

Original Article

Knowledge and Opinions of Healthcare Professionals about the Meningococcus, Rotavirus and Human Papillomavirus Vaccines

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Abstract

Objective: This descriptive cross-sectional study aims to determine the knowledge and opinions of the healthcare professionals (physicians, nurses, midwives, and health officers) working in pediatric-neonatal clinics and intensive care units about meningococemia, rotavirus, and human papillomavirus (HPV) infections/vaccines.

Methodology: The sample of this descriptive cross-sectional study was composed of the healthcare professionals working in pediatric/neonatal clinics of the three university hospitals located in different cities of Turkey. Data were collected with a 33 questions survey prepared by the researchers. The significance was accepted to be at the level of $p < 0.05$.

Results: A total of 222 individuals, including nurses (68.0%), physicians (26.1%), midwives (3.2%), and health officers (2.7%), participated in the study. The mean score of the healthcare professionals' knowledge about invasive meningococcal disease, rotavirus, and HPV vaccines was 16.73 ± 4.93 . When comparing the mean scores in terms of educational status, the mean scores of those having a doctoral degree were statistically significantly higher ($p < 0.05$). 86.5% of the healthcare professionals thought that the rotavirus (86.5%), meningococcal (90.5%), and HPV vaccine (75.2%) should be included in the national vaccination schedule.

Conclusions: Consequently, the healthcare professionals had a lack of knowledge about invasive meningococcal disease, rotavirus, and HPV vaccines, but they believed that these three vaccines should be included in the national vaccination schedule. Health care professionals need to know about vaccination, an essential subject for making the applications correctly and having a word in current improvements.

Keywords; Invasive meningococcal disease, Rotavirus, HPV, Vaccination, Health Professionals, Pediatrics

Introduction

The national vaccination schedule is updated continuously in parallel with the developments in

immunization. The most important factors affecting these updates are the diseases' epidemiology and reliable, practical, accessible,

and economic vaccines (Celep, 2020). The national immunization program is frequently updated in Turkey following the actual data, and its scope is extended gradually (Arisoy et al., 2015). In Turkey's vaccine workshops in 2014, 2016 and 2018, the invasive meningococcal disease, rotavirus, and HPV vaccines have been discussed and recommended to be included in the national vaccination schedule (Republic Of Turkey Ministry Of Health, 2014; Republic Of Turkey Ministry Of Health, 2018).

Rotavirus is a severe viral disease leading to mortality because of diarrhea and dehydration in children under the age of 5 (Burnett et al., 2018; World Health Organization, 2018). According to the World Health Organization (WHO) estimations, in 2013, about 215.000 children under the age of 5 die each year due to vaccine-preventable rotavirus infections (World Health Organization, 2018). WHO has recommended all the countries, mainly those with high mortality rates in children due to diarrhea, to include the rotavirus vaccines in their national vaccine program (World Health Organization, 2018). Although 81 countries included the rotavirus vaccine in their national vaccination programs in 2016, it has not been included in Turkey's national vaccination schedule (Burnett et al., 2016). Invasive meningococcal disease is an invasive disease seen as endemic in Turkey and has a high mortality and morbidity rate in childhood (Arisoy et al., 2015). Even in countries with proper treatment and medical care, 7-19% still die (Ozdemir et al., 2018). Immunity has been provided through vaccination at the rate of 43-57% in infants and over 90% in adolescents and adults (Gülcü & Arslan, 2018). The meningococcal vaccine is also not included in the national vaccine schedule in Turkey. Human Papillomavirus (HPV) is one of the main factors of cervical cancer, which causes high mortality worldwide (Erbaydar et al., 2016). About 90% of cervical cancer deaths have occurred in the low- and middle-income countries (World Health Organization, 2018). Cervical cancer is ranked as the 10th among the cancer types in the women in all age groups in Turkey, and the average age of the women diagnosed with cervical cancer is 48.7 (Republic Of Turkey Ministry Of Health, 2016a). Even though screening programs are prioritized in the early diagnosis of the disease, WHO has recommended HPV vaccination in 2009 to

prevent and protect from the disease (World Health Organization, 2017). This vaccine has been included in the routine vaccination program in 62 countries since October 2015 (Republic Of Turkey Ministry Of Health, 2018). The application rate of the HPV vaccine, which has not been included in the vaccination program by the ministry of health, is less than 1% in Turkey (Oz et al., 2018).

Healthcare professionals are the individuals who will provide the primary protection in these three diseases that may be seen especially in childhood and are known to cause fundamental problems; evaluating the opinions of healthcare professionals about the matter gain significant importance. The importance of the subject is related to our future. The more vaccinated child, the less child mortality and morbidity rates.

This study was planned to determine the healthcare professionals' knowledge about invasive meningococcal disease, rotavirus, HPV infections, and vaccines, which are not included in the national vaccination schedule, and their opinions on adding these vaccines to the national vaccination schedule.

For this purpose, the following research questions were determined:

1. Do healthcare professionals know about invasive meningococcal disease, rotavirus, and HPV diseases?
2. What are their opinions about the inclusion of invasive meningococcal disease, rotavirus, and HPV vaccines in the national vaccination schedule?

Methodology

This descriptive cross-sectional study was conducted to assess healthcare professionals' knowledge about the meningococcal, rotavirus, and HPV vaccines not included in the national vaccination schedule and their opinions on adding these vaccines to the national vaccination schedule.

Design and Setting: This cross-sectional and descriptive study was conducted between July and November 2017 with healthcare professionals working in the pediatric/neonatal services and intensive care units of three university hospitals located in three cities of Turkey (Istanbul, Bursa, and Van). Three

researchers from these cities collected the data simultaneously. Before data collection, researchers studied together on the survey and did not interfere, participants while they completed the study. All participants completed the study individually. It took approximately 30 minutes to complete the survey.

Participants: The study population was composed of the healthcare professionals working in the pediatric/neonatal services and intensive care units of the abovementioned locations. The study sample was composed of 222 healthcare professionals who worked in these hospitals' pediatric/neonatal services and intensive care units between July and November 2017 and agreed to participate in the study.

Data Collection: Data were collected with a survey, including a total of 33 questions. Six questions were for socio-demographic information (age, gender, institution, occupation, educational level, etc.). Twenty-four questions assess participants' knowledge about invasive meningococcal disease, rotavirus, HPV diseases, vaccines, and three questions to determine their opinions on including these vaccines in the national vaccination schedule (Gulcu & Arslan, 2018; Brady, Byington & Davies, 2014; Zafer & Yildiz, 2010). Each correct answer given to the questions on the vaccines was calculated to be one point. By these answers, the knowledge level scores of healthcare professionals about the vaccines were calculated and assessed. The minimum knowledge score to be obtained in 24 questions measuring knowledge level was "8," and the maximum knowledge score was "31". The participants filled out the data collection form individually.

Data Analysis: The IBM SPSS Statistics 22 (IBM SPSS, Turkey) software was used to analyze the data. Descriptive statistical methods (mean, standard deviation, frequency) were used to assess the data. Tabachnick & Fidell (2007) state that coefficients of skewness and kurtosis should be taken into consideration in case that p-value is less than 0.05 in the examination of the normal distribution of the data, and the data may be accepted to be generally distributed in case these coefficients are in the range of -1.500 and +1.500. According to this information, the age and knowledge score data obtained in this study were normally distributed, and parametric tests were used. Student t test was used in assessment

between two dependent groups, and One Way Anova was used in assessments between more than two groups. Mann Whitney U and Kruskal Wallis tests were used for non-parametric assessments. The Tukey HSD post hoc test was used to determine the group causing the difference. The significance was assessed at the level of $p < 0.05$.

Ethical Considerations: Concerning the study, ethics committee approval and Institutional permission from the hospitals where the research was conducted were obtained. Ethical approval (2017/ 71206) was obtained from xxx.

Results

Totally 222 individuals, 54 (%24.3) from Istanbul, 75 (%33.8) from Bursa, and 93 (%41.9) from Van, participated in the study.

The healthcare professionals' ages ranged between 19 and 64 years, and their age average was 30.63 ± 7.11 years. 49.1% ($n=109$) of the healthcare professionals had a bachelor's degree, 37.4% ($n=83$) were working for 0-4 years, and 68% ($n=151$) were nurses (Table 1).

Table 2 illustrates the distributions of the healthcare professionals' knowledge about invasive meningococcal disease, rotavirus, and HPV diseases and vaccines. 86.9% ($n=222$) of the healthcare professionals stated that the age group commonly encountering the rotavirus is 0-5, and 38.7% ($n=86$) noted that the infection reaches the peak point during winter months. 81.1% ($n=180$) expressed that the fecal-oral route transmits it, and 24.3% ($n=54$) stated that it is transmitted by contaminated stuff/surfaces. 39.2% ($n=87$) declared that its symptoms are fever-diarrhea-vomiting, respectively, and 75.7% ($n=168$) stated that its serious complication is dehydration. When examining the distribution of the healthcare professionals' knowledge levels about invasive meningococcal disease, 73.4% ($n=163$) of them stated that the age group commonly encountering the disease is 0-5, 48.6% ($n=108$) expressed that it reaches the peak point during winter months and 26.1% ($n=58$) during late autumn months. 45.5% (101) stated that it is transmitted by droplet, it was expressed that the symptoms of the disease are respiratory failure (18.9%; $n=44$), photophobia (23.9%; $n=53$), neck stiffness (65.8%; $n=146$), sepsis (29.7%; $n=66$), and meningitis (54.5%; $n=121$) and 78.4%

($n=174$) of them stated that it is a disease leaving sequelae. When examining the distribution of the healthcare professionals' knowledge levels about HPV, they stated that it is transmitted sexually (88.3; $n=196$) and by contact (18.9%; $n=42$), 74.8% ($n=166$) of them stated that its symptoms are genital warts, 22.5% ($n=50$) abnormal vaginal bleeding. 78.4% ($n=174$) stated that the most serious disease associated with HPV is cervical cancer, and 37.8% ($n=84$) expressed that its vaccine provides lifetime protection.

It was found that 42.8% ($n=95$) of the healthcare professionals answered the question about the months of rotavirus vaccination as 2nd-4th-6th months, and 41% ($n=91$) answered as 2nd and 4th months. 41.4% ($n=92$) of the participants responded to the question, "how many doses is the meningococcal vaccine administered?" as "I don't know," and 31.5% answered one dose. 49.5% ($n=110$) of the participants responded to the question, "how many doses are HPV vaccine administered?" as "I don't know," and 20.7% ($n=46$) answered as two doses.

It was observed that 61.3% ($n=136$) of the healthcare professionals agreed with the expression of "rotavirus is a notifiable disease." 64% ($n=142$) agreed with the statement "invasive meningococcal disease is a notifiable disease." 37.8% ($n=84$) agreed with the statement "HPV is a notifiable disease." It was determined that 86.5% ($n=192$) of the healthcare professionals considered that rotavirus vaccine, 90.5% ($n=201$) meningococcal vaccine and 75.2% ($n=167$) HPV vaccine should be included in the national vaccination schedule (Table 2).

The healthcare professionals' knowledge mean score was 16.73 ± 4.93 (min:8-max:31), and the median was 16 (Table 3).

Upon assessing knowledge level rates about the vaccines based on the education levels, there was a statistically significant difference ($KW:28.460$; $p<0.001$). The advanced analysis (Bonferonni advanced analysis) showed no statistically significant difference between those with a bachelor's degree and a master's degree and between those with a master's degree and a doctoral degree. The correct answer averages of those with a master's degree were higher than those with a high-school degree and an associate degree. The averages of those with a doctoral degree were higher compared to those with a high school degree, an associate degree, and a bachelor's degree. When examining the knowledge mean scores of the healthcare professionals participating in the study based on the cities they worked in, there was a statistically significant difference between them ($F:11.806$; $p<0.001$). According to Tukey HSD analysis performed to determine the city causing the difference, the mean scores of the healthcare professionals working in Istanbul were higher than those working in the other cities. The physicians' knowledge mean score was statistically significantly higher than the nurses/midwives or other health officers ($t:8.635$; $p:0.000$). While examining healthcare professionals' awareness levels based on their working duration, there was no statistically significant difference between them ($p>0.05$, Table 4).

Table 1. Descriptive characteristics of the healthcare professionals (N=222)

		19-64	30.63±7.11
		n	%
Age (year)			
Education status	Vocational High School of Health	19	8.6
	Associate Degree	42	18.9
	Bachelor	109	49.1
	Postgraduate	52	23.4
Study province	Istanbul	54	24.3

	Bursa	75	33.8
	Van	93	41.9
Working time	0-4 years	83	37.4
	5-10 years	80	36.0
	11 years and over	59	26.6
Professional title	Doctor	58	26.1
	Nurse	151	68.0
	Midwife	7	3.2
	Health officer	6	2.7
Title of the doctors (n=58)	Assistant	51	23.0
	Expert	4	1.8
	Associate professor	1	0.5
	Professor	2	0.9

Table 2. The knowledge of the healthcare professionals about meningococcal, rotavirus and HPV diseases and vaccines (N=222)

		n	% **	
ROTAVIRUS	The most common age group	0-4 age	193	86.9
		5-18 age	24	10.8
		Adult	5	2.3
	Peak periods	In summer	82	36.9
		In winter months	86	38.7
		In both	54	24.3
	*Infection way	Fecal-oral transmission	180	81.1
		Respiratory transmission	20	9.0
		Blood transmission	6	2.7
		Contaminated items / surfaces	54	24.3
	Symptoms (respectively)	Fever- Diarrhea- Vomiting	87	39.2
		Vomiting- Diarrhea- Fever	49	22.1
		Diarrhea-Vomiting-Fever	86	38.7
	*Advanced Problems Caused	Dehydration	168	75.7
		Acidosis	45	20.3
Electrolyte İmbalance		125	56.3	
Anemia		19	8.6	

	2nd - 4th - 6th Months	95	42.8
Which months the vaccine is given	2nd - 4th Months	91	41.0
	6th - 12th - 18th Months	33	14.9
	4th - 6th - 18th Months	20	9.0
The most common age group	0-4 age	163	73.4
	5-15 age	48	21.6
	16-23 age	11	5.0
* Peak periods	Late winter months	108	48.6
	Late autumn months	58	26.1
	Early summer months	29	13.1
	Early spring months	37	16.7
*Infection way	Fecal-oral transmission	33	14.9
	Respiratory transmission	100	45.0
	Droplet path	101	45.5
	Contaminated items / surfaces	37	16.7
	Direct contact	30	13.5
*Symptoms	Shortness of breath	44	19.8
	Photophobia	53	23.9
	Neck stiffness	146	65.8
	Sepsis	66	29.7
	Meningitis	121	54.5
It is a disease that causes sequelae.	I agree	174	78.4
	I don't agree	22	9.9
	I don't know	26	11.7
*How many doses are vaccinated?	One dose	29	13.1
	2 doses	70	31.5
	3 doses	24	10.8
	4 doses	7	3.2
	I don't know	92	41.4
*Infection way	Droplet path	11	5.0
	Sexual transmission	196	88.3

MENINGOCOCCEMIA

HPV

	Respiratory transmission	3	1.4
	Contact transmission	42	18.9
*Symptoms	Abnormal vaginal bleeding	50	22.5
	Genital warts	166	74.8
	Fungal infections	19	8.6
	Genital itching	61	27.5
	It causes cervical cancer.	I agree	174
I don't agree		19	8.6
I don't know		29	13.1
Vaccine provides lifelong protection.	I agree	58	26.1
	I don't agree	84	37.8
	I don't know	80	36.0
How many doses are vaccinated?	One dose	35	15.8
	2 doses	46	20.7
	3 doses	23	10.4
	4 doses	8	3.6
	I don't know	110	49.5
Is its notification mandatory?***	Rotavirus	136	61.3
	Invasive meningococcal disease	142	64
	HPV	84	37.8
Should vaccines enter the national vaccination schedule?***	Rotavirus	192	86.5
	Meningococcal	201	90.5
	HPV	167	75.2

*Each correct answer gets one point in the data collection form. Some questions have multiple correct answers.

Percent to total was taken *the rate of those giving the answer of yes.

Table 3. The knowledge score of the healthcare professionals about meningococcal, rotavirus and HPV vaccines (N=222)

Min-Max	8-31
Mean±SD	16.73±4.93
Median	16

Table 4. Comparison of the mean knowledge score of healthcare professionals according to their general characteristics

		Mean±SD
Education status	Vocational High School Of Health ^a	14.63±3.59
	Associate Degree ^b	14.79±3.52
	Bachelor ^c	16.48±4.87
	Master ^d	18.42±4.74
	Doctorate ^e	20.64±4.93
	KW; p	28.460; 0.000**
Study province	Istanbul	19.37±5.55
	Bursa	15.44±4.48
	Van	16.25±4.34
	F; p	11.806; 0.000**
Professional title	Physician (n=58)	20.90±4.68
	Nurse /Midwife/ Health officer (n=164)	15.26±4.12
	t; p	8.635; 0.000**
Physicians	Asistant (n=51)	20.02±4.25
	Expert/Associate professor/Professor (n=7)	26.86±3.13
	Z;p	-3.215;0.001*
Working time	0-4 years	16.54±5.70
	5-10 years	16.91±4.49
	11 years and over	16.76±4.93
	F;p	0.115;0.891

r:Pearson's Correlation Analysis, KW:Kruskall Wallis, H F:One Way ANOVA, t:Student t-Test, Z:Mann Whitney U,
* p<0.05 **p<0.001, a=b,b=c,a=c,a<d,a<e,b<d,b<e,c=d,c<e,d=e

Discussion

It is a known fact that vaccination is the most effective application besides all procedures applied in reducing human deaths caused by infectious diseases (Argut, Yetim & Gokcay, 2016). In a meta-analysis of studies conducted in Latin America, the rotavirus vaccine was found useful (71%) in children under 12 months of age

against hospitalizations caused by rotavirus in the region. In the same study, the rotavirus vaccine effectively reduced the mortality rates of acute gastroenteritis in children under one year of age (Chavers et al., 2018). Additionally, two meta-analysis studies showed that routine rotavirus vaccination was highly effective in reducing child mortality among countries with low, medium, and high mortality rates (Burnett,

Parashar & Tate, 2020). Although rotavirus disease is a considerable burden worldwide, many countries, including Turkey, have not included it in their national vaccination program. In Turkey, Rotavirus disease has been included among the notifiable diseases (Republic Of Turkey Ministry Of Health, 2015). However, the vaccine is still not included in the national immunization program (Republic Of Turkey Ministry Of Health, 2020). If they wanted their child to be vaccinated, parents could buy the vaccine privately. For this study, it is a gratifying outcome that more than half of the healthcare professionals (61.3%) knew reporting rotavirus disease is mandatory. Most of them (%86.5) have a positive view of the inclusion of the rotavirus vaccine in the national program. These results were parallel to previous studies and to the policies of countries that have added rotavirus vaccines to their immunization programs (Osman Koksall & Koksall, 2012; Burke et al., 2019; International Vaccine Access Center, 2020).

Meningococcal infections are a significant health problem worldwide (Leca et al., 2015). In most countries, meningococcal infections are categorized as notifiable diseases. After a vaccine derivative is included in their national immunization programs, they significantly decrease disease rates (Centers for Disease Control and Prevention, 2015; Borrow et al., 2017; Global Alliance for Vaccines and Immunization, 2020). They are recommended to be added to routine immunization programs to reduce mortality and morbidity rates caused by this disease (World Health Organization, 2014). Meningococcal vaccines still have not been taken into Turkey's routine immunization schedule, but parents could have it privately (Republic Of Turkey Ministry Of Health, 2016b). A pleasing finding for this study that 64% of the participants know invasive meningococcal disease is a notifiable disease. This result shows that most participants know the Ministry of Health's current studies on the disease. And a significant proportion of healthcare professionals (90.5%) also stated that meningococcal vaccines should be included in the national immunization program. Thus, all children may have the possibility of immunization against the disease (Turhan et al., 2010; Hancerli & Salman, 2013; Watson, Novy & Friedland, 2019).

Studies about HPV infection and vaccine reported that the vaccine could prevent cervical cancer cases. And there will be a significant reduction in screening and treatment costs (Abi Jaoude et al., 2018; Goldie et al., 2004; Kulasingam & Myers, 2003). Considering these reports, 19 countries with European Union memberships 2012, USA 2006, and England 2007 included the HPV vaccine in the national immunization calendars (Markowitz et al., 2007; Sahbaz & Erol, 2014). According to the report published by the IVAC (International Vaccine Access Center), as of the end of 2020, the HPV vaccine is included in the national immunization calendar of 106 countries (International Vaccine Access Center, 2020). However, the HPV vaccine has not yet entered the national vaccination calendar in Turkey, and it is not among the notifiable diseases. In this study, 37.8% of health care professionals stated that HPV is among the diseases that must be notified, and almost half of them do not know how many doses the vaccine has (49.5%). The results show that the study participants had insufficient knowledge about HPV infection and vaccine.

Similarly, other studies on this subject in Turkey show that the desired level of knowledge score has not been reached yet. Despite the insufficient knowledge, most participants (75.2%) stated that the HPV vaccine should enter the national vaccination program. Similar to our study, studies conducted with healthcare professionals working in different professions show that most of them recommend these vaccines (Erbaydar et al., 2016; Markowitz et al., 2007; Kahn et al., 2005).

When the outcomes are evaluated regarding the educational levels, it has been found that the average level of knowledge of participants with a doctorate and master's degrees was significantly higher than participants with other education levels. This result could be vital since it seems to support further studies showing the importance of education level (Yuksel et al., 2015; Argut, Yetim & Gokcay, 2016).

Limitations: The study has some limitations. First of all, the sample size was not enough to reflect all health care providers' situations. The research was being done to analyze only three vaccines, not all the vaccines.

Conclusion and Recommendations: This study shows that healthcare professionals in the hospitals included in the survey have up-to-date information about meningococcus and rotavirus. They have positive views about the inclusion of vaccines related to these diseases in our country's national vaccination program. Besides, the knowledge level of health professionals about HPV disease and vaccine is insufficient. Despite this, healthcare professionals have positive views about the inclusion of the HPV vaccine in the routine vaccination calendar. There is a need to provide information on the subject, especially about the HPV vaccine, and conduct prospective studies to show the vaccination results. This study does not reflect all health professionals' opinions in Turkey. It is essential to have healthcare professionals' views who work in the east and the west of Turkey's major hospitals and the world's. With this study, it is seen that health professionals have insufficient knowledge about these three diseases and their vaccines. Therefore, it is important to remedy this deficiency with national training programs. At the same time, this study provides critical findings comparing our country's general situation with other countries.

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