International Journal of Health Services Research and Policy
www.dergipark.org.tr/ijhsrp

IJHSRP

e-ISSN: 2602-3482

Research Article

PERCEPTION OF CONTROL, DISEASE, AND VACCINE FOR COVID-19: THE EXAMPLE OF HEALTHCARE PROFESSIONALS

Havva KAÇAN [1] ***Gülşen Ulaş KARAAHMETOĞLU*** [2] ***Vasfiye BAYRAM DEĞER*** [3]*

[1,2] Kastamonu University, Faculty of Health Science, Kastamonu, Turkey
[3]Mardin Artuklu University, Faculty of Health Science, Mardin, Turkey
*Corresponding author: vasfiyedeg@gmail.com

Abstract*: The study was conducted to examine the relation between control perception, disease perception, and vaccine perception of healthcare employees regarding Covid-19. The median and min-max scores of the participants in the sub-dimension of the disease perception scale were found to be 4.00 (1.33 - 5.00) for dangerousness and 4.00 (1.00 - 5.00) for contagiousness. The control perception scale scores of healthcare professionals were 2.50 (1.00 - 5.00) for macro-control, 3.00 (1.00 - 4.75) for micro-control, and 3.25 (1.00 - 5.00) for controllability. The score of a positive attitude toward the COVID-19 vaccine of the health employees who accepted to participate in the study was found as 4.00 (1.00 - 5.00) and the negative attitude score towards the vaccine was 3.40 (1.00 - 5.00). In our study, a statistically significant difference was found between positive attitudes towards the vaccine and professional experience scores ($p<0.05$). A statistically significant difference was also detected between the positive attitude scores of the participants towards the vaccine and the variables of direct contact with a COVID-19 patient and chronic disease status ($p<0.05$). It was determined that healthcare professionals had high Covid-19 disease and control perceptions and negative attitudes towards the vaccine. When the roles and responsibilities of immunization and health workers in controlling pandemics are considered, it is recommended to organize training programs to eliminate the doubts of healthcare employees regarding the safety and efficacy of the Covid-19 vaccine and to maximize the acceptance of the vaccine.*

Keywords: *Healthcare Employee, Covid-19 Control Perception, Covid-19 Disease Perception, Covid-19 Vaccine Perception, Vaccine Hesitancy*

Received: August 17, 2021 *Accepted: March 10, 2022*

1. Introduction

The covid-19 virus has spread all over the world in a short time after emerging in Wuhan, China, and causing severe pneumonia [1, 2]. It was declared a pandemic by the World Health Organization after a total of 118 thousand people in 114 countries were infected with the virus as of March 11, 2020, and 4 thousand 291 people died because of it [3]. Despite the protective measures and quarantine after the declaration of the pandemic, the number of cases still continues to increase gradually [4]. Despite the protective measures and quarantine after the announcement of the pandemic, the number of cases continued to increase.

Healthcare employees who are in close contact with infected people are at high risk of outbreaks [5-7]. Although healthcare staff who deal with the diagnosis, treatment, and care of patients diagnosed

with Covid-19 experience problems in this process, they continue to support society in the measures they must take against the pandemic [8, 9]. On the one hand, healthcare staff tries to fight the rapidly spreading Covid-19 pandemic and provide one-to-one care to patients who are in direct contact with the agent, on the other hand, they also fulfill their responsibilities as a part of the society [10, 11]. It is important for healthcare staff to be informed about the disease and take preventive measures for Covid-19 as well as for their patients [10]. Because when healthcare employees become infected, the reaction of the healthcare system to the pandemic decreases, and thus, the incidence rate increases uncontrollably by affecting the provision of healthcare services negatively [4]. The measures taken by the healthcare professionals are as important as the measures taken by the institutions in controlling the Covid-19 pandemic [10, 12]. On the other hand, the knowledge and attitudes of healthcare professionals towards infectious diseases [7, 13], and their perceptions and attitudes regarding Covid-19 disease will also have positive effects on keeping the pandemic under control [13].

Another important issue in controlling the pandemic is immunization. When it is considered that the Covid-19 virus spreads rapidly causing deaths, an effective vaccine is needed [2]. Although it is certain that mass vaccination will be very beneficial, it must not be expected to eliminate the disease from being an important issue. There are serious uncertainties regarding the effectiveness of vaccines in individual protection, to what extent they can protect people with severe illness, the degree of immunity, and how long they will last [4]. The perceptions of healthcare employees, who have the power to influence society, on the disease and control of Covid-19, as well as their perceptions on vaccines are curious issues. Yekdeş et al. (2020), who examined the attitudes of doctors towards immunization, reported that 52.3% of the doctors in the Internal Sciences Department did not take an immunization anamnesis, and 58.8% of the doctors in the Department of Surgical Sciences did not take immunization anamnesis from their patients [14]. In the same study, 10.5% of the doctors said that they had hesitations about vaccination. Immunization services are among life-long primary healthcare services, and acquisitions can be easily lost because of the recent increase in vaccine refusal cases. Doctors question immunization status in their daily practices to decrease the hesitancy of vaccination, which is seen in healthcare employees, and which may affect the individuals they serve, providing the required service when deficiencies are detected in immune anamnesis of patients, and including immune services in all steps may reduce the rates of not being vaccinated. These days when the pandemic is still ongoing, the hesitation of healthcare employees regarding the Covid-19 vaccine can affect the individuals they serve negatively. For this reason, the effectiveness of healthcare employees on society should not be forgotten to prevent vaccine rejection and control the pandemic. When the roles and responsibilities of healthcare workers are considered, healthcare employees have key roles in keeping the pandemic under control and in decreasing the burden [15]. It must not be forgotten that vaccine rejection is an important issue because it will cause pandemics [16].

The purpose was to examine healthcare employees' control perception, disease perception, and perception of the Covid-19 vaccine that was developed during the pandemic.

The hypothesis of the Study

- There is a relation between the Control Perception, Disease Perception, and Vaccination Perception of Healthcare Staff regarding Covid-19.

- There is no relation between the Control Perception, Disease Perception, and Vaccination Perception of Healthcare Staff regarding Covid-19.

2. Material and Methods

2.1. Type of Study

The study had a cross-sectional and descriptive design to examine the relationship between the control perception, disease perception, and vaccine perception of healthcare staff.

2.2. Study Population and Sampling

The population of the study consisted of 746 health personnel working in the Training and Research Hospital in a province. In calculating the sample size, the formula used when the number of elements in the population was known was used and the sample size was determined to be at least 256 healthcare workers [17] The research was conducted with 354 healthcare professionals who agreed to participate in the study.

2.3. Data Collection Tools

The data collection form of the research consists of the Descriptive Data Form and The Perception and Attitude Scales Related to the Covid-19 Scale.

2.4. Descriptive data Form

The data collection form of the research consists of the Descriptive Data Form and The Perception and Attitude Scales Related to the Covid-19 Scale.

2.5. The Perception and Attitude Scales Related to the Covid-19 Scale

The validity and reliability study of the scale was conducted by Geniş et al. The Cronbach Alpha value was calculated as 0.74. The scale consists of five different subdimensions. (1) COVID-19 Disease Perception Scale, (2) Perception of Causes of COVID-19 Scale, (3) Perception of Control of COVID-19 Scale, (4) COVID-19 Avoiding Attitudes Scale, (5) Attitudes towards COVID-19 Vaccine Scale [18].

The subdimensions of the Perception of Control of COVID-19 Scale, the COVID-19 Disease Perception Scale, and the Attitudes towards COVID-19 Vaccine Scale were used in the study.

The Perception of Control of COVID-19 Scale: The scale consists of 12 items. The scale has a 5-point Likert design. The expressions of the scale are “I strongly disagree (1)”, “I disagree (2)”, “I am indecisive (3)”, “I agree (4)”, and “I strongly agree (5)”. It consists of three subdimensions, which are Macro Control, Personal (Micro) Control, and Controllability. Macro Control is about beliefs about the effectiveness of the measures taken at institutional, national, or global levels. The second subdimension, which is also called Personal Control, is about the effectiveness of the personal precautions taken to avoid the disease. The final subdimension evaluates the perception of the controllability of the disease. The items in the controllability subdimension are scored reversely. A value between 1-and 5 is obtained by dividing the total score that is obtained by adding the scores of the items in the subdimension by the number of items in that subdimension. High scores in the Macro Control subdimension reflect the belief that the measures are adequate, high scores in the personal control dimension reflect the belief that personal control measures can provide good control of the disease, and high scores in the controllability subdimension reflect the belief that the disease can be controlled. The reverse items are coded as 1→5; 2→4; 3→3; 4→2; 5→1.

COVID-19 Disease Perception Scale: The scale consists of 7 items. The scale, which has a 5-point Likert design, consists of two subdimensions "Dangerousness" and "Infectiousness". The

expressions on the scale are "I strongly disagree (1)", "I disagree (2)", "I am indecisive (3)", "I agree (4)", and "I strongly agree (5)". The first subdimension, which is called "Dangerousness", includes perceptions and beliefs about the danger of COVID-19. The second component, which is called "Infectiousness", consists of items on perceptions of the infectiousness of the disease. Some items in the Dangerousness subdimension are reverse coded. A value between 1 and 5 is obtained by dividing the total score obtained by adding the item scores in the subdimension by the number of items in that subdimension. A high score in the dangerousness subdimension shows that the perception of the dangerousness of the disease is high, and a high score in the infectiousness subdimension shows that the perception of infectiousness of the virus is high. Reverse items are coded as 1→5; 2→4; 3→3; 4→2; 5→1.

Attitudes Towards COVID-19 Vaccine Scale: The scale has 9 items and 2 subdimensions (positive and negative attitudes). The expressions of the scale are "I strongly disagree (1)", "I disagree (2)", "I am indecisive (3)", "I agree (4)", and "I strongly agree (5)". Items in negative attitude subdimensions are scored reversely. A value between 1 and 5 is obtained by dividing the total score obtained by adding the item scores in the scale subdimension by the number of items in that subdimension. A high score in the positive attitude subdimension shows that the attitude towards vaccination is positive. The items in the negative attitude subdimension are calculated after they are reversed, and a high score in this subdimension shows that the negative attitude towards vaccination is less. Reverse items are coded as 1→5; 2→4; 3→3; 4→2; 5→1.

2.6. Data Collection

The data were collected face-to-face by the researchers with the healthcare staff under Covid-19 measures. Questionnaires and scales were filled out by the participating healthcare staff.

2.7. Data Analysis

SPSS 22.0 program was used for statistical analysis in the study. Number, percentage, median, and minimum-maximum values were used as descriptive statistical methods in the evaluation of the data. Kolmogorov-Smirnov and Shapiro-Wilk tests were applied to determine whether the dependent variables showed normal distribution according to descriptive features. Non-parametric hypothesis tests were applied to determine the differences in the variables that did not satisfy the normal distribution assumption. In the analysis of the data, as non-parametric methods, the Mann-Whitney U test was used to compare the quantitative continuous data between two independent groups, and the Kruskal Wallis Test was used to compare the quantitative continuous data between more than two independent groups. After the Kruskal Wallis Test, the Mann-Whitney U test was used as a complement to determine the differences. Spearman Correlation Analysis was applied between the continuous variables of the study. Correlation analysis is applied to determine the strength (degree) and direction of the linear relationship between continuous variables (http://www.istatistikanaliz.com/regression_analizi.asp).

The findings were evaluated at the 95% confidence interval and the 5% significance level.

Ethical Considerations

Written permissions were obtained from the Turkish Republic Ministry of Health, and Kastamonu Training and Research Hospital; and Ethics Committee Approval was obtained from Kastamonu University Clinical Research Ethics Committee with the decision number 2020-KAEK-143-79, and date 06.5.2021. The permission for using the scale was taken from the author.

3. Results

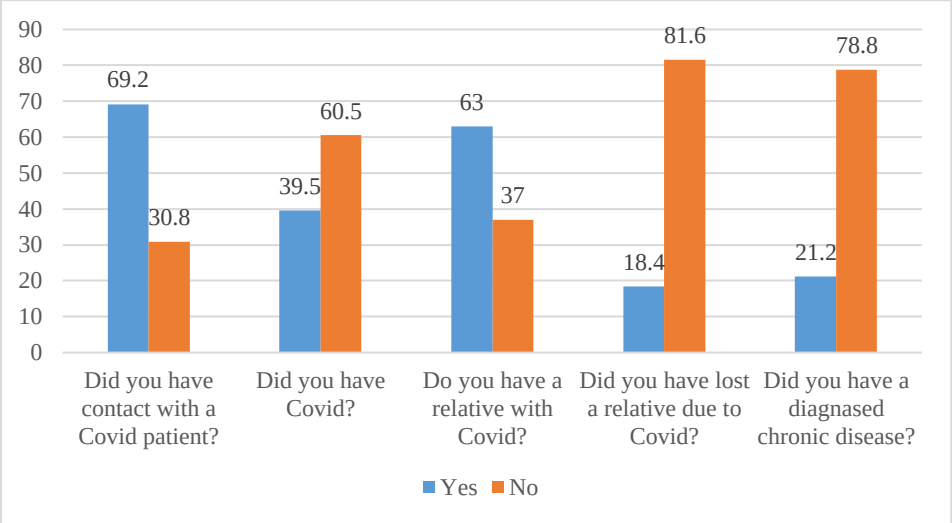
A total of 68.4% of the healthcare staff who were included in the scope of the study were women, 33.9% were between the ages of 18-29, 61.0% were married, 56.5% were nurses/midwives, 33.3% had 0-5 years of professional experience, and 43.5% were working in the service (Table 1).

Table 1. Descriptive Characteristics of Healthcare Staff

Variable	n	%
Gender		
Female	242	68.4
Male	112	31.6
Age		
18-29	120	33.9
30-39	113	31.9
40-49	92	26.0
50-59	29	8.2
Marital Status		
Married	216	61.0
Single	138	39.0
Profession		
Doctor	64	18.1
Nurse/Midwife	200	56.5
Pharmacist	14	4.0
Other	76	21.5
Professional Experience (Years)		
0-5	118	33.3
6-10	97	27.4
11-15	55	15.5
16-20	28	7.9
21 +	56	15.8
Unit Worked		
ICU	56	15.8
Service	154	43.5
Emergency	27	7.6
Other	117	33.1

A total of 69.2% of the participants stated that they had direct contact with Covid-19 patients, 60.5% had not Covid-19, 63.0% were the relatives of those who had Covid-19, 81.6% lost their relatives due to Covid-19, and 78.8% had a chronic disease (Graphic 1).

When the Cronbach Alpha values of the scales were examined according to the data of the study, it was found to be 0.62 (quite reliable) on the Disease Perception Scale, 0.66 (quite reliable) on the Control Perception Scale, and 0.81 (highly reliable) in the Attitudes Towards Vaccination Scale (Table 2).



Graphic 1. Characteristics of Healthcare Employees regarding the Disease

Table 2. Distribution of Mean Sub-Scale Scores of Healthcare Staff and Cronbach Alpha Values

Subdimension	n	Median	Min - Max	Cronbach Alpha Value
Disease Perception Scale				
Dangerousness	354	4.00	1.33 - 5.00	0.62
Infectiousness	354	4.00	1.00 - 5.00	
Control Perception Scale				
Macro control	354	2.50	1.00 - 5.00	
Micro control	354	3.00	1.00 - 4.75	0.66
Controllability	354	3.25	1.00 - 5.00	
Attitudes Towards Vaccination Scale				
Positive attitude	354	4.00	1.00 - 5.00	0.81
Negative attitude	354	3.40	1.00 - 5.00	

When the median and min-max scores of the scale sub-dimensions of the participants were evaluated, the dangerousness score was 4.00 (1.33 - 5.00), the contagiousness score was 4.00 (1.00 - 5.00); the macro-control score was 2.50 (1.00 - 5.00), micro control score was 3.00 (1.00 - 4.75), controllability score was 3.25 (1.00 - 5.00); positive attitudes towards the vaccine score were 4.00 (1.00 - 5.00), and negative attitudes towards the vaccine score were 3.40 (1.00 - 5.00) (Table 2).

No significant differences were detected between gender and sub-dimension scores ($p > 0.05$). When the macro-control sub-dimension median and min-max scores were analyzed according to marital status and being in direct contact with Covid-19 patients, the scores of singles were 2.63 (1.00 - 5.00) compared to married people with 2.25 (1.00 - 4.75), and those who did not have direct contact with Covid-19 patients had a higher score of 2.50 (1.00 - 5.00) compared to those who had direct contact with 2.25 (1.00 - 4.75) ($p<0.05$).

A statistically significant difference was detected between the median and min-max scores of the micro control subscale and the Covid-19 status variable ($p<0.05$). It was found that the scores of those without Covid-19 were higher with 3.00 (1.00 - 4.75) than those who had it with 2.75 (1.00 - 4.75).

A statistically significant difference was detected between the median and min-max scores of the dangerousness sub-dimension and the variable of direct contact with Covid-19 patients ($p<0.05$). Those who had direct contact with Covid-19 patients scored 4.00 (1.67-5.00) higher than those who did not have direct contact with 3.85 (1.33-5.00). A statistically significant difference was found between the

contagious median and min-max scores and the age variable ($p<0.05$). It was found that the score of those aged 18-29 age range was higher at 4.00 (1.33 - 4.75) the score of those aged 30-39 age range was higher at 4.00 (1.00 - 5.00) than those in the 40-49 age range with 3.67 (1.00 - 5.00).

Statistically significant differences were found between the median and min-max scores of the macro-control sub-dimension and the occupation, professional experience, and the unit worked variables ($p<0.05$). The scores of the nurses/midwives were 2.50 (1.00 - 5.00) and the scores of the others (health technicians, EMTs, paramedics) were found to be higher than 2.00 (1.00 - 4.25). It was determined that the scores of those with 16 - 20 years of professional experience were lower with 1.75 (1.00 - 3.25) than the scores of those with 0-5 years with 2.75 (1.00 - 4.50) and 21+ years with 2.50 (1.00 - 4.75). The scores of those working in the Emergency Department were higher with 2.75 (1.25 - 4.50) than the others (medical technician, emergency room, and paramedic) with 2.25 (1.00 - 4.25).

Table 3. Comparison of the Descriptive Characteristics of the Healthcare Staff and their Mean Scores in Attitudes towards Covid-19 Vaccine Scale

Variable		Positive attitude		Negative attitude	
	n	Median (Min-Max)	Test-p	Median (Min-Max)	Test-p
Gender					
Female	242	3.75 (1-5)	*MWU*=12310.0	3.40 (1-5)	*MWU*=13109.5
Male	112	4.00 (1-5)	p=0.164	3.40 (1.80-5)	p=0.620
Age					
18-29	120	3.63 (1-5)		3.40 (1-5)	
30-39	113	4.00 (1-5)	x^2= 5.700	3.40 (1.40-5)	x^2=1.375
40-49	92	4.00 (1-5)	p=0.127	3.40 (1.60-5)	p=0.711
50-59	29	4.00 (2-5)		3.40 (2.40-5)	
Marital Status					
Married	216	4.00 (1-5)	*MWU*=13434.0	3.40 (1.40-5)	*MWU*=13777.0
Single	138	3.75 (1-5)	p=0.116	3.40 (1-5)	p=0.228
Professional					
Doctor	64	4.25 (1.75-5)		3.70 (1.80-5)	
Nurse/Midwife	200	3.75 (1-5)	x^2= 6.521	3.40 (1-5)	x^2= 6.909
Pharmacist	14	3.75 (1.25-4.50)	p=0.089	3.20 (2.40-4.60)	p=0.075
Other	76	4.00 (1-5)		3.60 (2-5)	
Professional experience(Year)					
0-5	118	3.50 (1-5)		3.40 (1-5)	
6-10	97	4.00 (1-5)	x^2= 23.568	3.40 (1.40-5)	x^2= 5.534
11-15	55	3.75 (1.50-5)	*p=0.001***	3.40 (2.40-5)	p=0.237
16-20	28	4.00 (1.50-5)	*5>1, 5>3*	3.50 (1.60-5)	
21 +	56	4.25 (2-5)		3.40 (1.80-5)	
Unit worked					
Intensive care	56	4.00 (1-5)		4.00 (1.60-5)	
Service	154	3.75 (1-5)	x^2= 4.010	3.40 (1-5)	x^2= 1.274
Emergency	27	4.00 (1.75-5)	p=0.260	3.40 (1.80-4.60)	p=0.735
Other[a]	117	4.00 (1-5)		3.40 (1.40-5)	

[a]Healthcare Health technician, EMT, Paramedic; Kruskal Wallis test; MWU=Mann Whitney-U; **p<0.01

No significant differences were found as a result of the Mann Whitney U and Kruskal Wallis Tests, which were used to determine the relationships between the sub-dimension median and min-max scores of the attitude towards the Covid-19 vaccine, and the variables of gender, age, marital status,

occupation, and unit of working (p>0.05). Statistically significant differences were detected between the positive attitude towards vaccination sub-dimension scores and the professional experience variable (p<0.05). Those who had 21+ years of professional experience had 4.25 (2-5) higher scores than those with 0-5 years of 3.50 (1-5) and 11-15 years of 3.75 (1.50-5) professional experience (Table 3).

Table 4. Comparison of Disease Status and Attitudes of Health Staff Towards COVID-19 Vaccine Scale Mean Scores

		Positive attitude		Negative attitude	
Variable	**n**	**Median (Min-Max)**	**Test-p**	**Median (Min-Max)**	**Test-p**
Did you have direct contact with a Covid-19 patient?					
Yes	245	4.00 (1-5)	*MWU*=11215.5	3.40 (1.40-5)	*MWU*=12516.0
No	109	3.75 (1-5)	p=0.016*	3.40 (1-5)	p=0.345
Did you have COVID?					
Yes	140	4.00 (1-5)	*MWU*=14175.0	3.40 (1.40-5)	*MWU*=14638.0
No	214	3.75 (1-5)	p=0.443	3.40 (1-5)	p=0.720
Did you have a relative with Covid-19?					
Yes	223	4.00 (1-5)	*MWU*=13801.5	3.40 (1-5)	*MWU*=11771.5
No	131	3.75 (1.25-5)	p=0.385	3.60 (2-5)	p=0.002**
Did you have a relative you lost due to Covid-19?					
Yes	65	4.00 (1-5)	MWU=8834.5	3.40 (1-5)	*MWU*=8634.5
No	289	3.75 (1-5)	p=0.452	3.40 (1.40-5)	p=0.307
Do you have any diagnosed chronic diseases?					
Yes	75	4.50 (1-5)	*MWU*=7649.0	3.40 (1.40-5)	*MWU*=10217.5
No	279	3.75 (1-5)	p=0.001**	3.40 (1-5)	p=0.755

MWU=Mann Whitney-U; *p<0.05; **p<0.01

Statistically significant differences were found between the median and min-max scores of positive attitude towards the vaccine and the variable of direct contact with COVID-19 patients and chronic disease status (p<0.05). Those who had direct contact with Covid-19 patients scored 4.00 (1-5) when compared to 3.75 (1-5) in those who did not have direct contact. The scores of those who had the chronic disease were higher at 4.50 (1-5) than the scores of those who did not have a chronic disease at 3.75 (1-5). Statistically significant differences were detected between the negative attitude towards the vaccine sub-dimension scores and the variable of being related to COVID-19 (p<0.05). The mean score of those who did not have COVID-19 in their relatives was 3.60 (2-5) higher than those who had 3.40 (1-5) (Table 4).

Table 5. Relation between the subdimensions of the disease perception, perception of control, and attitude towards vaccine scales

		Dangerousness	Infectiousness	Macro control	Micro control	Controllability	Vaccine positive	Vaccine negative
Dangerousness	$r_{Spearman}$	1.000						
	p	0.000						
Infectiousness	$r_{Spearman}$	0.307	1.000					
	p	0.000**	0.000					
Macro control	$r_{Spearman}$	-0.236	-0.020	1.000				
	p	0.000**	0.351	0.000				
Micro control	$r_{Spearman}$	-0.067	0.092	0.391	1.000			
	p	0.103	0.042*	0.000**	0.000			
Controllability	$r_{Spearman}$	0.184	-0.131	-0.094	-0.118	1.000		
	p	0.000**	0.007**	0.038*	0.013*	0.000		
Vaccine positive	$r_{Spearman}$	0.259	0.265	-0.011	0.051	-0.033	1.000	
	p	0.000**	0.000**	0.418	0.168	0.266	0.000	
Vaccine negative	$r_{Spearman}$	0.335	0.109	-0.205	-0.178	0.170	0.358	1.000
	p	0.000**	0.020*	0.000**	0.000**	0.001**	0.000**	0.000

*p <0.05 ; **p <0.01

A weak, positive and significant relationship was detected between dangerousness and infectiousness; a weak and a negative relation was detected with macro control; a very weak and a positive relation was detected with controllability; a weak and a positive relation was detected with a positive attitude towards a vaccine, and a weak and a positive relation was detected with a negative attitude towards a vaccine. A very weak, positive, and significant relation was detected between infectiousness and micro-control; a very weak and negative relation was detected with controllability; a weak and positive relationship was detected with the positive attitude towards vaccine; and a very weak, positive, and significant relation was detected with a negative attitude towards a vaccine.

A weak, significant and positive relationship was detected between macro-control and micro-control; a very weak and negative relation was detected with controllability; and a very weak, negative, and significant relationship was detected with a negative attitude towards a vaccine. A weak, significant, and negative relationship was detected between macro-control and controllability; and a very weak and negative relation was detected with a negative attitude towards a vaccine. A very weak, positive, and significant relation was detected between controllability and a negative attitude towards a vaccine. A weak, positive and significant relationship was detected between a positive attitude towards a vaccine and a negative attitude towards a vaccine.

4. Discussion and Conclusions

The Covid-19 pandemic, which has caused fear, anxiety, and uncertainty all over the world, is still continuing. Wu et al. (2009) demonstrated the need to understand possible psychosocial effects of the pandemic among healthcare employees during the easily transmitted, rapidly spreading SARS epidemic in 2009 [19]. It was emphasized in previous epidemics (SARS) that healthcare employees were under intense stress because of fear of becoming ill, fear of transmitting the infection to their families, and heavy workload, and healthcare providers needed to balance their basic “duty to treat” with their duty to their families and loved ones during pandemics. Again, studies conducted on the SARS epidemic determined that the epidemic posed an enormous physical and emotional burden for healthcare employees who were on the first line in the fight against the disease [1]. Healthcare employees also faced the risk of losing their lives in the social support setting which decreased significantly during pandemics [20]. For these reasons, the perceptions of healthcare employees, who are the most affected

group in the Covid 19 pandemic, regarding the disease, their opinions on control measures, and their attitudes towards the vaccine, are extremely important. The conspiracy theories regarding the disease, which have been on the agenda since the early days of the pandemic, maintain their place in the vaccine-related process. Also, the practices, statements, and attitudes of healthcare professionals are considered among the most influential factors in the behavior of society regarding disease and vaccination [21].

When the disease perception scale sub-dimension scores of the participants were examined, it was found that the dangerousness score was 4.00 (1.33 - 5.00), and the mean infectiousness score was 4.00 (1.00 - 5.00) (Table 2). According to our study data, healthcare professionals said that they perceived the disease as very dangerous, and it was highly contagious. Similarly, high-level anxiety was detected in a cross-sectional study that evaluated the COVID-19 pandemic perceptions of healthcare employees working in a chest diseases training hospital in Cluj-Napoca, Romania. Only 67 participants completed the disease perception questionnaire part of the study, in which 115 people participated, because of high anxiety levels (the rest did not fill the questionnaire because "they could not imagine themselves in that position (having the disease)" [22]. It can be interpreted as a natural result that healthcare employees have high anxiety levels about the perception of the disease because they are faced with a highly contagious, unknown disease and are at higher risk than other occupational groups in society.

The mean control perception scale macro-control score of the healthcare employees who participated in the study was 2.50 (1.00 - 5.00), the mean micro-control score was 3.00 (1.00 - 4.75), and the mean controllability score was 3.25 (1.00 - 5.00) (Table 2). Previous studies reported that healthcare employees who are at the forefront during pandemic periods are at risk for mental disorders (e.g. anxiety about infection, fatigue, burnout at work, and Post-Traumatic Stress Disorder (PTSD)) [23]. Again, in previous pandemic experiences (SARS), it was reported that the perceived dangerousness, uncertainty, and uncontrollability regarding the disease increased the probability of individuals developing PTSD [24]. It was reported in a study (2020) in which the results of 144 studies were evaluated that PTSD was detected in one out of every four healthcare employees during the SARS and Ebola periods [25]. Again, the inability to control the disease leads to the loss of life security, and the loss of life security is related closely to PTSD, and it is a fact that the mental health of healthcare employees is affected positively when they take infection control measures [26]. The infected healthcare employees reported in the SARS and MERS epidemics that they lost control of the disease in their professional lives when they took the role of being patients, and the lack of knowledge on the treatment and the processes of the disease also caused a loss of control feeling [25]. In treatment and prevention works, it was determined that employees could increase controllability with individual measures they took, and psychiatric symptoms could be decreased in more than 95% of employees with individual institutional measures [27]. Based on these findings, mental problems, especially PTSD symptoms, will be seen less in those who believe that control measures are taken for COVID-19 in the country and the entire world, and in those who think that the disease can be prevented and the pandemic can be controlled with personal measures, and this will be reflected in healthcare employees as a contribution in terms of high work efficiency, high morale, and strong social struggle.

The mean score of positive attitudes towards the COVID-19 vaccine of the healthcare employees who agreed to participate in the present study was 4.00 (1.00 - 5.00), and the mean score of negative attitudes towards the vaccine was 3.40 (1.00 - 5.00) (Table 2). It was determined in our study that positive and negative attitudes towards the vaccine were close to each other, and both were at a high level. Previous reports showed that the willingness to be vaccinated was between 60% and 90% among doctors in Greece (February 2020) and France (March-July, 2020) [28, 29], and between 40% and 60% among nurses in Hong Kong and China [30]. In a series of studies conducted in several countries, it was reported that vaccine acceptance rates ranged from as low as 27.7% in Congolese healthcare employees

[31] to over 95.0% in a study that included healthcare employees in the Asia-Pacific region [32]. Our findings are consistent with a study conducted in China on the general population, in which a low proportion of participants (0.7%) were unwilling to receive the vaccine [33]. However, our findings are also consistent with studies conducted in Europe and the USA, which reported a higher proportion of participants who were reluctant to vaccination. The reported rate was 15-26% in Italy [34], 26% in France [35], 29% in Poland [36], and 20% in the USA [37], and there were both positive and negative attitudes in our study. The main reason for the negative attitudes appears to be the concern that new vaccines will not be safe [35]. However, these reluctance levels to vaccinate against COVID-19 are alarmingly higher than the level of reluctance to usual vaccines [36]. The high positive-negative attitude level towards the vaccine in our study may also be because of the fact that Turkey has both Asian and European textures. Lazarus et al. reported that there were significant differences in the willingness to be vaccinated in Asian and European countries, stating that 80% of those who approached the vaccine positively tended to be from Asian countries, which could be because of the fact that their general population is from societies such as China, Singapore, and South Korea that have a strong trust in central governments. Regarding healthcare employees, past experience with the pandemic influenza vaccine showed that not all healthcare employees may agree to be vaccinated against COVID-19 [38]. However, there is very little publication reporting healthcare employees agreeing to be vaccinated with COVID-19 vaccines; and as far as we are concerned, there are no publications about their intention to recommend these vaccines to their patients. According to a cross-sectional study (2020) conducted with practitioners who worked in France and the French-speaking areas of Belgium (Brussels, Wallonia), and nurses working in Quebec, Canada, 72.4% of healthcare employees favored being vaccinated with a future COVID-19 vaccine; and 79.6% would recommend it to their patients [39]. It is often mistakenly believed that the attitudes of healthcare employees towards vaccines should be positive because they have scientific and medical training. However, health employees are not a homogeneous group, and most of them are not experts in the field of vaccination [40]. Also, vaccination is not an essential part of the initial training of healthcare employees [41], and those who need further training in this area still tend to be "convinced" of the benefits of vaccinations by profession. Several studies show that there is vaccination hesitancy among healthcare employees at prevalence and intensity levels varying inversely with their education levels [42-44]. Verger et al. found that the perception that the safety of vaccines, which are developed in an emergency, cannot be guaranteed plays important role in the acceptance of COVID-19 vaccines. The same study also uncovered that distrust in the Ministry of Health also played role in the low acceptance levels of COVID-19 vaccines. Trust in institutions dealing with the vaccine is a key driver of vaccine acceptance, not only for the general population but also for healthcare employees, as long as the social context shapes how information is interpreted and used [42]. This confidence has been tested by several debates (e.g., the effectiveness of masks and certain old or new drugs) since the pandemic began. When the relatively low trust of healthcare employees in the pharmaceutical industry is considered, concerns are expressed that these attitudes may not be easily changed in some healthcare employees [40].

In the present study, statistically significant differences were found between the scores of the positive attitude towards the vaccine sub-dimension and the professional experience variable ($p<0.05$). Those who had 21+ years of professional experience had a higher score of 4.25 (2-5) (Table 3).

In a cross-sectional study conducted by Khan et al. (2014) in Saudi Arabia with 280 healthcare employees in two hospitals in the Qassim region, it was reported that experienced staff had more knowledge and positive attitudes than those who were relatively new in their field [45]. There are studies in the literature reporting the relations between professional experience and knowledge and attitudes as important, and experience affects the level of knowledge [46].

In the study, statistically significant differences were detected between the positive attitude of participants towards the vaccine sub-dimension score and the variables of direct contact with COVID-19 patients and chronic disease status ($p<0.05$). Those who had direct contact with Covid-19 patients scored 4.00 (1-5) when compared to 3.75 (1-5) in those who did not have direct contact, the scores of those who had the chronic disease were higher with 4.50 (1-5) than the scores of those who did not have a chronic disease with 3.75 (1-5) (Table 4). Similar to our study findings, in their study conducted in Thailand, Srichan et al. (2020) found high levels of knowledge and attitudes about COVID-19 among healthcare employees with chronic diseases [47]. High knowledge and attitude levels are some of the factors affecting the positive opinion regarding the vaccine. The fact that the mortality rates of the COVID-19 pandemic are much higher in individuals with chronic diseases means a further increase in the risk of healthcare employees who are already in the risk group. Again, similar to our study findings, Biswas et al. (2021) reported that the use of vaccines is common in healthcare employees who are at risk of contact with Covid -19. In connection with these reasons, positive attitudes are the expected results in this regard at the knowledge level and attitude level, and indirectly in terms of vaccine perspective.

Limitations of the Study

Healthcare employees who worked in a hospital of the Ministry of Health in Turkey were included in the study. For this reason, the results cannot be generalized to all healthcare staff. When the sub-dimension scores of the perception of illness of the participants were evaluated, the dangerousness score was 4.00 (1.33 - 5.00), and the contagiousness score was 4.00 (1.00 - 5.00). According to the study data, healthcare employees said that they perceived the disease as very dangerous and very contagious. The macro-control score of the healthcare employees who participated in the study was 2.50 (1.00 - 5.00), the micro-control score average was 3.00 (1.00 - 4.75), and the controllability score was 3.25 (1.00 - 5.00). The positive attitude score of the healthcare employees who participated in the study towards the COVID-19 vaccine was found to be 4.00 (1.00 - 5.00), and the negative attitude score towards the vaccine was 3.40 (1.00 - 5.00). In the study, it was also found that positive and negative attitudes towards the vaccine were close to each other and both were at a high level. A statistically significant difference was detected between the participants' positive attitude towards the vaccine sub-dimension score, the variables of direct contact with COVID-19 patients, and chronic disease status ($p<0.05$). Those who had direct contact with Covid-19 patients scored 4.00 (1-5) when compared to 3.75 (1-5) in those who did not have direct contact, and the scores of those who had the chronic disease were higher with 4.50 (1-5) than the scores of those who did not have a chronic disease with 3.75 (1-5).

In conclusion, to combat COVID-19, we must focus on research on vaccines and drugs, and work to prevent further spread [48]. Also, healthcare employees face more biological, chemical, ergonomic, physical, and psychosocial risks of infectious disease outbreaks when compared to the general population. If healthcare employees, who have to work more intensively during pandemic processes, become infected with the virus, which is the pandemic factor, the healthcare system will be affected adversely, and cause negative and severe consequences such as the spread of the disease and the further growth of the problem, the inability to meet the demands for healthcare services, and even the collapse of the healthcare system. There will be a much better-functioning healthcare system with effective and efficient healthcare policies intending to improve the working conditions of healthcare

employees, take all necessary measures to protect their health, and make them happy materially and morally. Also, immunization is the most effective method in the prevention of infectious diseases and the fight against pandemics. Right at this point, since there are no proven drugs for the treatment of COVID-19, there is no other option other than the vaccine. Vaccines are drugs, which are compulsory to be used today to protect the health and well-being of all individuals of all ages. Vaccine hesitancy is a complex phenomenon, especially in the agenda regarding new vaccines. As COVID-19 vaccines are made available, countries prioritized frontline healthcare employees as vaccine candidates. Since COVID-19 vaccines are approved rapidly, and vaccine development phases are accelerated, the legitimate concerns regarding vaccine safety, particularly regarding long-term adverse effects, cannot be ignored. Healthcare employees may also have negative attitudes as well as positive attitudes towards the vaccine. When the roles and responsibilities of immunization and healthcare employees in controlling the epidemics are considered, it is recommended to eliminate the doubts of healthcare employees about the safety and efficacy of the Covid-19 vaccine and to organize training programs to maximize the acceptance of the Covid-19 vaccine. However, regular monitoring of the attitudes and practices of healthcare employees towards COVID-19 vaccines in future periods is essential not only due to their role in vaccination campaigns but also because they are involved in the patient caregiving period. In this sense, increasing scientific publications is important in terms of contributing to the monitoring of this situation.

Ethical Considerations

Written permissions were obtained from the Turkish Republic Ministry of Health, and Kastamonu Training and Research Hospital, and Ethics Committee Approval were obtained from Kastamonu University Clinical Research Ethics Committee with the decision number 2020-KAEK-143-79, and date 06.5.2021. The permission for using the scale was taken from the author.

Authors' contributions

H.K.: Conceptualization, Methodology, Formal analysis, Writing - Original draft preparation, Investigation (%35).

G.U.K.: Conceptualization, Methodology, Formal analysis, Writing - Original draft preparation, Investigation (%35).

V.B.D.: Conceptualization, Methodology, Formal analysis, Writing - Original draft preparation, Investigation (%30).

All authors read and approved the final manuscript.

Acknowledgments: The authors are grateful to the nurses who participated in this study.

Conflicting Interest: The authors declared no potential conflicts of interest.

Funding: The author(s) received no financial support for the research and/or authorship of this study.

References

[1] Huang, L., Xu, FM., Liu H.R., "Emotional responses and coping strategies of nurses and nursing college students during COVID-19 outbreak", *MedRxiv*, Preprint, 2020. doi: https://doi.org/10.1101/2020.03.05.20031898.

[2] Li, Y.D., Chi, W.Y., Su, J.H., Ferrall, L., Hung, C.F., Wu T.C., "Coronavirus vaccine development: from SARS and MERS to COVID-19" *Journal of Biomed Sci*, 27(104), 1-24 https://doi.org/10.1186/s12929-020-00695-2. 2020.

[3] World Health Organization(2020). *Immunization, Vaccines and Biologicals* [Online]. Avaliable: https://www.who.int/teams/regulation-prequalification/eul/immunization-vaccines-and-biologicals.

[4] Azap, A., "Covıd-19 Vaccines: Light at the end of the Tunnel", *Archives Medical Review Journal*, 29, 94-100, 2020. doi:10.17827/aktd.841264

[5] Haviari, S., Bénet, T., Elahi, M.S., André, P., Loulergue, P., Vanhems, P., "Vaccination of healthcare workers: A review", *Human Vaccines & Immunotherapeutics*, 11(11), 2522-2537, 2015. doi: 10.1080/21645515.2015.1082014

[6] Lucia, V.C., Kelekar, A., Afonso, N.M., "Covıd-19 vaccine hesitancy among medical students", *Journal of Public Health*, 43(3), 445-449, 2021. doi:10.1093/PubMed/fdaa230

[7] Zhang, M., Zhou, M., Tang, F., Wang, Y., Nie, H., Zhangi L., You, G., "Knowledge, attitude, and practice regarding Covıd-19 among healthcare workers in Henan, China", *Journal of Hospital Infection*, 105, 183-187, 2020.

[8] Su, A.(2020, Feb. 25). *Doctors and nurses fighting coronavirus in China die of both infection and fatigue* [Online]. Avaliable: https://www.latimes.com/world-nation/story/2020-02-25/doctors-fighting-coronavirus-in-china-die-of-both-infection-and-fatigue

[9] Jankowicz, M. (2020). *An Italian coronavirus nurse posted a picture of her face bruised from wearing a mask to highlight how much health workers are struggling* [Online]. Avaliable: https://www.insider.com/coronavirus-italy-nurse-alessia-bonari-bruised-face-physical-psychological-toll-2020-3

[10] Sağlık Bakanlığı (2020). *Sağlık Bakanlığı Koronavirüs Rehberi* [Online]. Avaliable: https://hsgm.saglik.gov.tr/tr/bulasici-hastaliklar/2019-n-cov/liste/2019-ncov-afis-ve-brosurler.html%20.

[11] Askın, R., Bozkurt, Y., Zekiye, Z., "Covid-19 pandemisi: Psikolojik etkileri ve terapötik müdahaleler", İstanbul *Ticaret Üniversitesi Sosyal Bilimler Dergisi*, 19(37), 304-318, 2020.

[12] Ergün, E., Ergün, Ş., Çelebi, İ., "Acil sağlık hizmetleri personellerinin covid-19 hakkında bilgi, korunma düzeyleri ve etkileyen etmenler", *Paramedik ve Acil Sağlık Hizmetleri Dergisi,* 1(1), 16-27, 2020.

[13] Wang, C., Hornby, P.W., Hayden, F.G., Gao, G.F., "A novel coronavirus outbreak of global health concern", *Lancet*, 395(10223), 470-473, 2020. doi: 10.1016/S0140-6736(20)30185-9

[14] Yekdeş, D.H., Altunok, A., Eskiocak, M., Marangoz, B., "Immunization attitudes of physicians at a university hospital", *Klimik Dergisi, 33*(3), 255-9, 2020.

[15] Biswas, N., Mustapha, T., Khubchandani, J., Price, J.H., "The nature and extent of Covıd-19 vaccination hesitancy in healthcare workers", *Journal of Community Health*, 46, 1244-1251, 2021. https://doi.org/10.1007/s10900-021-00984-3,

[16] Ceyhan, M.(2020). *Aşı reddi* [Online]. Avaliable: https://docplayer.biz.tr/62696905-Asi-reddi-mehmet-ceyhan.html. 2020.

[17] Sümbüloğlu, K., Sümbüloğu, V., "*Biyoistatistik", Hatiboğlu Yayınları*. ISBN: 9789757527121. 14. Baskı, Ankara, 2018.

[18] Geniş, B., Gürhan, N., Koç, M., Geniş, Ç., Şirin, B., Çirakoğlu,O., Coşar, B., "Development of perceptıon and attıtude scales related wıth covıd-19 pandemıa", *Pearson Journal Of Socıal Scıences & Humanıtıes, 5*(7), 305-326, 2020.

[19] Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C.J., Susser, E., Lu, J., "The psychological impact of the SARS epidemic on hospital employees in China: Exposure, risk perception, and altruistic acceptance of risk", *The Canadian Journal of Psychiatry,* 54(5), 302-311, 2009.

[20] Stawicki, S.P., Paladino, L., Sharpe, R.P., Galwankar, S.C., Sholevar, F., Marchionni, C., Papadimos, T.J., Paul, E., Hansoti, B., Firstenberg, M. et al., "Reflections on the Ebola public health emergency of international concern, part 2: The unseen epidemic of posttraumatic stress among health-care personnel and survivors of the 2014–2016 Ebola outbreak", *J. Glob. Infect. Dis.*, 9, 45–50., 2017.

[21] Sallam, M., Dababseh, D., Eid, H., Al-Mahzoum, K., Al-Haidar, A., Taim, D., Mahafzah, A., "High rates of covıd-19 vaccine hesitancy and ıts association with conspiracy beliefs: A study in Jordan and Kuwait among other Arab countries", *Vaccines*, 9(1), 42, 2021.

[22] Man, M.A., Toma, C., Motoc, N.S., Necrelescu, O.L., Bondor, C.I., Chis, A.F., Rajnoveanu, R.M., "Disease Perception and Coping with Emotional Distress during COVID-19 Pandemic: A Survey among Medical Staff", *Int. J. Environ. Res. Public Health*, 17(13), 4899, https://doi.org/10.3390/ijerph17134899, 2020.

[23] El-Hage, W., Hingray, C., Lemogne, C., Yrondi, A., Brunault, P., Bienvenu, T., et al., "Health professionals facing the coronavirus disease 2019 (COVID-19) pandemic: What are the mental health risks?" *Encephale,* 46(3), 73–80, 2020. doi: 10.1016/j.encep.2020.04.008

[24] Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C.J., Susser, E., Lu, J., Hoven, C.W. "The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk", *Can J Psychiatry*, 54(5), 302-11, 2009. doi: 10.1177/070674370905400504

[25] Chew, Q.H., Wei, K.C., Vasoo, S., Chua, H.C., Sim, K., "Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: practical considerations for the COVID-19 pandemic", *Singapore Med J,* 61(7), 350-356, 2020. doi: 10.11622/smedj.2020046

[26] Preti, E., Di Mattei, V., Perego, G., Ferrari, F., Mazzetti, M., Taranto, P., Calati, R., "The psychological impact of epidemic and pandemic outbreaks on healthcare workers: a rapid review of the evidence", *Current Psychiatry Reports,* 22(8), 1-22, 2020.

[27] Tan, W., Hao, F., McIntyre, R.S., Jiang, L., Jiang, X., Zhang. L., Zhao, X., et al. "Is returning to work during the COVID-19 pandemic stressful? A study on immediate mental health status and psychoneuroimmunity prevention measures of Chinese workforce", *Brain, Behavior, and Immunity*, 87, 84-92, 2020. doi: 10.1016/j.bbi.2020.04.055

[28] Papagiannis, D., Malli, F., Raptis, D.G., Papathanasiou, I.V., Fradelos, E.C., Daniil, Z., et al., "Assessment of Knowledge, Attitudes, and Practices towards New Coronavirus (SARS-CoV-2) of Health Care Professionals in Greece before the Outbreak Period", *Int J Environ Res Public Health,* 17(14), 4925, 2020. https://doi.org/10.3390/ijerph17144925

[29] Gagneux-Brunon, A., Detoc, M., Bruel, S., Tardy, B., Rozaire, O., Frappe, P., et al., "Intention to get vaccinations against COVID-19 in French healthcare workers during the first pandemic wave: a cross-sectional survey", *J Hosp Infect*, 108, 168-73, 2021. https://doi.org/10.1016/j.jhin.2020.11.020, PMID: 33259883

[30] Wang, K., Wong, E.L.Y., Ho, K.F., Cheung, A.W.L., Chan, E.Y.Y., Yeoh, E.K., et al., Intention of nurses to accept coronavirus disease 2019 vaccination and change of intention to accept seasonal influenza vaccination during the coronavirus disease 2019 pandemic: A cross-sectional survey, *Vaccine*, 38(45), 7049-56, 2020. https://doi.org/10.1016/j.vaccine

[31] Kabamba Nzaji, M., Kabamba Ngombe, L., Ngoie Mwamba, G., Banza Ndala, D.B., Mbidi Miema, J., Lungoyo, C.L., Mwimba, B.L., Bene, A.C.M., Musenga, E.M., "Acceptability of Vaccination Against COVID-19 among Healthcare Workers in the Democratic Republic of the Congo", *Pragmatic Obs. Res*, 11, 103–109, 2020.

[32] Chew, N.W., Cheong, C., Kong, G., Phua, K., Ngiam, J.N., Tan, B.Y., Wang, B., Hao, F., Tan, W., Han, X., et al., "An Asia-Pacific study on healthcare worker's perception and willingness to receive COVID-19 vaccination", *Int. J. Infect. Dis*, Preprint, 2021. doi: 10.1016/j.ijid.2021.03.069

[33] Lazarus, J.V., Ratzan, S.C., Palayew, A., Gostin, L.O., Larson, H.J., Rabin, K., et al., "A global survey of potential acceptance of a COVID-19 vaccine", *Nat Med*, 27, 225–228, 2021. https://doi.org/10.1038/s41591-020-1124-9,.

[34] Graffigna, G., Palamenghi, L., Boccia, S., Barello, S., "Relationship between citizens' health engagement and intention to take the covid-19 vaccine in Italy: a mediation analysis", *Vaccines*, 8(576), 1-11, 2020. doi:10.3390/vaccines8040576

[35] Peretti-Watel, P., Seror, V., Cortaredona, S., Launay, O., Raude, J., Verger, P., "A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation", *Lancet Infect Dis*, 20(7), 769–770, 2020.

[36] Feleszko, W., Lewulis, P., Czarnecki, A., Waszkiewicz, P., "Flattening the curve of COVID-19 vaccine rejection—a global overview", *Vaccines (Basel)*, 9(1), 44, 2020. doi:10.3390/vaccines9010044

[37] Thunstrom, L., Ashworth, M., Finnoff, D., Newbold, S., "Hesitancy towards a COVID-19 vaccine and prospects for herd immunity", *Ecohealth*, 1-17, 2021. doi: 10.1007/s10393-021-01524-0

[38] Bish, A., Yardley, L., Nicoll, A., Michie, S., "Factors associated with uptake of vaccination against pandemic influenza: a systematic review", *Vaccine*, *29*(38), 6472-84, 2011. https://doi.org/10.1016/j.vaccine.2011.06.107

[39] Verger, P., Scronias, D., Dauby, N., Adedzi, K.A., Gobert, C., Bergeat, M., Dubé, E., "Attitudes of healthcare workers towards COVID-19 vaccination: a survey in France and French-speaking parts of Belgium and Canada 2020", *Euro Surveill*, 26(3), 2002047, 2021. doi: 10.2807/1560-7917. ES.2021.26.3.2002047

[40] Raude, J., Fressard, L., Gautier, A., Pulcini, C., Peretti-Watel, P., Verger, P., "Opening the 'Vaccine Hesitancy' black box: how trust in institutions affects French GPs' vaccination practices", *Expert Rev Vaccines*, 15(7), 937-48, 2016. https://doi.org/10.1080/14760584.2016.1184092, PMID: 27140417,

[41] Kernéis, S., Jacquet, C., Bannay, A., May, T., Launay, O., Verger, P., et al., "EDUVAC Study Group. Vaccine Education of Medical Students: A Nationwide Cross-sectional Survey", *Am J Prev Med*, 53(3), e97-104, 2017. https://doi.org/10.1016/j.amepre.2017.01.014, PMID: 28237636,

[42] Yaqub, O., Castle-Clarke, S., Sevdalis, N., Chataway, J., "Attitudes to vaccination: a critical review", *Soc Sci Med*, 112, 1-11, 2014. https://doi.org/10.1016/j.socscimed.2014.04.018, PMID: 24788111

[43] Karlsson, L.C., Lewandowsky, S., Antfolk, J., Salo, P., Lindfelt, M., Oksanen, T., et al., "The association between vaccination confidence, vaccination behavior, and willingness to recommend vaccines among Finnish healthcare workers", *PLoS One*, 14(10), e0224330, 2019. https://doi.org/10.1371/journal.pone.0224330

[44] Wilson, R., Zaytseva, A., Bocquier, A., Nokri, A., Fressard, L., Chamboredon, P., et al., " Vaccine hesitancy and self-vaccination behaviors among nurses in southeastern France", *Vaccine*, 38(5), 1144-51, 2020. https://doi.org/10.1016/j.vaccine.2019.11.018

[45] Khan, M.U., Shah, S., Ahmad, A., Fatokun, O., "Knowledge and attitude of healthcare workers about the middle east respiratory syndrome in multispecialty hospitals of Qassim, Saudi Arabia", *BMC Public Health*, 14(1), 1-7, 2014.

[46] Tam, D.K.P., Lee, S., Lee, S.S. "Impact of SARS on avian influenza preparedness in healthcare workers", *Infection*, 35(5), 320-325, 2007. doi: 10.1007/s15010-007-6353-z

[47] Srichan, P., Apidechkul, T., Tamornpark, R., et.al, "Knowledge, Attitude and Preparedness to Respond to COVID-19 Among the Bordered Population of Northern Thailand in the Early Period of the Outbreak: A Cross-Sectional Study", *WHO South-East Asia Journal of Public Health*, 9(2), 118-125, 2020.

[48] Doğan, M., Bayraktar M., "COVID-19 with a Public Health Perspective: Measures Taken in Turkey and Public Compliance with the Measures", *Iran J Public Health*, 49(1), 67-75, 2020. http://ijph.tums.ac.ir.