ORIGINAL PAPER

EXPLORING HEALTH LITERACY AND VACCINE ATTITUDES AMONG STUDENTS 50+ YEARS OF AGE AT REFRESHMENT UNIVERSITY

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Summary

Background. The effect of health literacy on individuals' attitudes towards vaccination is a critical issue. This study examines the health literacy and general attitudes towards vaccination of students aged 50 years and above.

Material and methods. A survey was administered to 360 respondents aged 50 years and above who were studying at Akdeniz University (Türkiye), Refreshment University. The health literacy scale and general vaccine attitudes scale were used in this study with a descriptive and cross-sectional research design. Descriptive statistics, independent sample t-tests, ANOVA, and Pearson correlation analyses were used for analysis of the data.

Results. The research results revealed that health literacy (79.2%) was high and that attitudes toward vaccines were moderate (52.6%). Statistically significant differences were detected in terms of vaccine attitudes and age, gender, marital status, education, and satisfaction with health workers. An unexpected negative relationship was found between health literacy and vaccine attitudes.

Conclusions. Accurate information, adequate health communication, and a participatory approach to reduce psychological resistance should be provided to eliminate vaccine hesitancy and increase confidence in vaccination. The effectiveness of health literacy programs should be increased, and other factors should be examined in depth.

Keywords: vaccine attitudes, vaccine hesitancy, 50 years and older, health knowledge, trust

Introduction

Health literacy refers to the knowledge, skills, and competencies necessary to improve personal and community health by changing individuals' lifestyles and conditions [1]. Even in economically developed countries in Europe, many children, adolescents, and adults have limited health literacy skills. According to research conducted in the WHO European Region, population health literacy follows a social gradient and can reinforce existing inequalities [1]. Elderly individuals with low health literacy may have difficulty managing multiple diseases and understanding treatment processes, leading to disruptions in self-care [2]. In this context, individuals' capacity to make sense of health information and their ability to apply this information play a crucial role in the effectiveness of health protection and improvement processes. While their level of knowledge about health information enables older individuals to make conscious and effective decisions in health management, it also directly affects the success of health-related strategies [3].

In recent years, the effects of health literacy on the general well-being of elderly individuals have been addressed within the scope of health policies and education programs. Third-age university education, which has been carried out in Türkiye since the 1970s, plays an important role in this context. As of 2016, this education can be considered a valuable component of global health policies in terms of increasing the health literacy of elderly

individuals and supporting active aging processes. The courses and activities in third-age university education are designed by including the concepts of health and lifelong learning, which are among the dimensions of the active aging concept of the WHO. The content of these education programs is shaped to help elderly individuals understand health information and use this information effectively. The effect of this education on increasing the health literacy and general well-being of elderly individuals shows that it offers a strategic approach to increasing the accessibility and effectiveness of health services [4].

Lorini et al. [5], who investigated the relationship between health literacy and vaccination (including attitudes toward vaccines, the intention to vaccinate, and vaccine uptake) through a systematic review, concluded that health literacy is affected by several factors, such as country, age, and the type of vaccine, in the prediction of vaccine acceptance, but the relationship between health literacy and vaccination is not yet clear. Similarly, Zhang et al. [6] concluded in their systematic review that although vaccine literacy plays a role in determining the level of vaccine hesitancy, the relationship remains unclear.

A systematic review conducted by Fenta et al. [7] on health literacy and COVID-19 vaccine acceptance revealed that there was a relationship between health literacy and COVID-19 vaccine acceptance. In this study, positive perceptions of the vaccine, vaccine hesitancy, adverse reactions due to vaccines, residence, socioeconomic status, level of education, younger age, being a healthcare professional, and positive belief factors were associated with health literacy and COVID-19 vaccine acceptance [7].

Despite vaccines being proven effective in preventing illness, disability, and death from vaccine-preventable diseases, individuals continue to defy the evidence and refuse to be vaccinated in many parts of the world [5]. Vaccine hesitancy is a term used to describe a range of attitudes, ranging from reluctance to get vaccinated to outright refusal. During the pandemic, vaccine hesitancy was considered one of the ten major threats to public health [8].

Literacy training significantly contributes to the awareness of individuals. For example, in a study conducted by Alper Ay et al. [9], a significant difference was found between the disaster awareness perception levels of elderly individuals and their status of receiving disaster education. In this study, while pre-disaster awareness and false disaster awareness levels were higher in those who did not receive disaster education, post-disaster awareness levels were higher in those who received disaster education [9].

Effective health literacy interventions should be characterized by a common definition and methodology, and the results should be comparable. Visscher et al. [10] reported significant gaps in "which interventions are most effective" in improving health literacy. Therefore, the development of health literacy studies can also significantly increase the effectiveness of health literacy programs. Studies on health literacy and vaccination attitudes among middle-aged and older individuals are quite limited.

Aim of the work

This study aimed to determine the health literacy levels of Akdeniz University, Refreshment University students and their general attitudes toward vaccination. The study also aimed to determine the relationship between health literacy and attitudes toward vaccination by examining the differences between some sociodemographic characteristics of the participants and their health literacy and attitudes toward vaccination.

Material and methods

The research population consisted of 750 individuals 50+ years of age studying at Akdeniz University within the scope of Refreshment University. It was calculated that reaching

at least 255 individuals with a 95% confidence interval was sufficient as the sample of the research [11]. However, it aimed to reach more participants, and 360 individuals who participated in the research voluntarily constituted the sample of the research; this data, consisting of 360 individuals, was included in the analyses. In this study, which is of the descriptive and cross-sectional research type, data was collected online via the system between April 15th, 2024 and July 15th, 2024 from students aged 50 years and above utilizing the survey technique.

A Google form was created with informed consent and a survey. Students were given the survey to fill out via WhatsApp. The students were asked to provide informed consent in the survey questionnaire.

The data obtained from the study was analyzed via SPSS version 23. Since the skewness and kurtosis values of the scales used in the study were lower than -1.5 and +1.5, the data was assumed to have a normal distribution [12], and parametric tests were used in the analyses. In addition to descriptive statistics, independent sample t-tests, one-way ANOVA, and Pearson correlation analysis were used in the analyses. In addition, Cronbach's alpha values were calculated to check the consistency and reliability between the variables. In the present study, $p<0.05$ was considered significant.

A total of 16 questions were asked in the survey used in the study, including questions about demographic characteristics and health information. In addition, two scales were used for health literacy and vaccine attitudes.

Health Literacy Scale: To measure the health literacy of the participants, a scale consisting of 18 items on a 5-point Likert scale (never 1 and always 5) developed by Ayvaz Kuloğlu [13] and whose validity and reliability were assessed was used. The items in this scale reflect an individual's ability to access, understand, and evaluate health information, as well as to make informed decisions regarding health. The scale includes both positively and negatively

worded statements to ensure a balanced assessment of health literacy. Higher scores on the scale indicate stronger abilities to navigate the healthcare system, apply health-promoting behavioral patterns, and manage one's health effectively. The reliability of the scale was determined to be 0.752. The health literacy scale consists of three dimensions: health services, disease prevention, and health improvement. 6 items in the scale are reverse scored [13]. The scale reliability was determined to be 0.739 in this study. The highest score of the health literacy level can be calculated as 90 out of 18 items on the scale.

Attitude Scale towards Vaccines: A scale developed by Cvjetkovic et al. [14] and validated in Turkish by Özümit [15] was used to measure participants' attitudes towards vaccines. The scale consists of 14 items on a 5-point Likert-type scale (1 for strongly disagree and 5 for strongly agree). The reliability value of the scale developed for attitudes towards vaccination was calculated as 0.853. The reliability of the scale was determined to be 0.866 in this study. It includes attitudes, behaviors, and thoughts regarding vaccination practices. It consists of 2 dimensions: vaccination thoughts and attitudes towards vaccination. Negative statements on the scale are reverse-scored, and scores between 14-32 are negative attitudes, 33-51 are moderate attitudes, and 52-70 are positive attitudes.

Results

The demographic characteristics of the Refreshment University students who participated in the study are presented in Table 1.

Table 1. Information on participants' descriptive characteristics

Variables	Categories	N	%
Gender	**Female**	256	71.1
	Male	104	28.9
Age	**50-65**	162	45.0
	66 and above	198	55.0
Marital status	**Married**	197	54.7
	Single	163	45.3
Education	**Primary and high school**	148	41.1
	Pre-undergraduate, undergraduate and postgraduate	212	58.9
Profession	**Not working**	161	44.7
	Housewife	63	17.5
	Civil servant	86	23.9
	Worker	18	5.0
	Self-employed	32	8.9
Do you know that you have the right to choose a doctor?	**Yes**	348	96.7
	No	12	3.3
When you are sick, what is the first thing you usually do?	**I go to the doctor/hospital**	265	73.6
	I use home remedies	63	17.5
	I consult individuals around me	3	0.8
	I consult the pharmacy	20	5.6
	I do nothing	9	2.5
Can you afford your doctor's expenses?	**Very easy**	38	10.6
	Partially easy	160	44.4
	Partially difficult	118	32.8
	Very difficult	36	10.0
	No answer	8	2.2
Which health institution do you generally apply to?	**Family medicine**	179	49.7
	State hospital	98	27.2
	University hospital	55	15.3
	Private hospital/practice	28	7.8
What is the first thing you do when the adult closest to you (your spouse, child, parent, etc.) gets sick?	**I "take" him/her to the doctor/hospital**	302	83.9
	I give him/her medicines at home	32	8.9
	I consult with individuals around me	2	0.6
	I consult with my pharmacy	21	5.8
	I don't do anything	3	0.8
Where do you first get health information in general?	**Television/radio**	19	5.3
	Newspaper, magazine	138	38.3
	Internet	191	53.1
	Doctor/nurse/pharmacist	12	3.3
What is your most common reason for applying to health institutions	**Prescribing medicine**	133	36.9
	Monitoring chronic diseases	103	28.6
	Preventive health services	48	13.3

and organizations (health services) in general?	Acute conditions	76	21.1
Do you feel the need to get a second opinion about your illness?	Yes	213	59.2
	No	12	3.3
	Sometimes	135	37.5
For what reason(s) do you feel the need to get a second opinion?	Because I don't understand the doctor	11	3.1
	Because the doctor doesn't give enough information	70	19.4
	Because I don't trust the doctor	22	6.1
	To have the doctor's diagnosis confirmed by a second doctor	245	68.1
	Because my circle recommends another doctor	12	3.3
In general, are you satisfied with the health services you receive from health institutions and organizations?	Not satisfied	29	8.1
	Partially satisfied	196	54.4
	Satisfied	135	37.5
Are you satisfied with healthcare professionals in general?	Not satisfied	13	3.6
	Partially satisfied	176	48.9
	Satisfied	171	47.5

A total of 71.1% of the participants were female, 55% were in the age group of 66 years and above, 54.7% were married, 58.9% had an associate's degree or undergraduate or postgraduate degree, and 44.7% were unemployed. A total of 96.7% of the participants stated that they have the right to choose a doctor, 73.6% stated that they first go to a doctor or hospital when they get sick, and 44.4% stated that they can partially cover the cost of doctors easily. A total of 49.7% of the participants stated that they primarily apply to family medicine, 83.9% take their relatives to a doctor/hospital when they get sick, 53.1% generally access their first health information on the Internet, 36.9% most frequently apply to health institutions and organizations to obtain prescriptions, 59.2% want a second opinion when they get sick, and 68.1% consult a second doctor to confirm the doctor's diagnosis. In addition, 54.4% of the participants stated that they were partially satisfied with health services, and 48.9% were partially satisfied with health workers (Table 1). Table 2 shows the participants' responses to the health literacy scale items.

Table 2. Participants' responses to the Health Literacy Scale

Items	M	%	SD
Health Services Dimension			
1) I participate in activities that will positively affect my health.	3.81	76.34	1.12
2) I wonder what the drugs prescribed by doctors are used for and research them.	3.68	73.78	1.22
3) When I have trouble using prescribed medications, I consult my doctor or pharmacy.	3.19	63.84	1.40
4) If questions like "What is my illness? What should I do?" come to my mind, I try to research and learn.	4.04	80.94	1.15
5) I learn about the symptoms and treatments of diseases that concern me.	4.11	82.34	1.03
6) I do research on mental health issues and treatments.	3.38	67.62	1.35
7) I try to understand why we need vaccines.	3.62	72.56	1.19
Protection from Diseases Dimension			
8) I do not believe that doing sports has a positive effect on my health, and I do not participate in sports activities.*	4.08	81.72	1.18
9) I do not prefer to make decisions that will improve my health.*	3.84	76.88	1.42
10) I don't believe my regular daily behaviors are related to my health.*	3.83	76.77	1.24
11) I don't usually read medication leaflets.*	3.66	73.33	1.24
12) I don't understand much when I read medication leaflets.*	3.75	75	0.98
13) When I get sick, I use medication upon recommendation.*	4.73	94.6	0.55
14) I do not believe that I understand the doctor's explanations sufficiently during any illness.*	3.93	78.61	0.92
Health Improvement Dimension			
15) I believe that expired foods will negatively affect my health.	4.51	90.22	1.00
16) I believe that behaviors such as smoking and drinking alcohol negatively affect my health, and I try to stop these habits.	4.28	85.66	1.14
17) I believe that the negative conditions around me (noise, dirty waste) affect my health.	4.40	88.16	1.00
18) I believe that garbage creates an environment for diseases, and I take the necessary precautions.	4.43	88.72	0.91
Health Literacy Scale Total Score: 71.27	3.96	79.2	0.48

Notes: M – mean; SD – Standard Deviation. Questions marked * are reverse-coded.

When the participants' scores from the health literacy scale items are examined in Table 2, the highest score belongs to the item "When I get sick, I use medicine upon recommendation" (94.6%). The lowest score was for the item "When I have difficulty using prescribed medications, I go to my doctor or pharmacy" (63.84%). The mean score of the health literacy

scale was 3.96±0.48 out of 5 (79.2%). The general health literacy levels of the participants were high (79.2%). These results suggest that some individuals may delay seeking clarification or support, highlighting the need to improve help-seeking behaviors related to medication use.

Table 3 shows the responses given by the participants to the vaccine attitude scale items.

Table 3. Responses given by the participants to the Vaccine Attitude Scale

Items	Mean	%	SD
Vaccine Thought Dimension			
1) Claims in the media that vaccines can cause certain psychological and neurological diseases, such as autism and multiple sclerosis, make me concerned about the safety of vaccination.*	3.48	69.6	1.14
2) It is important to include the entire population in vaccination to prevent the emergence of new epidemics.	2.62	52.4	1.16
3) An important way to include the population in vaccination is to educate parents about vaccines.	2.00	40	0.96
4) Doctors and nurses play an important role in educating parents about the importance of childhood vaccinations.	1.75	35	0.84
5) Since all of the diseases included in the vaccination program are very rare today, it is no longer necessary to vaccinate children.*	2.27	45.4	1.04
6) Stopping an infectious disease is safer than vaccinating against that disease.*	3.31	66.2	1.09
7) Vaccines contain substances that have been proven to be harmful to children's health.*	2.55	51	0.97
Attitude Dimension Towards Vaccination			
8) Before compulsory vaccination, diseases were disappearing with better hygiene and health measures.*	3.13	62.6	1.02
9) The state has no right to make vaccinations mandatory for children; parents should be the ones who make positive decisions for their children.*	2.89	57.8	1.24
10) There is insufficient evidence that vaccination prevents the occurrence of infectious diseases.*	2.77	55.4	1.08
11) Pharmaceutical companies encourage the vaccination of children to make a profit, even though they are aware that vaccination is harmful.	3.10	62	1.13
12) (If I were responsible) I would vaccinate children as per the recommended immunization schedule.	2.49	49.8	1.00
13) (If I were the responsible person) I would recommend that parents vaccinate their children within the recommended immunization schedule.	2.38	47.6	0.93
14) If vaccines were available against HIV (the virus that causes AIDS) and Hepatitis C (the virus that causes jaundice), I would get vaccinated.	2.04	40.8	0.99
Vaccine Attitudes Scale Total Score: 40.7	2.63	52.6	0.63

Notes: Questions marked * are reverse-coded.

When the scores obtained from the vaccine attitude scale items in the responses of the participants in Table 3 are examined, the item with the highest score is "Claims in the media that vaccines can cause certain psychological and neurological diseases such as autism and multiple sclerosis cause me to worry about the safety of vaccination" (69.6%). The lowest score was "Doctors and nurses play an important role in educating parents about the importance of childhood vaccination" (35%).

The overall mean score of the vaccine attitude scale was 2.63±0.63 (52.6%) out of 5, and the total score was 40.7. In the evaluation of the vaccine attitudes scale, since scores between 33 and 51 were considered at a "moderate" level, the participants' vaccine attitudes were generally at a moderate level. These results show that the participants had certain concerns and uncertainties in their attitudes toward vaccination, but their attitudes were not completely negative.

Health literacy levels, as shown in Table 4, were higher in the answers to the question "What do you usually do first when you are sick?" with scores of "I go to the doctor" (4.00±0.46) and "I consult a pharmacy" (4.11±0.28) compared with the other answers (*p*=0.002). Accordingly, those who answered "I use home medicines, consult individuals around me" and "I do nothing" when they are sick had lower health literacy levels.

Table 4. Difference analysis according to participants' Health Literacy and Vaccination Attitudes

| Variables | Categories | Health Literacy | | *p* value | Vaccination Attitudes | | *p* value |
		M±SD	t/F value		M±SD	M±SD	t/F value
Age	50-65 (n=162)	3.95±0.49	-0.381	0.703	2.70±0.66	1.963	0.05*
	66 and above (n=198)	3.97±0.47			2.57±0.60		
Gender	Female (n=256)	3.99±0.46	1.634	0.103	2.68±0.62	2.291	0.023*
	Male (n=104)	3.89±0.53			2.51±0.65		
Marital status	Married	3.93±0.46	-1.464	0.144	2.53±0.58	-3.258	0.001*

	(n=197)						
	Single/divorced (n=163)	4.00±0.51			2.75±0.67		
Occupation	**Not working (n=161)**	3.79±0.48	0.623	0.646	2.65±0.68	1.599	0.174
	Housewife (n=63)	3.99±0.45			2.66±0.56		
	Civil servant (n=86)	3.90±0.50			2.60±0.61		
	Worker (n=18)	4.05±0.58			2.81±0.50		
	Self-employed (n=32)	3.93±0.46			2.39±0.62		
Education	**Primary and high school (n=148)**	3.96±0.50	0.114	0.909	2.74±0.55	2.721	0.007* 1>2
	Pre-undergraduate, undergraduate, and postgraduate (n=212)	3.96±0.47			2.55±0.67		
Can you afford your doctor's expenses?	**Very easy (n=38)**	4.05±0.48	1.475	0.209	2.51±0.62	1.557	0.185
	Partially easy (n=160)	4.00±0.49			2.63±0.60		
	Partially difficult (n=118)	3.89±0.47			2.62±0.66		
	Very difficult (n=36)	3.97±0.50			2.67±0.67		
	No answer (n=8)	3.75±0.37			3.11±0.58		
When you are sick, what is the first thing you usually do?	**I go to the doctor/hospital (n=265)**	4.00±0.46	4.454	0.002* 1.4>2	2.60±0.65	1.988	0.096
	I use home remedies (n=63)	3.76±0.53			2.63±0.53		
	I consult individuals around me (n=3)	3.51±0.33			2.16±0.22		
	I consult the	4.11±0.28			2.96±0.63		

	pharmacy (n=20)						
	I do nothing (n=9)	3.93±0.72			2.77±0.49		
What is the first thing you do when the adult closest to you (your spouse, parents, etc.) gets sick?	I take him/her to the doctor/hospital (n=302)	3.97±0.47	4.087	0.003* 2.3< 1,4,5	2.60±0.64	1.993	0.095
	I give medicines from home (n=32)	3.74±0.54			2.61±0.52		
	I consult with individuals around me (n=2)	3.13±0.19			2.92±0.20		
	I consult my pharmacy (n=21)	4.14±0.34			2.99±0.64		
	I do nothing (n=3)	4.20±0.44			2.52±0.39		
Which healthcare institution do you generally apply to?	Family medicine (n=179)	3.92±0.48	2.629	0.05* 3>1	2.64±0.61	0.546	0.651
	State hospital (n=98)	3.93±0.52			2.65±0.66		
	University hospital (n=55)	4.12±0.42			2.53±0.66		
	Private hospital/practice (n=28)	3.96±0.41			2.64±0.62		
In general, what is your most frequent reason for applying to health institutions and organizations (health services)?	Prescribing medication (n=133)	3.86±0.51	2.778	0.041* 1<2,3,4	2.54±0.57	2.317	0.075
	Monitoring chronic diseases (n=103)	4.02±0.47			2.63±0.66		
	Preventive health services (n=48)	4.00±0.45			2.82±0.66		
	Acute conditions	4.02±0.46			2.65±0.65		

	(n=76)						
Where do you first find health information in general?	**Television/radio (n=19)**	3.85±0.45	1.566	0.197	2.60±0.51	1.848	0.138
	Newspaper, magazine (n=138)	4.00±0.51			2.70±0.66		
	Internet (n=191)	3.96±0.45			2.56±0.62		
	Doctor/nurse/ pharmacist (n=12)	3.72±0.57			2.87±0.55		
Do you know that you have the right to choose a doctor?	**Yes (n=348)**	3.96±0.49	2.480	0.682	2.62±0.63	0.206	0.650
	No (n=12)	3.90±0.34			2.84±0.72		
Do you feel the need to get a second opinion about your illness?	**Yes (n=213)**	3.98±0.48	0.847	0.430	2.68±0.63	1.892	0.152
	No (n=12)	4.02±0.59			2.41±0.41		
	Sometimes (n=135)	3.92±0.47			2.57±0.64		
For what reason(s) do you feel the need to get a second opinion?	**Because I did not understand the doctor (n=11)**	3.83±0.55	2.495	0.043* 2,4>5	2.15±0.79	1.811	0.126
	Because the doctor did not give enough information (n=70)	3.99±0.46			2.62±0.54		
	Because I do not trust the doctor (n=22)	4.00±0.50			2.57±0.69		
	To have the doctor's diagnosis confirmed by a second doctor (n=245)	3.97±0.48			2.65±0.63		
	Because individuals around me recommended another doctor (n=12)	3.55±0.52			2.76±0.70		
In general, are you satisfied with the health services you receive from health	**Not satisfied (n=29)**	3.81±0.50	2.119	0.122	2.78±0.55	1.707	0.183
	Partially	3.95±0.47			2.65±0.65		

institutions and organizations?	satisfied (n=196)						
	Satisfied (n=135)	3.50±0.43			2.56±0.62		
Are you satisfied with healthcare professionals in general?	Not satisfied (n=13)	3.71±0.42	4.164	0.016* 3>1	2.82±0.59	3.639	0.027* 3<2
	Partially satisfied (n=176)	3.91±0.49			2.70±0.62		
	Satisfied (n=171)	4.03±0.47			2.54±0.63		

Notes: M – mean; SD – Standard Deviation.

The answers to the question "What is the first thing you do when the adult closest to you (your spouse, parents, etc.) becomes sick? ", the scores of "I give them medicine at home" (3.74±0.54) and "I consult with individuals around me" (3.13±0.19) were lower than those of the other answers (*p*=0.003). Those who answered "I take them to the doctor/hospital", "I consult with my pharmacist", and "I do nothing" had higher health literacy levels.

The answers to the question "Which health institution do you generally apply to?", those who preferred university hospitals (4.12±0.42) were more common than those who preferred family medicine (3.92±0.48) (*p*=0.05). Accordingly, those who preferred the university hospital as a second-level health institution had higher health literacy levels.

The answers to the question "What is your most frequent reason for applying to health institutions and organizations (health services) in general?", the proportion of those who received a prescription for medicine (3.86±0.51) was lower than that of those who received other options (*p*=0.041). Therefore, it was determined that those who most frequently apply to health institutions for chronic diseases, preventive health services, and acute conditions were found to have higher health literacy levels.

In the answers given to the questions "For what reason or reasons do you feel the need to obtain a second opinion ", those who answered "Because the doctor did not provide enough

information" (3.99±0.46) and "To have the doctor's diagnosis confirmed by a second doctor" (3.97±0.48) were significantly higher than those who answered "Because my circle recommended another doctor" (3.55±0.52) (p=0.043). In other words, the participants were less affected by the individuals around them.

In response to the question "Are you generally satisfied with healthcare professionals?", the participants' health literacy scores were significantly higher in those who responded "I am satisfied" (4.03±0.47) than in those who responded "I am not satisfied" (3.71±0.42) or "I am partially satisfied" (3.91±0.49) (p=0.016). Accordingly, it was determined that the participants who were generally satisfied with healthcare professionals had higher health literacy levels.

No statistically significant differences were found between the participants' health literacy levels and the variables of age, gender, marital status, occupation, education, ability to afford their doctor's expenses, ability to access health information in general, ability to have the right to choose a doctor, and the need to obtain a second opinion about your illness (p>0.05).

As shown in Table 4, the participants' attitudes toward vaccines varied according to age. The mean vaccine attitude score was significantly lower in those aged 66 and above (2.57±0.60) than in those aged 50-65 years (2.70±0.66) (p=0.05).

In terms of gender, the mean vaccine attitude score of women (2.68±0.62) was significantly greater than that of men (2.51±0.65) (p=0.023). Therefore, the attitude towards vaccination was greater in women.

In terms of the marital status variable, the mean vaccine attitude score was significantly greater for those who were single or divorced (2.75±0.67) than for those who were married (2.53±0.58) (p=0.001). Accordingly, the attitude towards vaccination was greater in single individuals.

In terms of the education level variable, the mean vaccine attitude score of primary school and high school graduates (2.74±0.55) was significantly higher than that of associate

degrees, undergraduates, and postgraduates (2.55±0.67) (p=0.007). Thus, vaccine attitudes were lower in those with higher education levels.

The mean vaccine attitude score among those who responded "I am satisfied" (2.54±0.63) to the question "Are you satisfied with healthcare professionals in general? " was significantly lower than that of those who answered "I am partially satisfied" (2.70±0.62) (p=0.027). Accordingly, those who were satisfied with healthcare professionals had lower attitudes toward vaccination. No significant differences were found between attitudes towards vaccines and other variables.

Table 5 shows the correlation analysis results of health literacy and attitudes towards vaccination scales.

Table 5. Correlation analysis of Health Literacy and Attitude towards Vaccination Scales

Scales	M±SD	1	2	3	4	5	6	7
Health services	3.69± 0.76	1	-	-	-	-	-	-
Prevention of diseases	3.97±0.62	0.105*	1	-	-	-	-	-
Improvement of health	4.40±0.68	0.449**	0.129*	1	-	-	-	-
Vaccination thought dimension	1.58±0.49	-0.038	-0.093	-0.031	1	-	-	-
Attitude towards vaccination dimension	2.69±0.75	-0.100	-0.120*	-0.031	0.714**	1	-	-
Health Literacy Scale (General)	3.96±0.48	0.805**	0.606**	0.651**	-0.079	-0.131*	1	-
Attitude Towards Vaccination Scale (General)	2.63±0.63	-0.078	-0.116*	-0.033	0.909**	0.941**	-0.116*	1

Notes: M – mean, SD – Standard Deviation, * 0.05, ** 0.01.

In the correlation analysis results in Table 5, a negative relationship was determined between the health literacy dimensions of "protection from diseases" and vaccine attitudes (general) (r=-0.116). Similarly, a negative relationship was detected between the overall health literacy scale score and the vaccine attitudes scale score (r=-0.116). Accordingly, when the participants' opportunities to protect themselves from diseases increased, their attitudes toward vaccination decreased. A negative relationship was detected between the overall health literacy scale score and the "attitude towards vaccination" dimension (r = -0.131). The results indicate that higher levels of health literacy are modestly associated with a more cautious or less favorable attitude toward vaccination, suggesting that vaccine-related information is being evaluated more critically.

Discussion

In this study, the participants' health literacy levels were generally 71.27 out of 90 points (3.96±0.48 out of 5, or 79.2%). It was determined that they generally did not prefer to use medication upon recommendation when they got sick (94.6%) and that they preferred to visit a doctor or pharmacy less when they had difficulty using prescribed medications (63.84%). Considering that 53.1% of the participants generally accessed their first health information on the Internet, it can be assumed that they searched the Internet when they had difficulty using prescribed medications.

These results show that although the health literacy level of students aged 50 years and above is generally high (79.2%), individual solution seeking is common, and consulting health professionals is not sufficiently adopted. In this context, increasing the habits of accessing health services and developing safe health behaviors are very important. Our study's higher health literacy level may be because individuals continue to receive education.

The participants' overall vaccine attitude level (40.7) was moderate (2.63±0.63 out of 5, or 52.6%). The highest score in the participants' responses regarding vaccine attitudes was "Claims in the media that vaccines can cause certain psychological and neurological diseases such as autism and multiple sclerosis make me worry about the safety of vaccination" (69.6%). The lowest score was "Doctors and nurses play an important role in educating parents about the importance of childhood vaccination" (35%). Accordingly, negative claims about vaccines in the press or on social media cause participants to worry about the reliability of vaccines. It can also be said that it would be more effective if educational institutions, along with doctors and nurses, played an greater role in the importance of childhood vaccination. In the study conducted by Beyazgül et al. [16], in which they questioned the knowledge and attitudes of elderly individuals about the COVID-19 disease and examined the effects on vaccine refusal, it was observed that elderly individuals whose main sources of information were news programs, social media platforms, and TV programs had higher vaccine refusal rates [16]. These results are consistent with our study.

The health literacy levels of those who prefer second stage hospitals, those who prefer doctors and pharmacies, those who visit the hospital for chronic, acute, and preventive health services, those who need a second opinion, and those who are satisfied with health workers were found to be high. On the other hand, Bertram et al. [17] determined that opinions about healthcare systems are greater in those with medium levels of health literacy because patients with high health literacy have higher expectations and may develop negative perceptions about the health system. In addition, individuals with low health literacy do not view the health system as collaborative, reducing their trust levels. Therefore, the perceived benefits to healthcare systems may vary.

According to Pechrapa et al. [18], health literacy makes it easier for individuals to understand and use health information, which means better health decisions and management

strategies. Older individuals with better health literacy can be more effective in preventing and managing diseases. In addition, accessibility and social support are important along with increasing health literacy as these factors can improve overall health by increasing access to health services and health awareness [18]. To improve health literacy, it is important to teach health information-seeking behaviors and increase public awareness of existing health programs [19].

As for vaccine attitude levels, statistically significant differences were determined in terms of age, gender, marital status, education level, and satisfaction with healthcare professionals.

Vaccine attitudes were lower in participants aged ≥66 years and those with higher education levels. This situation shows that older age groups and those with higher education levels are more hesitant about vaccination. Similar to our results, Kusuma et al. [20] reported high vaccine hesitancy in the older age group. In contrast, Li et al. [21] reported lower vaccine hesitancy in middle-aged individuals (45-59), and no difference was found in the ≥60 years of age group.

Vaccination attitudes were found to be high in women and single individuals. In contrast to our study, Kaplan et al. [22] reported that married individuals had more positive attitudes toward vaccination than single individuals did and thought that they did this to "protect themselves and their families" [22]. Similarly, studies have shown that women [21,23-27] and higher education levels are more strongly associated with vaccine hesitancy [21]. However, some studies are not consistent with the results in terms of education [28,29]. Those who were satisfied with healthcare professionals had lower attitudes towards vaccination. Accordingly, increasing satisfaction with healthcare professionals may lead to a decrease in attitudes towards vaccination and indicate greater trust in healthcare professionals. Unlike our results, in a study conducted on elderly individuals in Qatar, no significant differences were found between

vaccine attitudes and gender, marital status, socioeconomic status, or education level [30]. Understanding the extent to which older individuals may be hesitant or reject the COVID-19 vaccine and the factors associated with these attitudes is critical for designing effective public health interventions at both the individual and societal level. This understanding enables health policies and strategies to be shaped to target the elderly population and to develop strategies that increase vaccine acceptance [31].

In the results of the correlation analysis, a negative relationship (r=-0.116) was determined between the dimensions of health literacy, "protection from diseases", and vaccine attitudes. Accordingly, when the participants' opportunities to protect themselves from diseases increased, their attitudes toward vaccination decreased. In addition, a negative relationship was detected between the overall health literacy scale score and the "attitude towards vaccination" dimension (r=-0.131). An increase in the participants' health literacy caused a decrease in their attitudes toward vaccination.

Studies have shown that different results have been reached in the relationships between vaccine attitudes and health literacy and that they exhibit questioning approaches [6]. In support of our study, Yıldırım et al. [32] reported that there was a negative correlation between health literacy and vaccine safety perceptions. In addition, according to the mean scores in this study, health literacy was 54.92, and vaccine safety was 55.38 [32]. Another study revealed that vaccine literacy may play an important role in vaccination intention. In a study conducted on older Thai adults (66 years and above), a positive relationship was determined between COVID-19 vaccine literacy and attitudes and vaccination intentions. The results of this study emphasized that positive attitudes, and COVID-19 vaccine literacy could increase vaccine use in older adults, as well as the fact that healthcare professionals play important roles [33].

Zhang et al. [34] reported that health literacy in older adults from Hong Kong was limited, especially in terms of information evaluation. Weaker competencies in accessing and

evaluating health information were associated with greater difficulties in making vaccination decisions. In this context, health promotion programs should be provided comprehensively for older individuals. It is also recommended that health professionals and mass media reduce information complexity when conveying health messages and make it easier for older individuals to access and understand this information. This strategy aims to increase vaccination rates and prevent the spread of infectious diseases [34].

Conclusions

Our results showed that although the level of health literacy was high, vaccine attitudes were lower, and a negative relationship was determined between them. Moreover, similar to our results, studies on health literacy have shown that the problem was not only due to a lack of literacy. These results show that vaccine attitudes are affected by factors other than health literacy. Therefore, simply increasing health literacy will not lead to a positive attitude towards vaccines. Accurate information and adequate health communication are important for eliminating vaccine hesitancy [35]. Messages from experts and governments and the way they handle a pandemic may trigger psychological resistance. Instead, culturally appropriate and evidence-based communication and interventions may be more effective. Additionally, a participatory approach should be applied to understand the specific needs of the target audience [36,37]. Martinelli and Veltri [38] determined that cognitive and emotional concerns should be taken into account. If the severity of possible side effects of vaccination and safety information can be associated with health in middle-aged and older individuals, cognitive evaluations can be positively affected. Therefore, the effectiveness of health literacy programs should be increased for health education to be transformed into behavior.

The results of this study show that some individuals who have more knowledge about disease prevention (e.g. nutrition, physical activity, hygiene) might think they are sufficiently protected, and therefore their perceived need for vaccines decreases. The results suggest that health literacy interventions should integrate vaccine-related education alongside broader health promotion efforts.

Health literacy plays a crucial role in shaping the behavior of older adult students regarding vaccination. The results contribute to public health research by showing how specific aspects of health literacy, such as the ability to access, understand, and evaluate information, are related to trust in health institutions and making informed decisions. These insights may be used as a basis for future health education strategies and targeted interventions to improve vaccine uptake in aging populations.

The results of this study are limited to the data obtained from the 50 years and above age group in the sample and the responses given to the survey. Another limitation is that it is a cross-sectional study. For future research, studies on improving health literacy and vaccine attitudes in older age groups and longitudinal studies on older age groups are recommended. Qualitative studies can be conducted to better understand other factors and the reasons for negative attitudes.

Disclosures and acknowledgements

The permission was obtained from the institutional ethics committee (decision no. 2024/9 of 20.03.2024) and was implemented within the scope of the Helsinki Declaration.

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