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The Effect of Distrust in the Health System on Vaccine Hesitancy and Determination of Factors Affecting Vaccine Hesitancy: A Descriptive Research

Sağlık Sistemine Güvensizliğin Aşı Tereddütlüğü Üzerinde Etkisi ve Aşı Tereddütlüğünü Etkileyen Faktörlerin Belirlenmesi: Tanımlayıcı Araştırma

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ABSTRACT Objective: The aim of the study is to investigate how distrust in the health system affects vaccine hesitancy and to explain the relationship between these two variables. The study aims to contribute to the determination of effective strategies in the fight against vaccine hesitancy. **Material and Methods:** Within the scope of the study, the questionnaires collected from 444 people over the age of 18 living in Istanbul were included in the analysis. In the survey, in addition to demographic information, Distrust in Health Systems, Vaccine Hesitation and Social Media Confirmation/Trust Scales were used. Frequency analysis was used to determine the sociodemographic characteristics of the participants. The participants' vaccine hesitancy and perception of trust in the health system were determined by means of mean and standard deviation. The relationship between the variables was revealed by correlation and multiple regression analyses. **Results:** The relationship between vaccine hesitancy and distrust in the health system was found to be moderate at r=-0.345 (p=0.00<0.05). In the analysis, a significant negative relationship was found between vaccine hesitancy and distrust in the health system. According to the regression analysis results, 11.7% of the change in vaccine hesitancy levels is explained by distrust in health systems. The total vaccine hesitancy scores of the participants showed significant differences according to age. **Conclusion:** The study found that as trust in the health system increases, vaccine hesitancy also increases. The importance of reliability and transparency of health systems in combating vaccine hesitancy was emphasized. It was determined that vaccine hesitancy scores showed significant differences according to age. It showed that vaccine hesitancy may be at different levels among different age groups and therefore vaccination campaigns and communication strategies should be adapted according to age.

Keywords: Vaccine hesitancy; health systems; coronavirus disease-2019

ÖZET Amaç: Çalışmanın amacı, sağlık sistemine olan güvensizliğin aşı tereddütlüğünü nasıl etkilediğini araştırmak ve bu iki değişken arasındaki ilişkiyi açıklamaktır. Çalışma, aşı tereddütüyle mücadelede etkili stratejilerin belirlenmesine katkıda bulunmayı amaçlamaktadır. **Gereç ve Yöntemler:** Çalışma kapsamında İstanbul ilinde yaşayan 18 yaş üstü 444 kişiden toplanan anketler analizlere dâhil edilmiştir. Ankette demografik bilgilerin yanı sıra Sağlık Sistemlerine Güvensizlik, Aşı Tereddütü ve Sosyal Medya Teyit/Güven Ölçeklerinden faydalanılmıştır. Katılımcıların sosyodemografik özelliklerini belirlemek için frekans analizinden faydalanılmıştır. Katılımcıların aşı tereddütlüğü ve sağlık sistemine güvensizlik algıları ortalama ve standart sapma ile belirlenmiştir. Değişkenler arasındaki ilişki korelasyon ve çoklu regresyon analizleri ile ortaya konulmuştur. **Bulgular:** Aşı tereddütlüğü ve sağlık sistemine olan güvensizlik arasındaki ilişki düzeyi orta seviyede çıkmıştır r=-0,345 (p=0,00<0,05). Analiz sonucunda aşı tereddütlüğü ve sağlık sistemine güvensizlik arasında istatistiksel olarak anlamlı negatif bir ilişki bulunmuştur. Regresyon analizi sonuçlarına göre aşı tereddütü düzeyindeki değişim %11,7 oranında sağlık sistemlerine güvensizlik tarafından açıklanmaktadır. Katılımcıların aşı tereddüdü toplam puanları yaşa göre anlamlı farklılık göstermiştir. **Sonuç:** Çalışmada, sağlık sistemine duyulan güvensizlik arttıkça, aşı tereddütü düzeyinin de arttığı görülmüştür. Çalışma, aşı tereddütlüğü ile mücadelede sağlık sistemlerinin güvenilirliği ve şeffaflığının önemini vurgulamıştır. Aşı tereddütü puanlarının yaşa göre istatistiksel olarak anlamlı farklılık gösterdiği belirlenmiştir. Bu bulgu, farklı yaş grupları arasında aşı tereddütünün farklı düzeylerde olabileceğini ve bu nedenle aşı kampanyaları ve iletişim stratejilerinin yaşa göre özelleştirilmesi gerektiğini göstermiştir.

Anahtar Kelimeler: Aşı tereddütü; sağlık sistemleri; koronavirüs hastalığı-19

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One of the important contributions of public health studies is vaccination services. Reducing the morbidity and mortality rates of many infectious diseases becomes possible with the help of vaccination services. The complete eradication of smallpox worldwide is an example of the importance of vaccination services.[1] In order for vaccination services to be successful, which will help reduce the spread and incidence of diseases as a preventive health service, vaccination programs can be achieved at a high level of acceptance by the society.[1] Although countries have made many efforts to achieve individual and collective benefits, the concerns of some people or groups reduce vaccination rates, despite the safety of vaccination programs and the need for vaccination programs. Concern about vaccination programs started with the smallpox vaccine introduced in the 18th century and continued until our time.[2] Nowadays, the concept of vaccine hesitancy has shown itself again with the the coronavirus disease-2019 (COVID-19) pandemic.

The Strategic Advisory Group, Vaccine Hesitancy Working Group of the World Health Organization defined vaccine hesitancy as a behavior that various factors such as problems with trust (in the vaccine and/or provider), complacency or postponement (not believing in the necessity of the vaccine, not being able to evaluate the vaccine), accessibility (ease) can affect.[3] Some individuals with vaccine hesitancy may have concerns about vaccines even if they accept all vaccines, while others may reject vaccines, postpone the vaccine or vaccine doses, or some individuals may reject all vaccines.[4]

In recent years, there has been a significant experience with vaccine hesitancy with COVID-19 pandemic. COVID-19 vaccines have been swiftly developed and authorized for use under the influence of advances in scientific knowledge and developments in medical technologies, and have demonstrated safety and effectiveness in preventing the onset of the disease.[5] However, although its effectiveness and safety have been proven, there have been reports that a high percentage of people report that they are hesitant about vaccines. When looking at the literature, it is noteworthy that hesitancy is expressed due to reasons such as COVID-19 vaccines not being effective and safe, having side effects, and the rapid production of the vaccine.[6-8] At the same time, factors such as information pollution on social platforms regarding COVID-19 vaccines and the spread of conspiracy theories are also seen as reasons for hesitation. On the other hand, insufficient knowledge of healthcare professionals about vaccination services or insufficient advice given to patients, distrust of pharmaceutical companies, concerns about health policies established by the government, and contradictory statements of scientists are among the main factors of vaccine hesitancy.[9]

The trust of a community in the health system is crucial in the process of determination of the demand of health services and its utilization. The effectiveness of the health system impacts the utilization of health services. A robust health system is characterized by its capacity to achieve sufficient service coverage and maintain quality care, which relies on factors like financing, information systems, governance, and the capacity of human resources.[10] Trust can often be defined as an expectation that an individual can trust the communication or actions of another.[11] Trust, through relational arrangements, can play a vital role in the interventions and future actions of the healthcare system, which may include some risk elements and to which healthcare providers and community members depend. Trust, whether at the community or individual level, significantly influences the demand and acceptance of vaccines, is a cornerstone of public health. Thus, health systems must guarantee safe and sufficient delivery of vaccines, along with accurate communication of vaccination services and information to the public.[10]

MATERIAL AND METHODS

PURPOSE OF THE STUDY

The study aimed to assess the impact of distrust in the healthcare system on COVID-19 vaccine hesitancy and to explore the relationship between them. Additionally, it was aimed to examine the factors which affect vaccine hesitancy.

UNIVERSE AND SAMPLING

The study's population includes all individuals aged 18 and above residing in İstanbul. Different figures

were obtained for individuals over the age of 18 in İstanbul. Therefore, in order to avoid any errors in the sample size, the sample size calculation was made using the sample size formula, which is valid for cases where the population is unknown. The formula applied is as follows:

"Sample size=(z value)²×p×(1-p)/(margin of error)²"

According to this

z value=1.96 p=0.50

Margin of error=5% and evaluated in the formula.

For sample size=(1.96)²×0.5×(1-0.5)/(0.05)²

= 3.8416×0.25/0.0025

= 384.16 was reached.

By adding 10% margin of error to the number 384, the number 422 was considered sufficient for the sample of the study. By adding 10% wastage to the number 384, the number 422 was deemed sufficient for the sample of the study. The sample consisted of 444 people randomly selected from this universe and participating in the survey. Although the sample size was initially determined as 422 people, 444 people were reached as a result of random participation during the survey process, and this did not affect the results of the study, although it increased the power of the analysis. In the survey, in addition to demographic information, Distrust in Health Systems, Vaccine Hesitation and Social Media Confirmation/Trust Scales were used.[12] The data of the research was collected between 1 September 2022 and 10 December 2023.

DATA COLLECTION TOOLS

This study employed face-to-face interviews as the data collection method. The questionnaire utilized comprises three sections. The first part includes survey questions aiming for personal information (age, gender, level of education, marital status, level of monthly income) and general perspective on COVID-19 vaccines (COVID-19 vaccination status, attitude towards vaccination of COVID-19, recommendation of the COVID-19 vaccine to family or friends, self-definition regarding the vaccine). Secondly, the Vaccine Hesitancy Scale (VHS) was used, and thirdly, the Health System Distrust Scale (HSDS) was used.

VHS; The scale, which is designed by Luyten et al. and adapted to Turkish by Yılmaz et al. comprises a total of two dimensions and 9 items: "lack of trust" and "risks".[13,14] Items 5 and 9 in the risks dimension are reverse scored. On the scale, an increase in the score demonstrates that hesitancy towards vaccines has decreased. The scale is a 5-point Likert type (1: strongly disagree and 5: strongly agree). In addition, increasing scale scores indicate that vaccine hesitancy is decreasing. Yilmaz et al.[14] As a result of the analysis adapted to Turkish by, the Cronbach's Alpha coefficient of the vaccine hesitancy scale was stated to be 0.87, which was found to be 0.90 in this study.

The scale, which is designed by Rose et al. and adapted to Turkish by Yeşildal et al. comprises a total of 10 items and a single dimension.[15,16] Items 2, 8 and 9 in the scale are reverse scored. The scale is a 5-point Likert type with 1 for strongly disagree and 5 for strongly agree. As the score on the scale increases, distrust in the health system increases. As a result of the analysis adapted into Turkish by Yesildal et al. the health system distrust scale's Cronbach Alpha coefficient was stated as 0.78, and in this study, which was found to be 0.86.[16]

ANALYSIS OF DATA

The data of the study were analyzed using SPSS 22.0 (IBM, Armonk, NY, USA) statistical software. Analysis of frequency was employed to ascertain the sociodemographic characteristics of the participants. Based on participants' descriptive characteristics, to examine differences in levels of scale, independent groups t-test, one way analysis of variance (ANOVA), and post hoc (Tukey, LSD) analyses were conducted. Participants' perceptions of vaccine hesitancy and trust in the healthcare system were determined using mean and standard deviation. The relationship between variables was revealed by correlation and multiple regression analyses. Kurtosis and skewness values were assessed to ascertain the normal distribution of the research variables.

ETHICAL ASPECT OF THE STUDY

Prior to commencing the study, ethical approval was obtained from the Marmara University, Health Sciences Institute Directorate Ethics Committee (date: June 24, 2022, no: 309824). Moreover, participants provided consent after being presented with the information form. The study adhered to the principles that were outlined in the Declaration of Helsinki.

RESULTS

65.3% of the participants in the study consisted of women and 34.7% were men. 54.5% of the participants are married. It was found that 47.5% of the participants were 30 years old and under. 30.0% of the participants stated that they had a Bachelor's degree. While 23% of the participants stated that they had no income, 9.2% stated that they had an income of less than 8,500 TL. 90.5% of the participants stated that they had received the COVID-19 vaccine. When their COVID-19 vaccines are taken into consideration, it was found that 88.8% had BioNTech (Germany with USA collabration) vaccines and 2% had Sinovac (China) and BioNTech vaccines (Table 1).

The descriptive analyzes conducted in the study shows that the participants' total "vaccine hesitancy" average was determined as 26.599±6.718, "lack of confidence" average was 20.687±7.020, and "risks" average was determined as 6.088±2.159 (Table 2). The average "general distrust in health systems" average of the participants was determined as 3.126±0.649 (Table 2).

In analyzing the variations in scale levels based on participants' descriptive characteristics, independent groups t-test, one-way analysis of variance (ANOVA), and post hoc (Tukey, LSD) analysis revealed significant differences in the total vaccine hesitancy scores among participants based on age ($F=5.686$; $p=0.001<0.05$). It was concluded that the total vaccine hesitancy scores of those aged 51 and over were higher than the total vaccine hesitancy scores of those aged 30 and under ($p<0.05$), and the total vaccine hesitancy scores of the ones aged 51 and over exceeded the total vaccine hesitancy scores of those between the ages of 31-40 ($p<0.05$). It was found out that the total vaccine hesitancy scores of those aged 30 and under were higher than the total vaccine hesitancy scores of the ones aged 41-50 ($p<0.05$), and the total vaccine hesitancy scores of those aged 51 and over were exceeded the total vaccine hesitancy scores of those aged 41-50 ($p<0.05$) (Table 3).

Univariate analyses conducted as part of the study revealed a significant difference in vaccine hes-

TABLE 1: Participants' distribution based on descriptive characteristics.

Groups	Frequency(n)	Percentage (%)
Sex		
Male	154	34.7
Female	290	65.3
Marital status		
Single	202	45.5
Married	242	54.5
Age		
30 and under	211	47.5
31-40	162	36.5
41-50	49	11.0
51 and above	22	5.0
Educational status		
High school	120	27.0
Associate degree	122	27.5
Undergraduate	133	30.0
Graduate	69	15.5
Monthly Income		
Less than 8500	41	9.2
8500-15000	147	33.1
15001-20000	83	18.7
20001-25000	27	6.1
25001 and above	43	9.7
No Income	103	23.2
Status of getting COVID-19 vaccination		
Yes	402	90.5
No	42	9.5
COVID-19 vaccination		
Sinovac	43	10.7
BioNTech	357	88.8
Sinovac ve BioNTech	2	0.5

TABLE 2: Average scores on vaccine hesitancy and distrust in health systems.

	n	$\bar{X}$	SD
Vaccine hesitancy total	444	26.599	6.718
Lack of trust	444	20.687	7.020
Risks	444	6.088	2.159
Distrust in health systems general	444	3.126	0.649

SD: Standard deviation.

TABLE 3: Differentiation of vaccine hesitancy scores according to descriptive characteristics.

Demographic Characteristics	n	Vaccine Hesitancy Total
Sex		X̄±SD
Male	154	25.851±6.901
Kadın	290	26.997±6.596
t value		-1.715
p value		0.087
Marital status		X̄±SD
Single	202	26.654±6.111
Married	242	26.554±7.197
t value		0.156
p value		0.875
Age		X̄±SD
30 and under	211	27.000±7.215
31-40	162	26.074±6.300
41-50	49	24.551±4.813
51 and above	22	31.182±6.215
F=		5.686
p value=		**0.001**
Post hoc=		4>1. 4>2. 1>3. 4>3 (p<0.05)
Educational level		X̄±SD
High school	120	27.150±6.637
Associate degree	122	26.262±7.174
Undergraduate	133	25.857±6.150
Graduate	69	27.667±6.995
F=		1.498
p value=		0.214
Monthly income		X̄±SD
Less than 8,500	41	25.951±6.111
8,500-15,000	147	26.524±6.752
15,001-20,000	83	26.410±6.815
20,001-25,000	27	25.185±6.102
25,001 and above	43	28.000±7.728
No income	103	26.903±6.558
F=		0.746
p value=		0.589
Status of getting COVID-19 vaccination		X̄±SD
Yes	402	26.978±6.715
No	42	22.976±5.629
t value=		3.726
p value=		**0.000**

SD: Standard deviation

itancy based on COVID-19 vaccination status. (p<0.05) (Table 3).

It has been seen that the overall vaccine hesitancy scores of the participants did not significantly differ with other variables (sociodemographic variables) (p>0.05) (Table 3).

"Results of post hoc analysis (p<0.05)

4>1: The age group of 51 and over is significantly higher than the age group of 30 and under.

4>2: 51 and over age group is significantly higher than 31-40 age group.

1>3: The age group 30 and below is significantly higher than the age group 41-50.

4>3: 51 and over age group is significantly higher than 41-50 age group.

In this way, the results in the Post hocanalysis are aligned with the ranking indicated in the table."

Correlation analysis was performed to investigate if there was a statistically significant relationship between the two variables of distrust in healthcare systems and vaccine hesitancy. The analysis indicated a correlation coefficient of r=-0.345 (p=0.00<0.05) between total of these two variables (Table 4).

The analysis of regression presented that distrust in the health system has a statistically significant negative effect on vaccine hesitancy (F=59.911; p<0.05). In this context, as the participants' distrust increases,

TABLE 4: Correlation analysis results.

		Distrust in health systems general	Aşı vaccine hesitancy total	Lack of trust	Risks
Distrust in health systems general	r value	1.000			
	p value	0.000			
Vaccine hesitancy total	r value	-0.345**	1.000		
	p value	0.000	0.000		
Lack of trust	r value	-0.228**	0.952**	1.000	
	p value	0.000	0.000	0.000	
Risks	r value	0.335**	-0.017	0.290**	1.000
	p value	0.000	0.716	0.000	0.000

*p<0.05, **p<0.01

TABLE 5: Effects of distrust in healthcare systems on vaccine hesitancy.

	Unstandardized coefficients		Standardized coefficients		
Independent variable	B	SE	ß	t value	p value
Stable	37.784	1.476		25.603	0.000
Distrust in Healthcare Systems	-3.578	0.462	-0.345	-7.740	0.000

Dependent variable=vaccine hesitancy. R=0.345; R2=0.117; F=59.911; p=0.000; Durbin Watson Value=1.177

B: Beta coefficient; SE: Standard error; β: Beta-standardized coefficient.

their perception of vaccine hesitancy decreases (F=59.911; p=0.000<0.05) (Table 5). 11.7% of the total change in the level of vaccine hesitancy is explained by distrust in healthcare systems. Besides, the level of vaccine hesitancy is increased by distrust in healthcare systems.

DISCUSSION

As of the 1st week of February 2024, more than 774 million cases of COVID-19 have been confirmed globally, resulting in over 7 million confirmed deaths. Specifically, by February 4, 2024, the global count stood at over 774 million confirmed cases with the deaths over 7 million. After that pandemic period, transition to normal life took place with the implementation of COVID-19 vaccinations. However, this process has also led to intense discussions on vaccine hesitancy. As a matter of fact, the success of a vaccine application is determined by the rate of population acceptance of the vaccine.[9] The global COVID-19 crisis may have a serious effect on public distrust in health authorities, medicine and science, depending on the intensity of the socio-economic and health consequences.[4] For this reason, the study examined the relation between people's distrust of the healthcare system and vaccine hesitancy, and whether vaccine hesitancy differs according to various descriptive factors.

It was determined that the vaccine hesitancy scores of the participants differed significantly according to age. According to the analysis results, those aged 30 and under have higher vaccine hesitancy perceptions. In a study by Gülmez et al. the "trust" factor was discussed as a factor affecting vaccine hesitancy and it was concluded that within the framework of the age factor, the trust problem was more common in participants in the 18-25 age group than in participants in the 36-45, 46-55, 66 and over age groups.[17] In Okubo et al.'s study, it was concluded that the difference in perception of vaccine hesitancy between young participants and the elderly was more than double.[18] The study revealed that individuals aged 15-39 exhibited a greater perception of vaccine hesitancy, whereas elder participants were more inclined to mention the risk of serious disease compared to younger ones. This observation aligns with findings from a separate study by Shih and colleagues, which noted a higher tendency for vaccine hesitancy among younger age groups, indicating a prevalent trend of COVID-19 vaccine refusal.[19] It was determined that the vaccine hesitancy scores of the participants showed a significant difference according to age and were found to be consistent with other studies in the literature. The findings of the study emphasize that strategies for vaccination practices should be organized taking into account age groups.

The analysis of the study presented that the participants generally experienced a moderate level of vaccine hesitancy 26.599±6.718 and a moderate level of distrust in the health system 3.126±0.649. The study analyzed the relationship between these two variables, finding a correlation between them. The analysis revealed that vaccine hesitancy also increased as distrust in the healthcare system increased. Similarly, Turhan et al. mentioned in their study about the existence of a relationship between distrust in the healthcare system and vaccine hesitancy.[20] On the other hand, Ebrahimi et al. concluded that trust in health authorities regarding vaccination is associated with lower incidence of vaccine hesitancy.[21] Additionally, Nowak et al. examined the relationship between the decision on childhood vaccinations and trust in medical providers, and found a relationship between trust and the decision to vaccinate.[22] It has been determined that distrust in health systems increases the level of vaccine hesitancy. Similarly, Ozawa et al. expressed in a study that although vaccination services are available, factors such as the perception of weakness of the health system, especially after a shock, and distrust in the health system are effective on vaccine use.[10] In the study, an example was given as the Ebola virus put pressure on the weak health system, reducing the quality of basic health services, and as a result, there was a decrease of more than 20% in the rate of child vaccination in health facilities, and it was emphasized that the use of vaccines would be delayed due to distrust in the health system.[10] Simultaneously, Liu et al. investigated the impact of distrust in the government on hesitancy of vaccine and discovered that trust lowered vaccine hesitancy.[23] Similarly, Özer et al. observed in their research that a rise in the perception of dis-

trust in the healthcare system led to a statistically significant increase in vaccine hesitancy.[24] It was observed that the findings in the literature supported the findings of the study. It was supported by the literature and the findings of the study that the concept of vaccine hesitancy should not be considered independently of distrust in the health system. Therefore, the idea that distrust in the health system should also be reduced in order to reduce negative factors such as hesitation and suspicion against vaccination is important. The findings of the study show that the relationship between these two variables should be taken into consideration in determining public health strategies and implementing health policies.

CONCLUSION

According to the study results, the participants exhibited a moderate level of vaccine hesitancy and distrust in the healthcare system. Additionally, it was concluded that an increase in distrust in the healthcare system corresponds to higher levels of vaccine hesitancy. The perception created in society by the rapidly developed COVID-19 vaccines in the pandemic period has resulted in an increase in distrust in the healthcare system, and therefore it has resulted in a strengthening of the perception of vaccine hesitancy. This increases the risk of vaccine-preventable diseases occurring in the future.

Based on the study results, it is suggested that policies and practices should be developed by healthcare system actors to reduce distrust in the healthcare system and reduce the perception of vaccine hesitancy. In this context, it is important to adopt more transparent practices in communication with the society, reduce uncertainties and create a bond of trust between the health system and the society. It is thought that these steps will contribute to an effective response to vaccine hesitancy that may occur in the future.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Duygu Deniz Çelik;* ***Design:*** *Duygu Deniz Çelik;* ***Control/Supervision:*** *Emre İşçi;* ***Data Collection and/or Processing:*** *Duygu Deniz Çelik;* ***Analysis and/or Interpretation:*** *Duygu Deniz Çelik, Emre İşçi;* ***Literature Review:*** *Duygu Deniz Çelik;* ***Writing the Article:*** *Duygu Deniz Çelik;* ***Critical Review:*** *Duygu Deniz Çelik, Emre İşçi;* ***References and Fundings:*** *Duygu Deniz Çelik.*

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