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Relationship of pneumococcal and influenza vaccination frequency with health literacy in the rural population in Turkey

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ABSTRACT

Introduction: Vaccines have been shown to prevent illness, disability and death from vaccine-preventable diseases. The purpose of our study was to analyze the influenza and pneumococcal vaccination status of patients, the factors that influence the uptake of influenza/pneumococcal vaccination and the effects of health literacy (HL) on vaccination.

Materials and methods: In this cross-sectional study, demographic characteristics, comorbid diseases and the pneumococcal and influenza vaccination status in previous years were recorded for each patient. The Turkish version of the European Health Literacy Survey Questionnaire (HLS-EU-Q47) was used to assess HL.

Results: A total of 350 patients were enrolled in the study. A total of 6.3% of patients had received both vaccines. 20% of subjects were vaccinated with influenza vaccine and 11.1% of the subjects were vaccinated with pneumococcal vaccine. Overall HL was insufficient for 70.9%, problematic for 20.6%, sufficient for 7.1% and excellent for 14.2% of patients. Patients who had pneumococcal and influenza vaccination had higher disease prevention HL scores ($p = 0.013$, $p = 0.001$; respectively).

Discussion: An insufficient HL level was found to be much higher than previous studies. It was observed that an increase in disease prevention HL was associated with a rise in the rate of pneumococcal and influenza vaccination.

1. Introduction

Vaccines have demonstrated their ability to prevent illness, disability and death from vaccine-preventable diseases [1]. However, people defy the evidence and refuse vaccinations in many parts of the world. Elderly patients with a chronic illness carry a high risk of influenza infection and post-influenza pneumonia [2]. National and international guidelines thus recommend annual immunization with influenza vaccine for individuals in high risk groups [3–5]. Two types of pneumococcal vaccines are approved for use according to the guidelines: pneumococcal polysaccharide vaccine (PPSV23) and pneumococcal conjugate vaccine (PCV13) [3]. This two type vaccines are currently licensed for adults in Turkey. PPSV23 has been available for many years for use in adults. The Ministry of Health of Turkey accepted risk groups for vaccine-preventable diseases, and implemented their immunization schedules in accordance with the decisions of Immunization Advisory Committee, including adult pneumococcal vaccination greatly consistent with those of updated U.S. Advisory Committee on Immunization Practices (ACIP) recommendations such as PCV13 for selected high-risk adults and for all adults ≥ 65 years of age. Pneumococcal and influenza vaccination is reimbursed by a funding mechanism in Turkey. Despite guideline recommendations, previous studies have reported that uptake of both pneumococcal and influenza vaccinations are very poor in the adult population in Turkey [6–9].

The World Health Organization defines health literacy as personal characteristics and social resources that enable individuals and communities to access, understand, evaluate and use information to make health-related decisions [10]. Health literacy can be summarized as an individual's ability to understand and interpret the provided medical information and to behave appropriately

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based on this information [11]. The positive impact of health literacy on chronic diseases has been shown in many studies [12,13]. It has been shown that health literacy levels of those who indicate that their social status is low, have poor education and income level, assess their health condition as bad, have limited activity due to health problems and are in the older population are lower [14]. HL is independently associated with several displeasing health outcomes, including poorer overall health status, hospitalization, mortality and healthcare costs [15,16]. Studies have found that low levels of HL are associated with poor adherence to preventive and therapeutic medical recommendations.

The purpose of this cross-sectional study was to analyze the influenza and pneumococcal vaccination status of patients admitted to outpatient clinics, the factors that influence the uptake of influenza/pneumococcal vaccination and the effects of health literacy on vaccination.

2. Materials and methods

This cross-sectional study was conducted using consecutive sampling of patients employed at the pulmonary disease outpatient clinic and family health center clinic in Bursa who agreed to take part in this study between March 2018 and August 2018. A total of 350 patients admitted to the clinics, between 18 and 65 years old, who could speak and understand Turkish, and who had no cognitive disease were included in the study. The study was approved by the ethics committee of Uludag University. Written informed consent was obtained from all participants in accordance with the Declaration of Helsinki.

Demographic characteristics, history of smoking and alcohol usage, education level, employment status, comorbid diseases, and pneumococcal and influenza vaccination statusin previous years were recorded for each patient. In the last year, hospitalizations, emergency admissions and hospital admissions due to flu or pneumonia were questioned. The study was carried out with face to face interviews between patients and clinicians.

2.1. European health literacy survey questionnaire

The Turkish version of the European Health Literacy Survey Questionnaire (HLS-EU-Q47) was used to assess health literacy. Participants were asked questions in the context of a 47-item health literacy questionnaire, and their responses were recorded. This scale uses the patient's own perception of the difficulty of a behavior for each question. The answers for the 47 questions were ranked as 1 = very difficult, 2 = quite hard, 3 = quite easy, and 4 = very easy. Survey questions were divided into subgroups and assessed as follows: health care: questions 1–16, disease prevention: questions 17–31, and health improvement: questions 32–47. At the end of the scoring, 0–25 points were insufficient, 25–33 points were problematic, 33–42 points were sufficient and 42–50 points were excellent.

The Turkish validity and reliability of the scale has been demonstrated by Abacigil et al. [17].

2.2. Statistical analysis

Shapiro Wilk test was used for assessing whether the variables followed a normal distribution. Variables were reported as mean ± standard deviation (minimum: maximum) or median (minimum: maximum) values. According to normality test results, independent samples *t* test or Mann Whitney *U* test were used for between group comparisons. Categorical variables were compared by Pearson Chi square test, Fisher's Exact Test or Fisher-Freeman-Halton test. Internal consistency of the Health Literacy Scale was examined by Cronbach alpha coefficient. The innerconsistency of the HL scale was investigated with the Cronbach alpha coefficient. Reliability coefficients of the HL scale and sub-scales were found to be $\alpha = 0.866$ for health care, $\alpha = 0.916$ for disease prevention, $\alpha = 0.873$ for health promotion and $\alpha = 0.935$ for the general scale. SPPS (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.) software was used for performing statistical analysis and $p < 0.05$ was set for statistical significance.

3. Results

A total of 350 patients were enrolled in this study. Demographic characteristics of the participants are summarised in Table 1. Their mean age was 63.28 (30:90) and 48.3% (n = 169) were male. The rate of vaccination was low. 20% (n = 70) of subjects were vaccinated with influenza vaccine and 11.1% (n = 39) of the cases were vaccinated with pneumococcal vaccine. A total of 6.3% (n = 22) patients had received both vaccines.

When we evaluated the percentage of the patients who have indication for pneumococcal and influenza vaccination (n = 313), it is found that 22% of participants in the vaccine indicated vs 19.2% of participants in the general population (n = 69) were vaccinated with influenza vaccine, 10.9% vs 9.71% (n = 34) of the cases were vaccinated with pneumococcal vaccine and a total of 7% vs 6.28% (n = 22) patients had received both vaccines.

Table 2 shows the results of HLS-EU-Q47. Overall HL was insufficient for 70.9%, problematic for 20.6%, sufficient for 7.1% and excellent for 14.2% of patients. When the subgroups were examined, health care HL was insufficient for 25.5% of the patients, problematic for 39.4%, sufficient for 29.7% and excellent for 5.4%. Disease prevention HL was insufficient for 80.3% of the patients, problematic for 12.6%, sufficient for 5.7%, and excellent for 1.4%. Finally, health improvement HL was insufficient for77.4% of the patients, problematic for 15.7%, sufficient for 5.4% and excellent for 1.5%.

It was determined that age and education level had no effect on both vaccinations, and the percentage of men who had influenza vaccination was higher than women ($p = 0.014$) (Table 3).

Patients who had pneumococcal and influenza vaccination had higher disease prevention HL scores ($p = 0.013$, $p = 0.001$; respectively). There was no difference between vaccinated and unvacci-

Table 1
Socio-demographic characteristics of participants.

	n = 350
Age (year)	63.28 ± 11.58 (30:90)
Gender (F/M)	181 (51.70%)/169 (48.30%)
Smoking	
Smoker	61 (17.40%)
Ex-smoker	85 (24.30%)
Non-smoker	204 (58.30%)
Cigarettes (pkg/year)	28 ± 14.13 (2:60)
Employment Status	
Unemployed	168 (48%)
Retired	111 (31.70%)
Employed	71 (20.30%)
Alcohol Usage	10 (2.90%)
Education	
Illiterate	43 (12.30%)
Literate	44 (12.60%)
Primary school	209 (59.70%)
High school	37 (10.60%)
University	17 (4.90%)

Data are presented as mean ± st.deviation (min.: max.) and n (%).

Table 2
Health literacy scores and distribution of subgroups.

	Insufficient (%)	Problematic (%)	Sufficient (%)	Excellent (%)
Overall HL (Q 1–47)	70.90%	20.60%	7.10%	1.40%
Health care HL (Q 1–16)	25.50%	39.40%	29.70%	5.40%
Disease prevention HL(Q 17–31)	80.30%	12.60%	5.70%	1.40%
Health improvement HL(Q 32–47)	77.40%	15.70%	5.40%	1.50%

HL: Health Literacy.

Table 3
Association of vaccination status with demographic factors and educational levels.

	Pneumococcal Vaccination		Influenza Vaccination	
	No (n = 311)	Yes (n = 39)	No (n = 280)	Yes (n = 70)
Age (year)	63.69 ± 11.62 (30:90)	59.95 ± 10.84 (30:77)	62.87 ± 11.57 (30:90)	64.90 ± 11.55 (30:86)
p-value	0.057[a]		0.190[a]	
Gender				
Female	162 (52.10%)	19 (48.70%)	126 (45%)	27 (38.60%)
Male	149 (47.90%)	20 (51.30%)	154 (55%)	43 (61.40%)
p-value	0.691[b]		0.014[b]	
Education				
Illiterate	38 (12.20%)	5 (12.80%)	35 (12.50%)	8 (11.40%)
Literate	39 (12.50%)	5 (12.80%)	36 (12.90%)	8 (11.40%)
Primary school	184 (59.20%)	25 (64.10%)	165 (58.90%)	44 (62.90%)
High school	35 (11.30%)	2 (5.10%)	30 (10.70%)	7 (10%)
University	15 (4.80%)	2 (5.10%)	14 (5%)	3 (4.30%)
p-value	0.857[c]		0.985[c]	

Data are presented as mean ± st.deviation (min.: max.) and n (%).
[a] : Independent samples *t* test, b: Pearson chi-square test, c: Fisher-Freeman-Halton test.

nated groups in overall HL, health care HL and health improvement HL (Table 4). For adults aged 65 years and above (n = 174), 21.1% (n = 37) were vaccinated with influenza vaccine and 8% (n = 14) of the cases were vaccinated with pneumococcal vaccine. A total of 2.9% (n = 5) of patients had received both vaccines. The median health improvement HL score of the patients aged 65 years and above who had a pneumococcal vaccine was higher than those who did not. The median health improvement, disease prevention and overall HL scores were higher for patients who had an influenza vaccine than those who did not (Table 5).

The number of comorbidities was higher in the influenza vaccinated patient group (p = 0.022). Subgroup analysis showed that patients with chronic renal failure and bronchiectasis had more influenza vaccination (p = 0.048, p = 0.004, respectively) (Table 6).

In the last one year, hospitalized patients had more pneumococcal and influenza vaccines and patients who had emergency admission in the last year had more influenza vaccines. There was no difference in terms of hospital admissions due to pneumonia in the last one year among pneumococcal vaccinated and unvaccinated groups (p = 0.307). Patients who were admitted to the hospital due to pneumonia in the last one year were found to have a greater influenza vaccination rate (p = 0.017) (see Table 7).

Logistic regression analysis of factors that may affect the refusal of pneumococcal vaccine showed that being aged 65 years and above, not being admittedto the hospital due to influenza, to be admitted to the hospital due to pneumonia, not to be hospitalized in the last 1 year and not to have influenze vaccination had the following results (OR: 2.41, 95% CI 1.08–5.36; OR: 2.43, 95% CI 1.09–5.43; OR: 4.10, 95% CI 1.12–15.10; OR: 2.93, 95% CI 1.13–7.65, and OR: 9.16, 95% CI 3.92–21.39, respectively) (Table 8a). On the other hand, factors that may affect the refusal of pneumococcal vaccine showed that being admitted to the hospital due to influenza, not

Table 4
Relationship of health literacy and vaccination status.

	Pneumococcal Vaccination		Influenza Vaccination	
	No (n = 311)	Yes (n = 39)	No (n = 280)	Yes (n = 70)
Overall HL	21.80 ± 7.36 (7.80:45.74)	23 ± 6.49 (10.28:37.59)	21.57 ± 7.45 (7.80:45.74)	23.38 ± 6.31 (13.12:40.78)
p-value	0.333[a]		0.062[a]	
Health care HL	29.84 ± 7.28 (12.50:50)	28.95 ± 7.90 (12.50:45.83)	29.48 ± 7.40 (12.50:50)	30.80 ± 7.08 (14.58:46.88)
p-value	0.476[a]		0.178[a]	
Disease prevention HL	15.26 ± 10.70 (0:48.89)	19.74 ± 9.05 (2.22:43.33)	14.85 ± 10.70 (0:48.89)	19.38 ± 9.47 (2.22:43.33)
p-value	0.013[a]		0.001[a]	
Health improvement HL	19.90 ± 8.81 (0:50)	20.09 ± 8.30 (5.21:32.29)	19.97 ± 8.85 (0:50)	19.71 ± 8.36 (5.21:41.67)
p-value	0.899[a]		0.821[a]	

Data are presented as mean ± st.deviation (min.: max.).
[a] : Independent samples *t* test.

Table 5
Relationship between health literacy and vaccination status for 65 years and older patients.

SOY	Pneumococcal Vaccination		Influenza Vaccination	
	No (n = 161)	Yes (n = 14)	No (n = 138)	Yes (n = 37)
Overall HL	18.79 (7.80:43.62)	21.81 (10.28:37.59)	18.09 (7.80:43.62)	21.63 (13.12:37.59)
	19.91 ± 6.59	*23.48 ± 8.75*	*19.45 ± 6.80*	*22.95 ± 6.30*
p-value	0.095[d]		0.002[b]	
Health care HL	28.13 (12.50:43.75)	30.73 (12.50:45.83)	27.60 (12.50:43.75)	31.75 (17.71:45.83)
	28.66 ± 7.29	*29.61 ± 9.79*	*28.01 ± 7.43*	*31.45 ± 7.17*
p-value	0.567[d]		0.022[d]	
Disease prevention HL	10(0:37.78)	17.78(2.22:43.33)	8.89(0:37.78)	17.78(2.22:43.33)
	12.73 ± 9.60	*18.57 ± 12.19*	*11.76 ± 9.26*	*18.60 ± 10.56*
p-value	0.076[d]		<0.001[d]	
Health improvement HL	16.67(5.21:50)	22.92(6.25:31.25)	16.67(5.21:50)	16.67(6.25:33.33)
	17.88 ± 8.08	*21.95 ± 8.11*	*18.12 ± 8.27*	*18.53 ± 7.72*
p-value	0.037[d]		0.576[b]	

Data are presented as median (min.: max.), mean ± st.deviation and n (%).
[d] : Mann-Whitney *U* test HL: Health Literacy.

Table 6
Relationship between vaccination status and comorbidities.

	Pneumococcal Vaccination		Influenza Vaccination	
	No (n = 311)	Yes (n = 39)	No (n = 280)	Yes (n = 70)
Number of comorbidities	2 (0:5)	2 (0:5)	2 (0:5)	2 (0:5)
	2 ± 1.03	*2.13 ± 1.13*	*1.94 ± 0.99*	*2.30 ± 1.20*
p-value	0.450[d]		0.022[d]	
Comorbidity				
Coronary Artery Disease	54 (17.40%)	7 (17.90%)	45 (16.10%)	16 (22.90%)
p-value	0.928[b]		0.181[b]	
Hypertension	196 (63%)	28 (71.80%)	183 (65.40%)	41 (58.60%)
p-value	0.282[b]		0.290[b]	
Congestive Heart Failure	20 (6.40%)	3 (7.70%)	18 (6.40%)	5 (7.10%)
p-value	0.731[e]		0.790[e]	
Arrhythmia	10 (3.20%)	1 (2.60%)	11 (3.90%)	0
p-value	1.00[e]		0.130[e]	
Hyperlipidemia	15 (4.80%)	2 (5.10%)	15 (5.40%)	2 (2.90%)
p-value	1.00[e]		0.541[e]	
Chronic Obstructive Pulmonary Disease	45 (14.50%)	4 (10.30%)	35 (12.50%)	14 (20%)
p-value	0.475[b]		0.106[b]	
Asthma	67 (21.50%)	10 (25.60%)	60 (21.40%)	17 (24.30%)
p-value	0.560[b]		0.606[b]	
Bronchiectasis	4 (1.30%)	3 (7.70%)	2 (0.70%)	5 (7.10%)
p-value	0.033[e]		0.004[e]	
Diabetes Mellitus	117 (37.60%)	15 (38.50%)	102 (36.40%)	30 (42.90%)
p-value	0.919[b]		0.321[b]	
Thyroid disorders	15 (4.80%)	3 (7.70%)	14 (5%)	4 (5.70%)
p-value	0.436[e]		0.766[e]	
Chronic renal failure	9 (2.90%)	2 (5.10%)	6 (2.10%)	5 (7.10%)
p-value	0.352[e]		0.048[e]	
Chronic Liver Disease	6 (1.90%)	0	4 (1.40%)	2 (2.90%)
p-value	1.00[e]		0.345[e]	
Cerebrovascular Disease	7 (2.30%)	1 (2.60%)	7 (2.50%)	1 (1.40%)
p-value	1.00[e]		1.00[e]	
Depression	4 (1.30%)	0	4 (1.40%)	0
p-value	1.00[e]		0.588[e]	
Malignancy	0	1 (2.60%)	0	1(1.40%)
p-value	0.111[e]		0.200[e]	
Collagen vascular disease	7 (2.30%)	2 (5.10%)	6 (2.10%)	3 (4.30%)
p-value	0.264[e]		0.391[e]	

Data are presented as median (min.: max.), mean ± st.deviation and n (%).
[b] : Pearson chi-square test, d: Mann-Whitney *U* test, e: Fisher's exact test.

to be admitted to the hospital due to pneumonia and not to have pneumoccal vaccinationhad these results (OR: 5.20, 95% CI 2.33–11.6; OR: 5.57, 95% CI 2.15–14.41 and OR: 12.64, 95% CI 5.16–30.96, respectively) (Table 8b).

We asked for reasons for refusing vaccination for patients who were never vaccinated and the leading factors adversely influencing vaccination were discouragement by doctors 71.6%, not being in the risk group 22.5%, disbelief in vaccine effectiveness 7.1% and being afraid of the side effects of vaccine 3.8% (Fig. 1).

Patients who were not vaccinated because of discouragement by doctors had a higher rate (75.1%) of insufficient overall HL scores ($p < 0.001$).

4. Discussion

This study aimed to determine the pneumococcal and influenza vaccination status of patients admitted to outpatient clinics and whether health literacy affects the vaccination rates. In this study

Table 7
Relationship between hospitalization, emergency and hospital admissions due to flu or pneumonia and vaccination status.

	Pneumococcal Vaccination		Influenza Vaccination	
	No (n = 311)	Yes (n = 39)	No (n = 280)	Yes (n = 70)
Hospitalization in the last year	63 (20.30%)	15 (38.50%)	50 (17.90%)	28 (40%)
p-value	0.010[b]		<0.001[b]	
Emergency admissions in the last year	130 (41.80%)	20 (51.30%)	109 (38.90%)	41 (58.60%)
p-value	0.259[b]		0.003[b]	
Hospital admission due to influenza	113 (36.30%)	17 (43.60%)	114 (40.70%)	16 (22.90%)
p-value	0.377[b]		0.006[b]	
Hospital admission due to pneumonia	42 (13.50%)	3 (7.70%)	30 (10.70%)	15 (21.40%)
p-value	0.307[b]		0.017[b]	

Data are presented as n (%). b: Pearson chi-square test, c: Fisher-Freeman-Halton test.

Table 8a
Independent correlates of refusing pneumococcal vaccine.

Predictor	Wald	OR(95%CI)	p-value
Gender			
(Ref.Cat.:Male)			
Female	0.70	–	0.403
Age (year)			
(Ref.Cat.:<65)			
≥65 years	4.64	2.41 (1.08:5.36)	0.031
Number of comorbidities	0.17	–	0.677
Hospital admission due to influenza*(Ref.Cat.Yes)*			
No	4.71	2.43 (1.09:5.43)	0.030
Hospital admission due to pneumonia*(Ref.Cat.No)*			
Yes	4.52	4.10 (1.12:15.10)	0.033
Hospitalization in the last year *(Ref.Cat.Yes)*			
No	4.85	2.93 (1.13:7.65)	0.028
Emergency admissions in the last year *(Ref.Cat.Yes)*			
No	0.07	–	0.789
Health Literacy Score			
Overall HL	0.05	–	0.828
Health care HL	0.06	–	0.804
Disease prevention HL	0.04	–	0.841
Health improvement HL	0.05	–	0.823
Influenza vaccination			
(Ref.Cat.not vaccinated)			
Vaccinated	26.17	9.16 (3.92:21.39)	<0.001
Model $\chi^2 = 291.81$; $p < 0.001$			
Pseudo $R^2 = 0.75$			
n = 350			

Ref.Cat: Reference category, OR: Odds ratio, CI:Confidence Interval.

Table 8b
Independent correlates of refusing influenza vaccine.

Predictor	Wald	OR(95%CI)	p-value
Gender			
(Ref.Cat.:Male)			
Female	3.66	–	0.056
Age (year)			
(Ref.Cat.:<65)			
≥65 years	1.84		0.175
Number of comorbidities	0.18	–	0.675
Hospital admission due to influenza*(Ref.Cat.Yes)*			
No	16.12	5.20 (2.33:11.64)	<0.001
Hospital admission due to pneumonia*(Ref.Cat.No)*			
Yes	12.52	5.57 (2.15:14.41)	<0.001
Hospitalization in the last year *(Ref.Cat.Yes)*			
No	1.13	–	0.287
Emergency admissions in the last year *(Ref.Cat.Yes)*			
No	2.16	–	0.141
Health Literacy Score			
Overall HL	3.23	–	0.072
Health care HL	3.22	–	0.073
Disease prevention HL	3.18	–	0.075
Health improvement HL	3.28	–	0.070
Pneumococcal vaccination			
(Ref.Cat.not vaccinated)			
Vaccinated	30.79	12.64(5.16:30.96)	<0.001
Model $\chi^2 = 221.89$; $p < 0.001$			
Pseudo $R^2 = 0.63$			
n = 350			

Ref.Cat: Reference category, OR: Odds ratio, CI:Confidence Interval.

population, which consisted of patients in a rural area, only 6.3% reported to have received both vaccines, 20% of the cases were vaccinated with influenza vaccine and 11.1% of the cases were vaccinated with pneumococcal vaccine. It was determined that age and education level had no effect on both vaccinations, and influenza vaccination in the male population was higher. Although pneumococcal and influenza vaccination is reimbursed by a funding mechanism in Turkey, this study confirmed previous reports that the rates of pneumococcal and influenza vaccination are low in Turkey [6–9].

In our study it was found that overall HL was insufficient for 70.9%, problematic for 20.6%, sufficient for 7.1% and excellent for 14.2% of patients. In a study performed in our country, the HL index was 30.4, and it was stated that 24.5% of the society was at an insufficient level and 40.1% was at a problematic-limited level [17]. In our study, the insufficient health literacy level was found to be much higher due to our study population being selected from a semi-rural area.

It was observed that an increase of disease prevention HL was associated with a rise in thepneumococcal and influenza vaccination rate. Aranha et al. showed that an adequate score in health literacy was associated with higher compliance with both influenza and pneumococcal vaccines [18]. Moran et al. investigated functional HL with the Short Test of Functional Health Literacy in Adults (S-TOFHLA) and found that the frequency of influenza vaccination did not vary significantly according to HL [19]. Bennett et al. evaluated HL with the National Assessment of Adult Literacy (NAAL) and showed that increased HL was associated with the likelihood that an older adult would have received the influenza vaccination [20].

White et al. found a significant positive association between HL and influenza vaccination for adults aged 65 years and above, meanwhile, HL was not positively associated with pneumococcal vaccination [21]. In our study, for adults aged 65 years and above, the median health improvement HL score of the patients who had a pneumococcal vaccine was higher than those who did not. The median health improvement, disease prevention and overall HL scores were higher for patients who had an influenza vaccine.

In a study performed in our countryin 2006, the reported vaccine coverage ratesfor people ≥ 65 years old, people with diabetes and people with COPD were 5.9%, 9.1% and 14.9%, respectively [22]. Our study showed that people ≥ 65 years old had a 2.5% vaccination rate with both vaccines. The number of comorbidities was higher in the influenza vaccinated patient group, and chronic renal failure and bronchiectasis had more influenza vaccinations. Andrew et al. showed that repeat users of the influenza vaccine

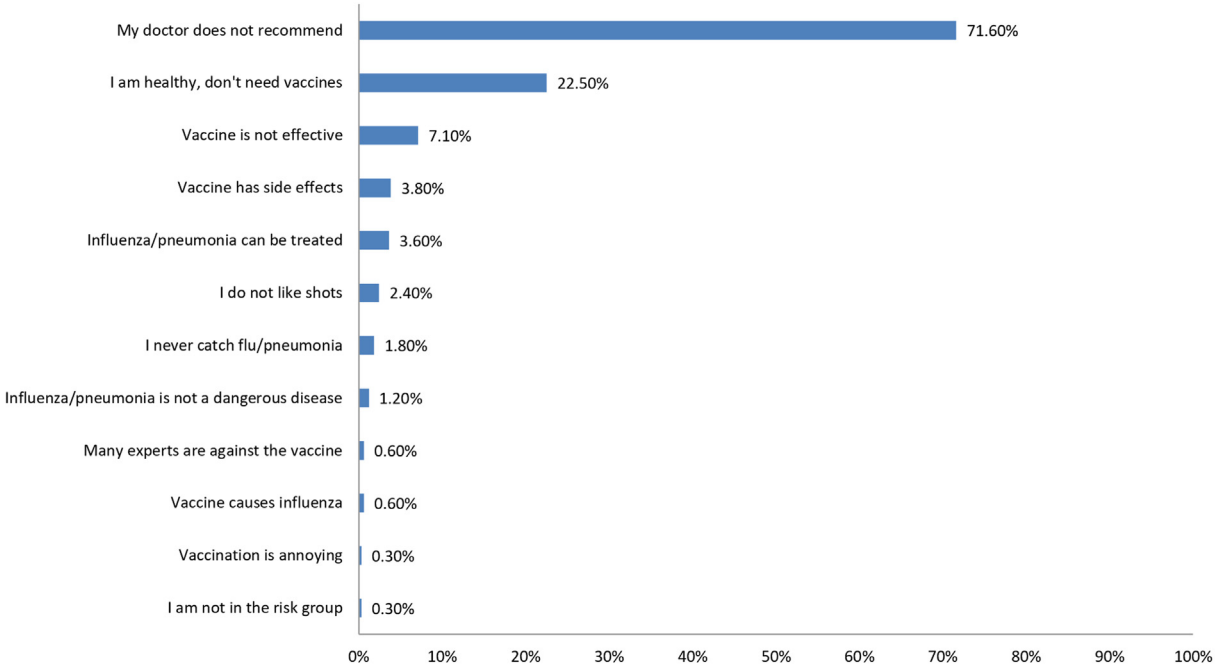

Fig. 1. Factors adversely influencing vaccine uptake.

were slightly older and had more comorbid illness and poorer self-rated health [23]. The study also showed that those living in rural areas were less likely to have regular influenza vaccination. Kamal et al. determined that need-related factors such as health status and comorbidities exhibited a strong relationship with influenza and pneumonia vaccination status [24].

Our study determined that in the last one year, hospitalized patients had more pneumococcal and influenza vaccines, and emergency admission in the last year positively affected influenza vaccination status. Hospitalization due to pneumonia in the last year encouraged patients to have influenza vaccination but not pneumococcal vaccination.

In our study we found factors that may affect the refusal of pneumococcal vaccine as: being aged 65 years and above, not admitted to the hospital due to influenza, to be admitted to the hospital due to pneumonia, not to be hospitalized in the last one year and not to have an influenza vaccination. Being admitted to the hospital due to influenza, not to be admitted to the hospital due to pneumonia and not to have pneumoccal vaccination were independent variables for refusing influenza vaccination. Demirdöğen et al. showed that prior influenza vaccination was determined to be the variable that influenced the receipt of pneumococcal vaccination [9]. Although being 65 years and over is a risk group for pneumoccal vaccination, this elderly population was found to be an independent factor for refusing pneumococcal vaccination in multivariate analysis. We think that this negative situation may be due to the low scores of health literacy and the low number of physician admissions in rural areas.

Reasons for refusing vaccination for patients who were never vaccinated and the leading factors adversely influencing vaccination were discouragement by doctors (71.6%), not being in the risk group (22.5%), disbelief in vaccine effectiveness (7.1%) and being afraid of the side effects of vaccines (3.8%). When we evaluated these patients for HL levels, patients who were not vaccinated because of discouragement by doctors had a higher rate of insufficient overall HL scores. In a previous Turkish study that evaluated factors influencing influenza vaccine uptake, the rates were disbelief in vaccine effectiveness (32%), believing that vaccination triggered influenza infection (20%), not being in the risk group (14%), being afraid of the side effects of the vaccine (13%) and being discouraged by their doctors (8%) [25].

Interestingly, in our study, the rate of unvacccinated patients due to discouragement by doctors was very high. We think that this big difference is related to the fact that our study was performed in rural areas and the patients may have less physician admission.

Potential limitations of this study merit consideration. Firstly, our study may exhibit recall bias due to subjects' responses to questionnaires and this may have influenced assessment of the vaccination rate. Secondly, we could not evaluate a healthy population aged 65 years and over because all participants had at least one comorbid disease. Lastly, the pneumococcal vaccination status was questioned in general, so conjugate and polysaccharide vaccination rates could not be evaluated separately.

5. Conclusions

We aimed to investigate the role of health literacy or illiteracy as a factor for vaccination hesitation. An insufficient health literacy level was found to be much higher in this study due to our study population being selected from a rural area. It was observed that an increase of disease prevention HLwas associated with a rise inthe pneumococcal and influenza vaccination rate. Although the most effective strategy for influenza and pneumococcal protection in people in risk groups is vaccination, we found low vaccination rates in Bursa, especially among elderly people. A country wide survey to determine the knowledge and attitude of family physicians toward influenza and pneumococcal vaccination and then planning educational workshops to promote positive behaviors may also help increase vaccine uptake.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary material

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