Vaccine Attitude of Healthcare Professionals Towards Covid19: Samsun/Turkey Example

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Abstract: The purpose of this study is to determine the attitudes of healthcare professionals towards CoronaVac and BioNTech vaccines applied in Turkey without the completion of phase 3 studies and to contribute to the policies that will be developed for the vaccine. The data in the study were collected between 01.03.2021 and 31.03.2021. The population consists of healthcare workers working in primary and secondary healthcare institutions in Samsun (N= 11.840). In determining the sample size, the unknown prevalence was taken as 50% and the margin of error as 3% by using the Open Epi Calculator program and it was determined as 979 with an error level of 0.05 and a power of 80%. Two forms were used for data collection namely Personal Introductory Information Form and Vaccination Attitude Scale. The data were evaluated with regression model and descriptive analysis such as number and percentage. The average age of the participants in the study was 38.33 ± 8.852, the average working year was 14.99 ± 8.920, 61.7%. 79% of the healthcare professionals were vaccinated for Covid 19, and all of them were vaccinated with CoronaVac vaccine. The vaccine acceptance average for CoronaVac vaccine is 3.81 ± 0.870, and the vaccine acceptance average for BioNTech vaccine is 3.76 ± 0.778. The attitude of those with more education and working years is better than others towards the BioNTech vaccine. An important finding of the study is that 79% of the healthcare workers in the research group were vaccinated; in other words, 21% of them corresponding to one out of five people were not vaccinated. The second important finding of the study is that those with higher education and more working years have a better attitude towards BioNTech vaccine than others.

INTRODUCTION

Immunization through vaccination is the most effective and successful public health strategy to reduce and eliminate health problems caused by infections[1,2,3,4]. As an example of this, smallpox was completely eradicated from the earth thanks to the smallpox vaccine by the year 1980. With the polio vaccine, the incidence of polio in the world decreased by 99% and the deaths of millions of children were prevented by vaccines[5].

COVID-19 is an infectious disease that emerged in the Wuhan region of China in December 2019 and spread all over the world in a short time. It has been officially declared by the World Health Organization that the New Corona Virus Infection has caused a global pandemic since it spread rapidly and caused death as of March 11, 2020[6]. Following this announcement of the World Health Organization, borders between countries were closed to prevent the spread of the disease, quarantine practices started and many measures such as masks, distance and hygiene rules were taken to prevent people from getting sick. In addition, the epidemic has adversely affected the country's economies and people's social activities. Therefore, scientists in many countries have started to work for the treatment of the disease[7,1,8,9,10]. One year later, 118.723.132 people were caught in COVID-19 infection all over the world and 2.633.955 of these patients died as of March 11, 2021[11].

Many countries have started vaccination studies in order to prevent the spread of COVID-19 and to return social life to normal again. CoronaVac company in China, SputnikV in Russia, AstraZeneca in England, BioNTech in Germany and Moderna in the USA have produced vaccines. Among these vaccines, those with the completed phase 3 studies were given emergency use permission and vaccination started[12]. However, many people have hesitated about vaccination with the completion of vaccination studies in such a fast time[13]. The World Health Organization states that three main factors will contribute to vaccine hesitancy: (i) individuals may not trust vaccines or fear vaccines; (ii) individuals cannot perceive the severity of the disease or do not value the vaccine; (iii) individuals and communities may have difficulties in accessing the vaccine[14].

Healthcare professionals are the highest risk group against COVID-19 transmission during the pandemic. The risk of healthcare workers may increase further due to various reasons such as continuous patient exposure, lack of personal protective equipment and inadequate infection control

training[15, 16]. Indeed, 1.716 healthcare workers were infected in China at the beginning of the Covid-19 epidemic and 23 healthcare workers died from COVID-19 infection in February 2020. For this reason, it was decided to vaccinate healthcare workers firstly all over the world[17].

According to the statements of Minister of Health Dr. Fahrettin KOCA in Turkey, the number of infected healthcare workers exceeded 120 thousand as of February 2021 and 380 of these employees died[18, 19, 20]. In order to slow down the increase of cases and ease the burden of hospitals in Turkey, curfews and intercity transportation restrictions were imposed on weekends in 30 metropolitan cities and Zonguldak, which corresponds to 78% of the country's population on 11-12 April 2020 for the first time in 20 years, and these bans were maintained until June 2020. As of June 2020, restrictions have been continued with partial applications, but since the number of cases continues to increase despite the vaccination started in April 2021, a full closure has been declared from 29 April 2021 to 17 May 2021[21]. In Turkey, 5 million 16 thousand 141 cases were seen, 4 million 691 thousand 224 of these cases recovered and 42 thousand 746 of them died from 11 March 2021 to 09 May 2021. Curfew has been declared between 21:00 and 05:00 in the evening to reduce the number of cases[22]. However, vaccination in Turkey started with the vaccination of Minister of Health Dr. Fahrettin KOCA with CoronaVac vaccine on January 13, 2021. Vaccination still continues according to the priority order determined by the Ministry of Health. The vaccination, which first started with the CoronaVac vaccine in Turkey, has been left to the preferences of the people as of April 2021 and the BioNTech vaccine has also been requested. These vaccines were administered to the whole community before the phase 3 studies were completed. In other words, the phase 3 study was conducted on the whole community.With the supply of Sputnik V vaccine as of June 2021, these three vaccines will be used in Turkey. As of May 9, 2021, 24 million 916 thousand 8 vaccines have been made in the country, 14 million 584 thousand 115 of these vaccines are the first dose and 10 million 331 thousand 893 are the second dose vaccines (covid19asi.saglik.gov.tr, 2021). However, both other segments of the society and some of the healthcare workers have had COVID-19 infection before and some have not been vaccinated due to vaccination hesitancy[23].

The attitude towards vaccines, i.e. vaccination hesitancy, is an ancient phenomenon that poses a serious threat to the prevention of infectious diseases[24,25]. Vaccines are the most important weapon in preventing global epidemics. For this reason, an unprecedented vaccine study has recently been carried out to prevent the Covid-19 outbreak[26,27]. and vaccination started worldwide following the emergency approval of many vaccines. Recent estimates about Covid-19 point out to immunization at 60-75% to prevent the spread of the virus in the community[28,29]. Vaccine cost, protection time and effectiveness are seen as the most important factor in achieving this goal[30]. In addition, vaccine hesitancy may be a determining factor in controlling and preventing the Covid-19 outbreak[31,32]. Therefore, high vaccine acceptance rates, raising awareness of communities about the safety and benefits of vaccines[33]. and using healthcare professionals while taking these actions can help mitigate the negative effects of the epidemic and control the epidemic faster.

Understanding the vaccine hesitancy of healthcare professionals has huge public health implications during epidemics. Infection of healthcare workers will reduce the workforce of the existing healthcare service. Moreover, protecting healthcare workers from infection plays a crucial role in controlling nosocomial transmission. It is undeniable that healthcare professionals are reliable and creditable source of information for patients about vaccine[34]. The WHO vaccine advisory group also emphasizes the role of healthcare professionals in building public confidence in vaccines[6]. Healthcare professionals can communicate the benefits of the vaccine to patients and address their concerns more easily.

In this regard, the purpose of this study is to determine the attitudes of healthcare professionals towards CoronaVac and BioNTech vaccines applied in Turkey without the completion of phase 3 studies and to contribute to the policies that will be developed for the vaccine.

MATERIALS and METHODS

Population and Settings

The research is planned in a cross-sectional type. The data in the study were collected between 01.03.2021 and 31.03.2021. The population consists of healthcare workers (physician, dentist, nurse, midwife, health officer) working in primary and secondary healthcare institutions in Samsun (N= 11.840). In determining the sample size, the unknown prevalence was taken as 50% and the margin of error as 3% by using the Open Epi Calculator program and it was determined as 979 with an error level of 0.05 and a power of 80%[35].

Data collection

The questionnaires were sent digitally to 250 randomly selected people working in primary care and 500 people working in secondary level, and 600 questionnaire forms were left to different health facilities as printout. 401 questionnaire forms were collected electronically and 600 questionnaires were collected by the drop and collect method. Incompletely and incorrectly filled 19 forms were canceled and the remaining 982 forms were analyzed. The distribution of the questionnaire forms was 350 employees from primary health care (Family Health Center, Community Health Center, District Health Directorate, 112 Command Control Center, Tuberculosis Dispensary, etc.) and 632 employees from secondary care (Hospitals).

Instruments

Two forms will be used in data collection namely Personal Introductory Information Form and Vaccine Attitude Scale.

Personal Introductory Information Form: Personal introductory information form consists of 14 statements that will reveal the socio-demographic characteristics of healthcare professionals.

Vaccine Attitude Scale: As data collection tool, a scale consisting of three sub-dimensions and 15 statements developed by Özpınar et al. (2020) will be used. 1st to 6th statements refer to the dimension of "vaccine acceptance", 7th and 8th statements express "side effect", and 9th to 15th expression express "vaccine hesitancy" dimension. The scale was scored with a 5-point Likert scale in the range of "1" if the level of agreement of the respondents to the questionnaire absolutely disagree, and "5" if they fully agree. As the mean scores of the sub-dimensions of vaccine acceptance, side effect and vaccine hesitancy go up, the perception of each sub-dimension also increases [36].

Statistical Analysis

SPSS 25.00 program was used in the analysis of the research. Descriptive analyzes such as number and percentage were performed for data, and factor analysis was performed for the scale. In addition, the dependent variable was evaluated with the regression model according to the Cox-Snell and Nagelkerke R^2 values.

Ethics

Before starting the research, permission was obtained from the Ministry of Health. Then, the ethics committee permission and informed consent from the individuals were obtained.

Research Limitations

Conducting the research only in Samsun province may be a limitation in terms of generalizability of the data.

RESULTS

61.7% of the research group is female, 38.3% is male, average age is 38.33± 8.852, average working year in the profession is 14.99± 8.920, 48.9% has an undergraduate degree, 74.9% is working as midwife-nurse-health officer, 25.1% is working as doctor-dentist, 66.4% is working in the secondary care, 35.6% is working in the primary care. 18.7% of the research group has had Covid-19 before, anyone from the family of 50.1% has had Covid-19, 69% does not smoke, 83.8% does not use alcohol, 40.2% thinks that domestic vaccine is more reliable and 79% has been vaccinated with CoronaVac vaccine (Table 1).

Table 1. Demographic Characteristics (N:982)

N %		
Age	38.33± 8.852	
Sex		
Female	606	61.7
Male	376	38.3
Educational Background		
High school	85	8.7
College	123	12.5
Undergraduate	480	48.9
Graduate	216	22
PhD	78	7.9
Marital Status		
Married	670	68.2
Single	312	31.8
Do you have children?		
Yes	657	66.9
No	325	33.1
Profession		
Doctor/Dentist	246	25.1
Midwife/Nurse/Health Officer	736	74.9
Healthcare Levels You Work		
Primary Care	350	35.6
Secondary Care	632	66.4
Working Year in the Profession	14.99± 8.920	
Have you had Covid-19?		
Yes	184	18.7
No	798	81.3
Has anyone in your family had Covid-19?		
Yes	492	50.1
No	490	49.9
Do you smoke?		
Yes	304	31
No	678	69
Do you use alcohol?		
Yes	159	16.2
No	823	83.8
Which of the Covid-19 vaccines do you think is more reliable?		
CoronaVac (China)	363	37
Moderna (US)	9	0.9
BioNTech (Germany)	190	19.3
Sputnik V (Russia)	11	1.1
Astra Zeneca (England)	14	1.4
Domestic vaccine	395	40.2
Have you been vaccinated with the Covid vaccine?		
Yes	776	79
No	206	21
Which vaccine did you have?		
CoronaVac (China)	776	100

Since the KMO value of the vaccine attitude scale was 0.876 and p <0.05[37], factor analysis was conducted. As a result of the analysis, no statement was removed since the factor load of the scale statements was not below 0.500 and it was determined that the scale consisted of 3 sub-dimensions as in the original. When the answers given for the CoronaVac vaccine were examined, the mean vaccine acceptance was found to be 3.81 ± 0.870, the mean side effect was 3.87 ± 0.740 and the mean vaccine hesitancy was 2.62 ± 0.840. Concerning the averages of BioNTech vaccine, it was found that vaccine acceptance was 3.76 ± 0.778, side effect was 3.82 ± 0.778 and vaccine hesitancy was 2.72 ± 0.906 (Table 2).

Table 3 exhibits the performance results of the logistic regression model established with the dependent variable (Which of the Covid-19 vaccines do you think is more reliable?).

According to Cox-Snell and Nagelkerke R^2 values, it is observed that the explanatory level of the regression model established with the dependent variable is sufficient. The correct classification rate of the model obtained is 65.8% and the model is also statistically significant (p<0.05).

Table 4 presents the coefficient statistics of the logistic regression model obtained with the dependent variable (Which of the Covid-19 vaccines do you think is more reliable?). According to the coefficient statistics, the independent variables of education level, marital status and working years in the profession affect the dependent variables statistically and significantly in this logistic regression model (p<0.05). The preference level of BioNTech vaccine is 2 times higher in those with graduate education than those with undergraduate and high school education. Considering the working years in the profession, the preference for BioNTech vaccine increases by 1.065 times when the working period increases by 1 year.

DISCUSSION

The attitudes of healthcare professionals working in Samsun province towards CoronaVac and BioNTech vaccines being the Covid -19 vaccines were examined in this study.

It has been stated in many studies in the literature that inaccurate and incomplete information about Covid-19 and vaccines negatively affect the society's attitude towards Covid-19 and disrupt the fight against the epidemic[38,39,40,41]. Healthcare professionals play a key role in eliminating this inaccurate and incomplete information. Since healthcare professionals are the role model of the society in protecting public health and preventing epidemics[42,43]. As a result of the study, it is thought that vaccination of 79% of the healthcare professionals; in other words, 21% of them, approximately one out of five people not being vaccinated, is an important data in vaccine hesitancy. It was determined in the study that all of the healthcare professionals were vaccinated with CoronaVac vaccine. The reason for this is that no vaccine other than CoronaVac vaccine was supplied in Turkey at the time of the study. BioNTech vaccine was put into practice in Turkey in April 2021.

It was determined in the study that the mean side effect scores in both vaccines were higher than the vaccine acceptance and vaccine hesitancy. The high average side effects can be explained by the rapid development of vaccines and the rapid completion of phase studies. In many studies, the reasons for vaccine hesitancy were expressed as unreliable rapid development of vaccines, lack of knowledge on possible side effects and safety concerns in the vaccine development process[42, 44, 45].

Another finding of the study is that although the vaccine acceptance is higher for the CoronaVac vaccine, it is higher for both vaccines. In addition, all of the 766 employees were vaccinated with CoronaVac vaccine and the reliability of the CoronaVac vaccine was the highest after the domestic vaccine in Turkey whose phase studies

Table 2. Vaccine Attitude Scale Factor Loads, Means and Standard Deviations

Type of vaccine	CoronaVac				BioNTech			
Statements	Alpha	Factor load	X̄	SD	Alpha	Factor load	X̄	SD
Vaccine Acceptance			3.81	0.87			3.76	0.778
Vaccines are useful for maintaining health.		0.774	3.81	1.037		0.766	3.77	0.903
Vaccines prevent some diseases.		0.745	3.93	0.969		0.776	3.84	0.895
It is necessary to get vaccinated.		0.817	3.89	0.968		0.822	3.8	0.897
Vaccines are safe.	0.936	0.754	3.55	0.932	0.932	0.752	3.53	0.902
All vaccines recommended by the Ministry of Health should be given.		0.705	3.7	1.116		0.655	3.67	1.008
Getting vaccinated is important to maintain the health of others in the community.		0.774	4.01	0.941		0.747	3.95	0.872
Side effect			3.87	0.74			3.82	0.778
Some vaccines cause side effects.	0.622	0.622	3.93	0.837	0.793	0.733	3.88	0.81
Multiple vaccines given at the same time may increase the risk of side effects.		0.555	3.81	0.905		0.729	3.77	0.989
Vaccine hesitancy			2.62	0.84			2.72	0.906
Getting vaccinated makes me worry.		0.669	2.86	1.172		0.682	2.99	1.139
I hesitate to be vaccinated.		0.789	2.77	1.177		0.713	2.87	1.16
Negative comments about vaccines affect my decision to be vaccinated.		0.709	2.81	1.19		0.710	2.97	1.186
Healthcare professionals' behavior influences my decision to be vaccinated.	0.86	0.588	3.07	1.233	0.904	0.585	2.93	1.191
The distance from the health center affects my decision to be vaccinated.		0.726	2.15	1.025		0.751	2.31	1.064
Waiting at the health center affects my decision to get vaccinated.		0.725	2.13	1.009		0.728	2.31	1.045
The opinions of those around me affect my decision to be vaccinated.		0.622	2.54	1.178		0.726	2.69	1.163
Kaiser-Meyer-Olkin (KMO)	0.876				p<0.05			

Table 3. Performance results of the logistic regression model established with the dependent variable (Which of the Covid-19 vaccines do you think is more reliable?)

-2 Log Probability	Cox-Snell R^2	Nagelkerke R^2
672.290	0.069	0.095

Table 4. Logistic regression model established with the dependent variable (Which of the Covid-19 vaccines do you think is more reliable?)

Variable	B	SH	Wald	p	Odds ratio
Age	-0.046	0.030	2.285	0.131	0.95
Sex (Ref=Male)					
Female	-0.205	0.222	0.852	0.356	0.81
Educational background (Ref=Graduate)					
High school	0.796	0.392	4.115	0.043	2.21
College	0.369	0.389	0.898	0.343	1.44
Undergraduate	0.753	0.257	8.544	0.003	2.12
Marital status (Ref=Single)					
Married	-0.727	0.303	5.759	0.016	0.48
Do you have children? (Ref=No)					
Yes	0.538	0.317	2.880	0.090	1.71
Profession (Ref=Doctor, dentist)					
Midwife - nurse – health officer	0.521	0.303	2.957	0.085	0.59
Healthcare Levels You Work (Ref=Secondary Care)					
Primary Care	2.322	1.527	2.313	0.128	10.19
Working year in the profession	0.715	0.303	5.562	0.018	2.04
Has anyone in your family had Covid-19? (Ref=No)					
Yes	-0.172	0.207	0.685	0.408	0.84
Do you smoke? (Ref=No)					
Yes	-0.277	0.219	1.611	0.204	0.75
Do you use alcohol? (Ref=No)					
Yes	-0.187	0.290	0.416	0.519	0.82
Have you been vaccinated? (Ref=No)					
Yes	0.325	0.261	1.556	0.212	1.384

B: Beta coefficient; SE: Standard error

are ongoing. In the study conducted by Dror et al. (2020) on Covid-19 vaccine rejection in Israel, the vaccine acceptance of healthcare workers working in Covid services was found to be 94% and it was 77% for those working in non-Covid services[42]. In the study, education level, marital status and working years in the profession affect the vaccine acceptance. BioNTech vaccine preference level of individuals with undergraduate degree is 2.12 times higher than those with graduate degree, and high school graduates prefer BioNTech vaccine 2.21 times higher than individuals with graduate education. Considering the working years in the profession, the preference for BioNTech vaccine increases by 1.065 times when the working period increases by 1 year.

An important finding obtained from the study is that the attitude of those with higher education and more working years is better than others towards BioNTech vaccine. Furthermore, when the duration of working in the profession increases by 1 year, the preference for BioNTech vaccine increases 1.06 times. This finding can be explained with the fact that as the education level increases, the level of knowledge about the characteristics of the vaccines increases and this situation affects the preference of vaccines. In addition, the number of cases also increases with the increase in the professional working year, and this situation brings along an increase in the level of knowledge. Thus, the issues to be considered are selected more carefully. Vaccine selection can be explained as an example of this.

Conclusion

An important finding of the study is that 79% of the healthcare professionals in the research group were vaccinated; in other words, 21% of them corresponding to one out of five people were not vaccinated, which is an important finding in vaccine hesitancy. 100% of those vaccinated received CoronaVac vaccine due to the fact that CoronaVac was the only vaccine available in Turkey during the study period. The second important finding of the study is that those with higher education level and working years have a better attitude towards BioNTech vaccine than others.

The role of healthcare professionals in community education is very effective. Scientific publications and in-service trainings should be supported in order for healthcare professionals to develop their attitudes positively, and then the attitude of society should evolve positively with visual and written media in community education.

Conflict of interest

The authors declare that there are no conflict of interests.

Financial disclosure

The authors declared that this study has received no financial support.

Ethical approval

Ethical committee permission for the study was granted by University Local Ethics Committee (ethic no: 2o.47a.4a5). Moreover, permission from the local health district management where the study was to be conducted was obtained.

Authors' contributions

All authors contributed: (1) the conception and design of the study, or acquisition of data, or analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

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