Original Research / Orijinal Araştırma

Does Health Literacy Affect Vaccine Hesitation?
Sağlık Okuryazarlığı Aşı Tereddüdünü Etkiler Mi?

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Abstract

Background: Despite substantial and convincing evidence that vaccines save the lives of millions of children each year, vaccine hesitancy has become a growing focus of attention and concern. In 2019, the World Health Organization ranked vaccine hesitancy among threats to global health. This study was conducted to determine the effect of individuals' health literacy on vaccine hesitancy.

Methods: This cross-sectional study was conducted with 365 adults in Turkey. Data were collected using a Sociodemographic Characteristics Form, the Health Literacy Scale, and the Vaccine Hesitancy Scale.

Results: The level of health literacy of the research group was good, and the level of their vaccine hesitancy was moderate. A significant negative correlation was found between health literacy and vaccine hesitancy ($p \leq 0.05$). It was determined that as the education level increased, the level of health literacy increased, and vaccine hesitancy decreased ($p \leq 0.05$). The vaccine hesitancy scores of those who had not received both adult and COVID-19 vaccines were higher than the scores of those who had ($p \leq 0.05$).

Conclusion: The study's findings showed a negative correlation between health literacy and vaccine hesitancy and that the level of education positively affected both variables. Conducting studies to increase health literacy to create social awareness about vaccine hesitancy or refusal can help reduce the increasing anti-vaccination movement.

Key words: Health Literacy, Vaccine, Vaccination, Vaccine Hesitancy

Özet

Giriş: Aşıların her yıl milyonlarca çocuğun hayatını kurtardığına dair sağlam ve ikna edici kanıtlara rağmen, aşı tereddüdü giderek artan bir ilgi ve endişe odağı haline gelmiştir. Dünya Sağlık Örgütü, 2019'da aşı tereddüdünü küresel sağlığa yönelik tehditler arasında sıralamıştır. Bu çalışma bireylerin sağlık okuryazarlığının aşı tereddüdüne etkisini belirlemek amacıyla yapılmıştır.

Yöntem: Kesitsel tipte olan bu çalışma Türkiye'deki 365 yetişkin ile yürütülmüştür. Veri; Sosyodemografik Özellikler Formu, Sağlık Okuryazarlığı Ölçeği ve Aşı Tereddüdü Ölçeği kullanılarak toplanmıştır.

Bulgular: Araştırma grubunun sağlık okuryazarlığı düzeyi iyi, aşı tereddüdü düzeyi ise orta düzeydedir. Sağlık okuryazarlığı ile aşı tereddüdü arasında anlamlı negatif korelasyon bulunmuştur ($p \leq 0,05$). Eğitim düzeyi arttıkça sağlık okuryazarlığı düzeyinin de arttığı, aşı tereddüdünün azaldığı belirlenmiştir ($p \leq 0,05$). Hem yetişkin dönem aşılarını hem de COVID-19 aşısını yaptırmayanların aşı tereddüdü puanları yaptıranlara göre daha yüksek bulunmuştur ($p \leq 0,05$).

Sonuç: Araştırmanın bulguları, sağlık okuryazarlığı ile aşı tereddüdü arasında negatif bir ilişki olduğunu ve eğitim düzeyinin her iki değişkeni de olumlu yönde etkilediğini göstermiştir. Aşı tereddüdü veya reddi konusunda toplumsal farkındalık oluşturmak için sağlık okuryazarlığını artırmaya yönelik çalışmalar yapmak, artan aşı karşıtı hareketin azaltılmasına yardımcı olabilir.

Anahtar kelimeler: Aşı, Aşılama, Aşı tereddüdü**,** Sağlık okuryazarlığı,

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Introductıon

Vaccines represent one of the most effective means of preventing disease and improving public health and are therefore regarded as one of the 10 greatest achievements of the 20th century in this field.[1,2] It is estimated that approximately 2-3 million human deaths worldwide and 14 thousand in Turkey are prevented every year thanks to immunization. In addition, it is known that approximately 25 diseases, most of which result in death, are prevented in the world thanks to easily accessible vaccines.[3] Reducing the prevalence and incidence of vaccine-preventable diseases depends on the high acceptance and inclusiveness of vaccination programs.[4,5] Immunization provides both direct protection for vaccinated individuals and indirect protection by providing herd immunity for the whole population.[6] Despite the benefits of vaccines, not many individuals are vaccinated worldwide, including about 20 million infants each year.[7] Deaths worldwide due to measles increased by 50% from 2016 to 2019, causing more than 207,500 deaths in 2019.[8] In Turkey, on the other hand, despite positive experiences with vaccination, vaccine hesitancy has gradually increased due to some occurrences such as a lawsuit that was won regarding "receiving parental consent for vaccination" in 2015 and anti-vaccination discourse that has frequently appeared in the media, and as a result, the number of families who did not receive vaccination increased from 183 in 2010 to 23 thousand in 2018.[9,10] Vaccine hesitancy is one of the important reasons leading to a decrease in vaccination rates and an increase in the frequency of vaccine-preventable diseases. The World Health Organization (WHO) defined vaccine hesitancy as "delay in accepting the administration of some vaccines or not allowing their administration despite their availability" and listed it among threats to global health in 2019.[7,8]

There is substantial and convincing evidence that vaccines save millions of children's lives each year; however, vaccine hesitancy has become a growing concern.[11] A reduction in the proportion of immune individuals within a given society may result in the emergence of epidemics. Consequently, the decision of whether to receive an immunization is not solely a matter of personal choice, but rather a collective responsibility that extends to the entire society. This indicates that vaccine hesitancy is an important public health problem.

Health literacy (HL) is an individual's ability to obtain, process, and understand basic health information to make informed health-related decisions. Studies show that low HL levels are associated with poor compliance with preventive and therapeutic medical recommendations. HL is considered an important factor to better define and understand the main determinants of vaccine intake.[12] Concurrently, while HL plays a significant role in shaping an individual's perception of vaccination in terms of health, vaccination also constitutes a crucial aspect of public health. We think increasing the ability to access accurate information and understand and evaluate information about vaccines will increase the level of individuals' HL, which in turn will lead to important changes in anti-vaccine attitudes. For these reasons, the study tried to answer the question "Does Health Literacy Affect Vaccine Hesitancy?"

Method

Design and sample

The population of this cross-sectional descriptive study consisted of individuals aged between 18 and 65 years. Since the study population was not known, the formula of $n = t^2 \times p \times q / d^2$, where p: the probability of occurrence; $q = 1 - p$; d: the effect size[13] was used to determine the sample size. The calculation was based on a 0.95% confidence interval, 5%, standard deviation, and 50% unknown prevalence. The minimum sample size was determined as 384.[13] A total of 365 individuals participated in the research. The research was carried out with a participation rate of 95%. Inclusion criteria were (a) individuals aged between 18 and 65 years, (b) residence in Turkey, (c) literacy in Turkish, (d) having internet access, (e) being a social media user on platforms, such as Facebook, WhatsApp, or Instagram.

Data collection tools

The data collection tools included a Sociodemographic Characteristics Form, which was prepared by the researchers following a comprehensive review of the relevant literature. This form included questions about the participants' age, education level, marital status, number of children, place of residence, employment status.

The Health Literacy Survey (HLS), developed by Sorensen et al. in 2013, was adapted to Turkish by Aras and Temel in 2017. HLS consists of 25 items and 4 sub-dimensions: "Accessing information", "Understanding information", "Measurement/Evaluation" and "Application/Use". The scores obtained from the five-point Likert-type scale range between 25 and 125.[14,15] The reliability coefficient was calculated as 0.92 in Aras and Temel's study and 0.94 in this study.

The Vaccine Hesitancy Scale, was developed by Kılınçarslan et al. in 2020[16] to objectively measure and better understand individuals' vaccine hesitancy. The scale consists of 21 items and 4 sub-dimensions: "Vaccine benefits and protective value", "Vaccine hesitancy", "Solutions for not being vaccinated" and "Reason for vaccine hesitancy". The score to be obtained from the five-point Likert-type scale ranges between 21 and 105, and higher scores indicate higher vaccine hesitancy. The reliability coefficient was calculated as 0.90 in Kılıçarslan's study and 0.86 in this study.

Data collection process

Due to the COVID-19 pandemic, data were collected online via a questionnaire created on "Google Forms" to facilitate recruiting individuals between the ages of 18-65. The link to the questionnaire was distributed to the individuals who had expressed their willingness to participate in the research project, and they were requested to complete it.

Data analysis

SPSS 22.0 software package was used to evaluate the study data. As a result of the normality tests, it was determined that the data did not show a normal distribution. Therefore, Kruskal-Wallis H and Mann-Whitney U tests were used for intergroup comparisons. In cases where the Kruskal-Wallis test was found to be significant, the Mann Whitney U test was performed to determine between which groups the difference was. To prevent type I errors that may interfere with the measurement in Mann-Whitney U-tests, the Bonferroni correction was applied. The relationship between scale scores was evaluated with Pearson correlation analysis. Simple linear regression analysis was performed to examine the effect of HL on the level of vaccine hesitancy. A five-model simple linear regression analysis was conducted to explain the effect of individuals' HL on vaccine hesitancy levels. Each of the sub-dimensions in the HLS was determined as a separate model. The level of significance was accepted as $p \leq 0.05$.

Ethical considerations

Ethical approval (Protocol Number: 2021/21) was obtained from the research and publication ethics committee of a university in Turkey to collect data. The first page of the questionnaire included a consent form, which also provided information about the purpose of the research. Only participants who checked the confirmation box of the consent form accessed the following pages and filled out the questionnaire. Necessary permissions were obtained from the authors of the scales used in the study.

Results

Participants' ages ranged from 18 to 65, with the mean age being 34.98±11.81, 55.9% of them were female, 58.4% were married, and 55.9% had at least one child. All of those who had children stated that they had their children vaccinated regularly. Also, it was found that 40.5% of the research group had received adult vaccines and that 90.1% had received at least two doses of the COVID-19 vaccine (Table 1).

Table 1. *Descriptive characteristics of the research group (n=365)*

Variable	**Mean±SD**	
Age	34.98±11.81	
Variables	**n**	**%**
Sex		
Women	204	55.9
Men	161	44.1
Marital status		
Married	213	58.4
Single	152	41.6
Education status		
Primary school	20	5.5
Middle School	9	2.5
High school	71	19.5
University	207	56.7
Postgraduate	58	15.9
Social security		
Yes	310	84.9
No	55	15.1
Income status		
Good	77	21.1
Middle	219	60.0
Insufficient	69	18.9

Table 1 (continued). *Descriptive characteristics of the research group (n=365)*

Number of children		
None	161	44.1
One	67	18.4
Two	103	28.2
Three	28	7.7
Four or more	6	1.6
The status of their children getting their vaccinations regularly		
Yes	204	100
No	-	-
Status of receiving adult vaccinations (HPV, Pneumonia, Flu etc.)		
Yes	148	40.5
No	217	59.5
COVID-19 vaccination status		
At least two doses of vaccine	329	90.1
Single dose vaccine	2	3.6
No vaccine	23	6.3

Participants' mean scores on the HLS and the Vaccine Hesitancy Scale are presented in Table 2. Accordingly, the mean scores on the HLS were 102.81±18.28 on the total scale, 22.49±4.14 on the access to information sub-dimension, 31.21±5.19 on the understanding information sub-dimension, 32.84±6.41 on the appraisal/evaluation sub-dimension, and 16.26±4.09 on the application/use sub-dimension. On the other hand, the mean scores on the Vaccine Hesitancy Scale were 48.74±14.98 on the total scale, 9.86±5.03 on the benefits and protective value of vaccines sub-dimension, 16.92±5.90 on the vaccine repugnance sub-dimension, 10.29±5.00 on the solutions for non-vaccination sub-dimension, and 11.66±3.10 on the justification of the vaccine hesitancy sub-dimension.

Table 2. *Health Literacy Scale and Vaccine Hesitancy Scale mean scores of the research group*

Scales	**Mean±SS**	**Min-Max**
Health Literacy Scale	102.81±18.28	25-118
Access to information	22.49±4.14	5-25
Understanding information	31.21±5.19	7-35
Appraisal/evaluation	32.84±6.41	8-38
Application/use	16.26±4.09	5-20
Vaccine Hesitancy Scale	48.74±14.98	26-99
Benefits and protective value of vaccines	9.86±5.03	5-25
Vaccine hesitancy	16.92±5.90	6-28
Solutions for non-vaccination	10.29±5.00	5-25
Justification of the vaccine hesitancy	11.66±3.10	8-25

It was found that the levels of HL and vaccine hesitancy in the research group were affected by the level of education, the total and sub-dimension scores of the HLS increased as the level of education increased, but that the total and sub-dimension scores on the Vaccine Hesitancy Scale decreased ($p \leq 0.05$). In addition, when the vaccine hesitancy scores were examined according to the status of having received adult vaccines and COVID-19 vaccines, it was found that the Vaccine Hesitancy Scale total and sub-dimension scores of those who stated that they had not received both adult vaccines and COVID-19 vaccines were statistically significantly higher than the scores of those who had ($p \leq 0.05$) (Table 3).

Table 3. *Distribution of Health Literacy Scale and Vaccine Hesitancy Scale total scores based on research group characteristic*

Variables	Health Literacy					Vaccine Hesitancy				
	Access to information	Understanding information	Appraisal evaluation	Application/use	Total	Benefits and protective value of vaccines	Vaccine Hesitancy	Solutions for non-vaccination	Justification of the vaccine hesitancy	Total
Education status										
Primary school[1]	19.30±6.09	27.75±7.51	28.90±9.73	15.25±5.39	91.20±27.45	10.90±6.39	18.10±5.39	11.20±597	13.20±4.49	53.40±18.01
Middle School[2]	17.22±8.52	25.27±10.79	26.55±11.91	12.77±6.07	81.77±35.73	16.11±6.75	19.88±7.14	13.88±7.27	13.44±4.66	63.33±14.84
High school[3]	22.23±3.63	30.66±4.37	32.16±5.83	15.54±4.25	100.61±16.03	10.54±5.47	17.42±6.12	11.33±5.53	12.22±3.57	51.53±17.17
University[4]	22.72±3.79	31.65±4.74	33.32±5.92	16.58±3.94	104.29±16.86	9.73±4.26	17.12±5.60	10.11±4.55	11.42±2.74	48.40±13.46
Postgraduate[5]	23.89±2.96	32.44±4.47	34.25±5.21	16.89±3.20	107.50±14.43	8.15±4.45	14.72±6.23	8.79±4.68	11.03±2.52	42.70±13.77
	H=21.980 **P=0.000** 4>1, 4>2, 5>1,5>2, 5>3, 5>4	H=19.298 **P=0.001** 4>1, 4>2, 4>3, 5>1, 5>2, 5>3	H=12.005 **P=0.017** 4>1,5>1, 5>2, 5>3	H=6.793 P=0.147	H=14.051 **P=0.007** 4>1, 4>3 5>1, 5>2, 5>3	H=16.922 **P=0.002** 2>1, 2>3, 2>4, 2>5, 3>5, 4>5	H=12.67 **P=0.013** 1>5, 2>5, 3>5, 4>5	H=11.777 **P=0.019** 2>5, 3>5, 4>5	H=11.938 **P=0.018** 2>4, 2>5, 3>5	H:22.428 **P=0.000** 4>5, 3>5, 1>5, 2>5, 2>4, 2>3
Status of receiving adult vaccinations										
Yes	22.24±4.51	30.94±5.44	32.89±6.61	16.43±4.20	102.52±19.49	8.53±4.20	16.40±6.15	9.59±4.60	11.49±2.93	46.02±14.02
No	22.66±3.87	31.93±5.02	32.80±6.28	16.15±4.03	103.02±17.46	10.77±5.35	17.27±5.71	10.77±5.22	11.78±3.22	50.60±15.36
	U=16.212 P=0.867	U=16.491 P=0.655	U=15.596 P=0.635	U=15.032 P=0.290	U=15.766 P=0.768	U=20.005 **P=0.000**	U=17.285 P=0.214	U=18.188 **P=0.030**	U=17.837 P=0.056	U=18.677 **P=0.008**
COVID-19 vaccination status										
Not received[1] One dose[2]	22.91±3.82	30.86±5.26	32.39±6.59	14.82±4.20	101.00±18.01	15.82±4.89	20.65±4.82	15.30±4.37	12.95±3.30	64.73±12.15
	21.38±4.77	30.84±4.37	33.30±5.76	16.92±3.30	102.46±15.33	12.92±5.83	19.76±6.17	13.15±7.19	13.69±4.75	59.53±19.44
At least two doses[3]	22.51±4.15	31.25±5.23	32.85±6.44	16.34±4.11	102±18.45	9.32±4.70	16.54±5.85	9.83±4.72	11.49±2.97	47.20±14.16
	H=1.346 P=0.510	H=0.675 P=0.713	H=0.119 P=0.942	H=3.646 P=0.162	H=0.835 P=0.659	H=35.316 **P=0.000** 1>2, 1>3	H=12.691 **P=0.002** 1>3	H=28.012 **P=0.000** 1>3	H=16.466 **P=0.000** 1>3, 2>3	H=33.747 **P=0.000** 1>3, 2>3
Total	22.49±4.14	31.21±5.19	32.84±6.41	16.26±4.09	102.81±18.28	9.86±5.03	16.92±5.90	10.29±5.00	11.66±3.10	48.74±14.98

Table 4 shows the correlation between the mean scores of the study group on the total and sub-dimensions of the HLS and the Vaccine Hesitancy Scale. A high, negative, and quite significant correlation was found between the total scores on both scales (r= -0.271, p=0.000). In addition, negative and quite significant correlations were found between the access to information sub-dimension of the HLS and the mean scores on the total Vaccine Hesitancy Scale and benefits and protective value of vaccines, solutions for non-vaccination, and justification of the vaccine hesitancy sub-dimensions; between the mean understanding information sub-dimension score of the HLS and the mean scores on the total Vaccine Hesitancy Scale and benefits and protective value of vaccines and justification of the vaccine hesitancy sub-dimensions; between the mean appraisal/evaluation sub-dimension score of the HLS and the mean scores on the total Vaccine Hesitancy Scale and benefits and protective value of vaccines, solutions for non-vaccination, and justification of the vaccine hesitancy sub-dimensions; between the mean application/use sub-dimension score of the HLS and the mean scores on the total Vaccine Hesitancy Scale and benefits and protective value of vaccines, vaccine repugnance, solutions for non-vaccination, and justification of the vaccine hesitancy sub-dimensions (Table 4).

Table 4. *Correlation between individuals' Health Literacy Scale and Vaccine Hesitancy Scale scores*

Health Literacy Scale		Benefits and protective value of vaccines	Vaccine Hesitancy	Solutions for non-vaccination	Justification of the vaccine hesitancy	Total
Access to information	r	-.410**	-.082	-.152**	-.207**	-.264**
	p	**.000**	.118	**.004**	**.000**	**.000**
Understanding information	r	-.406**	-.063	-.097	-.190**	-.233**
	p	**.000**	.231	.064	**.000**	**.000**
Appraisal/Evaluation	r	-.427**	-.064	-.104*	-.179**	-.240**
	p	**.000**	.223	**.047**	**.001**	**.000**
Application/Use	r	-.444**	-.108*	-.127*	-.180**	-.272**
	p	**.000**	**.038**	**.015**	**.001**	**.000**
Total	r	-.458**	-.083	-.127*	-.204**	-.271**
	p	**.000**	.113	**.015**	**.000**	**.000**

* p<0.05 **p<0.01, p=significance level, r=correlation coefficient

Table 5 shows the effect of individuals' HL on vaccine hesitancy. A simple linear regression analysis with five models was conducted to explain the effect of HL levels on vaccine hesitancy. Each of the subscales in the HL was specified as a separate model. On the other hand, in the last model, the effect the level of HL on the vaccine hesitancy was determined. The HL levels of the research group predicted vaccine hesitancy highly significantly. The observed decline in vaccine hesitancy can be attributed to the influence of the sub-dimensions of the HLS, with the access to information sub-dimension accounting for 6.9% (R^2=0.069), the understanding of the information sub-dimension contributing 5.4% (R^2=0.054), the appraisal/evaluation sub-dimension representing 5.8% (R^2=0.058), the application/use sub-dimension and the total HLS collectively explaining 7.4% (R^2=0.074) (Table 5).

Table 5. *The effect of individuals' health literacy levels on vaccine hesitancy*

Health Literacy Scale*	**Vaccine Hesitancy Scale**				
	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
	β	β	β	β	β
Access to information	-.952				
Understanding information		-.672			
Appraisal/Evaluation			-.562		
Application/Use				-.993	
Total					-.271
R	0.264	0.233	0.240	0.272	0.271
R^2	0.069	0.054	0.058	0.074	0.074
F	27.095	20.830	22.264	28.925	28.822
p	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
DW (1.5-2.5)**	2.072	2.066	2.054	2.027	2.063

Abbreviations: F, ANOVA value R, correlation coefficient; R^2, R square; β, standardized β; DW, Durbin-Watson; *Independent variable

Discussion

The increase in anti-vaccine views has become a global problem, causing the interruption of individual and community immunization. The objective of this study was to examine the influence of HL on vaccine hesitancy among individuals. The mean score of the participants on the total HLS was determined as 102.81±18.28. Considering that the minimum score that can be obtained from the scale is 25 and the maximum score is 125, it can be said that the participants' HL level was good. Their mean score on the total Vaccine Hesitancy Scale was 48.74±14.98. Considering the minimum score that can be obtained from the scale is 21 and the maximum score is 105, it can be said that the vaccine hesitancy level of participants was moderate.

It was determined that there was a negative and significant correlation between the participants' mean scores on the total HLS and its sub-dimensions and their mean scores on the total Vaccine Hesitancy Scale and its sub-dimensions. This finding is significant in demonstrating that individuals with an enhanced HL level are less prone to exhibit vaccine hesitancy. The findings of some studies in the literature support the current study findings.[17-21] For example, Wang et al. (2018) found that HL positively affected trust in vaccines and intention to get vaccinated.[17] Johri et al. (2015) determined that improvements in mothers' HL also improved their children's vaccination status.[18] Zhang et al. (2022) and Dodd et al. (2021) found that HL reduced COVID-19 vaccine hesitancy.[19,20] Ertaş and Göde (2021) found that there was a significant negative correlation between the level of HL and the level of anti-vaccine ideas.[21] HL affects the ability to obtain, understand, and use health information to protect and improve health. It is also important to have the ability to access and understand the right information to eliminate vaccine hesitancy. In addition, it is stated in the literature that HL can increase individuals' self-efficacy in deciding to get vaccinated by contributing to the understanding and evaluation of the effectiveness of vaccines.[19-22] Accordingly, HL is regarded as a crucial element in the process of elucidating and comprehending the principal factors that influence the decision to receive a vaccine.[12] It is stated that individuals with inadequate HL are less likely to adopt and use preventive health behaviors such as vaccination and immunization, which involve complex information. Indeed, Scott et al. (2002) concluded that inadequate HL was associated with lower use of preventive health services.[23] These findings are important in terms of showing that the gradually increasing vaccine hesitancy can be reduced by conducting studies to increase HL in the community.

In the current study, the level of participants' HL had a positive correlation with their education level and a negative correlation with their vaccine hesitancy. In the literature review, it was found that there was a positive correlation between the education level of individuals and their HL levels and that high levels of education increased the level of HL.[24-28] More than half of the research group were university graduates, which can be associated with a good level of HL. However, it is worrying that although a significant part of the participants had university or above education and their HL levels were good, they had a moderate level of vaccine hesitancy. Although all of the participants who had children had been vaccinated, and a significant proportion of them had received the promising COVID-19 vaccine, more than half of them had not received their adult vaccines, which should be evaluated in terms of vaccine hesitancy. When the vaccine hesitancy scores of the participants were examined according to the status of whether they had received their adult vaccines and COVID-19 vaccines, it was determined that the mean scores of the participants who had received these vaccines on the total and sub-dimensions of the Vaccine Hesitancy Scale were statistically significantly higher than the scores of those who had not received both vaccines. It has been stated that when unvaccinated adults contact the disease agent, they can carry these factors to young children and individuals with weak immune systems or elderly people and cause high rates of child and adult deaths.[10] In addition, the reflection of the vaccine hesitancy revealed in the current study on childhood vaccination practices may pose a risk in terms of herd immunity. This situation shows the importance of determining the factors affecting vaccine hesitancy and conducting studies to eliminate them. To combat vaccine refusal, it is important to determine the reasons for vaccine hesitancy/refusal, to carry out scientific studies to increase social approval of vaccination and to propose solutions considering these studies.[10,29] This is because if the vaccination rates decrease, the emergence and spread of pandemic diseases will be inevitable. In studies on vaccine refusal, the most common reasons for refusing vaccines have been reported as follows: "low vaccine efficiency," "mistrust," "side effects of vaccines," and "belief that vaccines are harmful".[1,30] In a Cochrane review of the investigation of the factors affecting the decisions of parents and caregivers to have their children vaccinated, 38 different studies were examined, and it was reported that lack of knowledge was the most important factor in vaccine hesitancy.[31v]In an evaluation based on the data of 194 WHO member countries, it was determined that in three years' time covering 2014 and 2016, concerns about vaccine safety and side effects, which are among the most common reasons for hesitation, increased from 22.0% to 23.0%, the lack of information on the importance of vaccination among families increased from 10.0% to 15.0%, and that religion, culture, gender, and other sociodemographic characteristics-based hesitancy increased from 9.0% to 12.0%.[32] In an international multicenter study conducted by the Infectious Diseases - International Research Initiative (ID-IRI), it was emphasized that all

the factors causing vaccine refusal were related to the education and education resources of society, and therefore that it was necessary to develop strategies at the global level and to provide reliable information to combat vaccine refusal.[33]

Conclusion

The results of this study, which was conducted to investigate the relationship between individuals' HL and vaccine hesitancy indicated that the level of HL of the participants was good, the level of their vaccine hesitancy was moderate, and these two characteristics were negatively correlated, as the level of education increased, HL increased and vaccine hesitancy decreased, and that as vaccine hesitancy increased, the status of getting both adult vaccines and COVID-19 vaccines decreased.

In light of these findings, it is recommended that studies should be carried out to increase the HL of society to create social awareness about vaccine hesitancy and refusal, qualitative and quantitative studies should be conducted in different and large populations and sample groups to provide a more holistic perspective on the factors that may affect vaccine hesitancy and refusal (such as socioeconomic status, cultural beliefs, and access to health services). In addition, healthcare professionals are the individuals who can best understand the hesitancy of individuals about vaccination and produce solutions. For this reason, to change the anti-vaccine attitudes of society, it should be ensured that individuals have enough knowledge about vaccines and that those who have vaccine hesitancy or anti-vaccination attitudes should be provided with counseling.

Limitation

This study is limited to the date it was conducted, the data collection forms used for the purpose, and the responses given by the participants. The study focused on a limited number of variables, such as HL and vaccine hesitancy. The data is cross-sectional and does not allow us to see how things change over time. This lack of ability to see how one's level of VH can change over time is restrictive since the situation with the pandemic and vaccines are changing rapidly and it is possible people's levels of hesitancy are more transient as well. Another limitation of the study is that only individuals with internet access and active social media use participated in the study.

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