about the vaccine	Vaccinated against HPV*		Total n (%)	gOR‡(95%CI)§	p value‖
	Yes	No			
	n (%)	n (%)			
Men do not get HPV*					
Disagree	63(10.1)	200(32.1)	263(42.1)	0.857 (0.563-1.3030)	0.470
Neither agree nor disagree	28(4.5)	93(14.9)	121(19.4)	0.896 (0531-1.513)	0.682
Agree	51(8.2)	189(30.3)	240(38.5)	1	
Vaccinated woman needs to do pap smear					
Disagree	65(10.4)	192(30.8)	257(41.2)	0.60 (0.428-1.047)	0.079
Neither agree nor disagree	38(6.1)	118(18.9)	156(25.0)	0.704 (0.425-1.166)	0.173
Agree	39(6.3)	172(27.6)	211(33.8)	1	
HPV* is acquired in sexual intercourse					
Disagree	41(6.6)	157(25.2)	198(31.7)	1.048 (0.681-1.614)	0.830
Neither agree nor disagree	29(4.6)	62(9.9)	91(14.6)	0.585 (0.351-0.977)	0.040
Agree	72(11.5)	263(42.1)	335(53.7)	1	
HPV* is very rare					
Disagree	100(16.0)	299(47.9)	399(63.9)	1	
Neither agree nor disagree	36(5.8)	142(22.8)	178(28.5)	1.319 (0.858-2.028)	0.207
Agree	6(1.0)	41(6.6)	47(7.5)	2.285 (0.942-5.544)	0.068
HPV* causes cervical cancer					
Disagree	18(2.9)	50(8.0)	68(10.9)	0.616 (0.329-1.154)	0.130
Neither agree nor disagree	79(12.7)	229(36.7)	308(49.4)	0.643 (0.426-0.970)	0.035
Agree	45(7.2)	203(32.5)	248(39.7)	1	
The vaccine protects against all types of uterine cancer					
Disagree	32(5.1)	128(20.5)	160(25.6)	1	
Neither agree nor disagree	52(8.3)	172(27.6)	224(35.9)	0.827 (0.503-1.358)	0.453
Agree	58(9.3)	182(29.2)	240(38.5)	0.784 (0.482-1.277)	0.784

*HPV = Human Papillomavirus; ‡gOR=Gross Odds Ratio; §95%CI = 95% Confidence Interval; ‖p value=p≤0.05.

Table 4 – Association between papillomavirus vaccine compliance and attitude variables. Teresina, PI, Brazil, 2018. (n=624)

Attitude	Vaccinated against HPV*		Total n(%)	gOR‡ (95%CI)§	p value‖
	Yes n(%)	No n (%)			
Confident of receiving both doses of vaccine					
No	6(1.0)	58(9.3)	64(10.3)	3.800(1.595-9.052)	0.003
Partly	22(3.5)	134(21.5)	156(25.0)	2.394(1.452-3.949)	0.001
Yes	114(18.3)	290(46.5)	404(64.7)	1	
Comfortable in talking about the vaccine					
No	12(1.9)	90(14.4)	102(16.3)	2.620(1.377-4.984)	0.003
Partly	28(4.5)	100(16.0)	128(20.5)	1.248(0.755-2.008)	0.362
Yes	102(16.3)	292(46.8)	394(63.1)	1	
Free to clarify doubts about the vaccine with nurses					
No	24(3.8)	103(16.5)	127(20.4)	1.303(0.784-2.167)	0.307
Partly	36(5.8)	109(17.5)	145(23.2)	0.920(0.586-1.443)	0.715
Yes	82(13.1)	270(43.3)	352(56.4)	1	
Know what happens when taking the vaccine					
No	16(2.6)	114(18.3)	130(20.8)	2.684(1.499-4.805)	0.001
Partly	45(7.2)	153(24.5)	198(31.7)	1.281(0.842-1.948)	0.247
Yes	81(13.0)	215(34.5)	296(47.4)	1	
Know how to deal with pain when getting the vaccine					
No	17(2.7)	91(14.6)	108(17.3)	1.704(0.961-3.021)	0.068
Partly	40(6.4)	124(19.9)	164(26.3)	0.987(0.641-1.520)	0.952
Yes	85(13,6)	267(42,8)	352(56,4)	1	

*HPV = Human Papillomavirus; ‡gOR=Gross Odds Ratio; §95%CI = 95% Confidence Interval; ‖p value = p≤0.05.

Table 5 – Multiple logistic regression of factors related to human papillomavirus vaccine support among adolescents surveyed. Teresina, PI, Brazil, 2018.

Variables	gOR†(95%CI)‡	p value§	aOR ‖ (95%CI)‡	p value ¶
Sex				
Female	1	<0.001	1	
Male	0.05 (0.03-0.08)	<0.001	0.05 (0.03-0.08)	<0.001
My parents made the decision				
Agree	1		1	
Neither agree nor disagree	0.11 (0.06-0.17)	<0.001	0.15 (0.08-0.27)	<0.001
Disagree	0.36 (0.20-0.63)	<0.001	0.34 (0.17-0.68)	0.003
Men do not get HPV*				
Agree	1.30 (0.67-2.54)	0.429	1.02 (0.44-2.34)	0.954
Neither agree nor disagree	0.49 (0.31-0.76)	0.001	0.34 (0.18-0.63)	0.001
Disagree	1		1	

* HPV = Human Papillomavirus; †gOR=Gross Odds Ratio; ‡95% CI = 95% Confidence Interval; ‖p value = p≤0.05; ‖aOR=Adjusted Odds Ratio; ¶p value = 0.150, considered in the Hosmer and Lemeshow Test.

DISCUSSION

The study made it possible to identify the various factors associated with compliance with HPV vaccination. Vaccination coverage found among adolescents was below the recommended level. Brazil had accumulated coverage in 2017 for girls/adolescents of 82.6%, with the first dose; and 52.8%, with a second dose[11]. Soon, there is a need to improve coverage, so that at least 80% is reached with the second dose, so that in the future, Brazil can reduce cancers associated with HPV.

A study with spatial analysis of vaccine coverage in Brazil identified a drop in the coverage of the second dose of HPV vaccine, and pointed out a relationship with social inequality and the need to organize vaccine delivery strategies in municipalities, because despite the availability in health services, the coverage found is heterogeneous when comparatorism in Brazilian states[17]. In another study, it was found that vaccination coverage is higher among younger target audiences, which also contributes to heterogeneous coverage when assessing by age[18].

In most countries that started vaccination shortly after the vaccine was launched in 2006, studies are being conducted to assess the impact on precursor lesions, recording satisfactory results. In Sweden, which has been offering the vaccine in schools since 2012, vaccine coverage has been around 80% for one dose, which has led to a reduction in HPV infections, cervical intraepithelial neoplasms and genital warts among women[3]. In Australia, the offer of the quadrivalent HPV vaccine has high levels of vaccination coverage, regardless of income level, thus leading to declines in several biological indicators, with a reduction in HPV infection[19].

In Canada, the HPV vaccine has been offered since 2008, in the school environment, with coverage above 90%, and there is growing evidence that immunization against HPV is effective in reducing infections in a few years after the vaccination implementation, thus registering rare HPV infections in those who received at least one dose of vaccine before starting sexual life[20].

Among the sociodemographic variables, it was observed that female adolescents were more likely to be vaccinated. This association is consistent with the literature, women are more inclined to vaccinate against HPV than men. The reason for this can be double, first, cervical cancer is statistically associated with HPV and only women are affected by it; and screening programs tend to reach the female population more[21]. In the USA, women have more knowledge about HPV, are more likely to accept the vaccine when compared to men, although the vaccine has been available to both sexes since 2009. Among the reasons for refusal to receive the vaccine, deficient knowledge, lack of access to health care, medical mistrust and concern for the safety of the vaccine are pointed[22].

Low coverage in men is associated with the fact that the vaccine was implanted with the main objective of preventing cervical cancer, with educational campaigns and broadcast in the media to achieve this purpose. This contributed to feminize the HPV infection and convey the idea that it does not affect men, being poorly recommended by health professionals for male adolescents, inappropriate conduct[23].

Among men, HPV-associated oropharynx cancer is the most frequent. It is estimated that anal cancer, whose occurrence is higher among women in the future, has a higher incidence among men. Therefore, it is pertinent to provide an increase in knowledge about HPV, in order to cover its association with cancer and the HPV vaccine, because the probability of having heard about HPV and the vaccine among men is around 70% less when compared to women[24].

The economic situation in this study did not interfere with the vaccine acceptance. Adolescents were assessed in relation to their economic condition using the asset indicator, which was divided into two groups: those who had greater possession of assets (78.5%) and those who had less (21.5%). In countries that do not have a free vaccination program, the acceptance of HPV vaccination is influenced by the economic situation, families with higher income are more willing to pay for HPV

vaccination. While among the families with lower income, it is observed that acceptance decreases when vaccination is not free[25].

The results related to sexual behavior and age of sexual onset were similar to those reported in the literature[5]. Early sexual initiation is a behavior that facilitates HPV infection, which together with the high prevalence of HPV increases the rates of infection in the pre-vaccination period[19].

The Young Brazilian population experiences a diversity of behaviors that involve other types of sexual intercourse, in addition to vaginal intercourse, similar to the sexual behavior of the adult population in the United States, in which it is observed that one in ten men report sexual intercourse between people of the same sex, similar to the proportion reported by other Latin American countries. It is noteworthy that the age of sexual debut varies between different cultures, Brazilians are involved in the first sexual intercourse at younger ages than people living in Great Britain and other regions. The age of the first sexual intercourse decreased over time in many countries, including Brazil[5].

This change in behavior occurs mediated by social determinants of health, related to the conditions in which people live and work, and for adolescents include material resources (socioeconomic status) and social factors (culture, social network and family). As adolescents change their age, experience new behaviors, define their careers and become independent from their parents, social determinants undergo changes, such as, for example, the influence of peers, which has a higher priority than the family. In this context of changes, interventions directed at adolescents, including the vaccine, need to be aligned and appropriate to this new phase[26].

Parents having been involved in making decisions regarding receiving the vaccine favored adolescents' aide to HPV vaccination. This finding is consistent with literature, which reports the strong impact of peer and parent influences on adolescence, affecting adolescent attitudes towards HPV vaccination. Thus, the promotion of HPV vaccination can target adolescents and their social network[27], as well as parents, combining strategies that promote communication between parents and adolescents about HPV. This could help clarify possible misunderstandings and increase vaccine support[28].

A study on HPV vaccination determinants in Amsterdam identified that mothers' intention to vaccinate their daughters is the strongest predictor of HPV vaccine compliance[29]. Evidence suggests that in the decision-making of mothers/guardians in HPV vaccination, the information mothers receive from doctors and other close people may influence vaccination decisions more than information from official media sources. This is consistent with recent findings that social norms have been the strongest predictors of people's progress toward the decision to obtain the HPV vaccine. These findings are important to more effectively target public health campaigns and vaccine interventions for different ethnic groups[30].

Regarding the knowledge about the vaccine and HPV, it was found, in this study, that adolescents who were not sure about whether men contract HPV, because they neither agreed nor disagreed with the statement, thus presenting a lower chance of being vaccinated. Thus, scientifically correct knowledge could have favored adequate decision-making on compliance with the vaccine, similar to other studies that included the knowledge variable and obtained mixed results that point to positive or negative associations, others in which there was no association, although it is considered adolescents' knowledge about HPV and the vaccine is important[12].

Thus, in order to achieve adequate vaccination coverage, the educational actions and the role of health professionals stand out, among them, nurses, especially those in Primary Health Care, because they work closer to communities, work with attached territories and have a differentiated view on health care, fundamental in this process of health education about HPV.

In this regard, nurses who consider the clients' social context and real needs can intervene and obtain positive results, with adolescents and family members who understand the importance of HPV vaccine so that, in this way, they can modify risk behaviors and comply with vaccination.

Regarding the study limitation, we highlight the absence of presentation of a vaccine card at the time of data collection, which may have underestimated the evaluation of vaccination coverage. Despite this restriction, the study contributes evidence to educational interventions aimed at affecting adolescents' vaccination.

CONCLUSION

This study presents vaccination coverage and factors associated with vaccination against human papillomavirus among adolescents. Low coverage and the following factors positively associated with compliance were identified: being female and parents having been involved in the decision to vaccinate.

Given the low vaccination coverage, adolescents remain susceptible to HPV-related diseases. Therefore, vaccination strategies need to be rethought, with the offer of vaccination in schools, mediated by educational campaigns.

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NOTES

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Data collection: Carvalho AMC.
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Discussion of results: Carvalho AMC, Araújo TME.
Writing and/or critical review of content: Carvalho AMC, Araújo TME.
Final review and approval of the final version: Carvalho AMC, Araújo TME.

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CONFLICT OF INTEREST

There is no conflict of interest.

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CORRESPONDING AUTHOR

Ayla Maria Calixto de Carvalho
aylamariacalixto@gmail.com