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Vaccination Status and Related Factors in an Elderly Turkish Population Sample: A Cross-Sectional Study

Hatice Sutcu Cicek, RN, PhD
Assoc. Prof, Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey

Mehmet Ilkin Naharci, MD
Gulhane Military Medical Academy, School of Medicine, Department of Internal Medicine, Division of Geriatrics, Ankara, Turkey

Fatma Ilknur Cinar, RN, PhD
Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey

Gulcan Bagcivan, RN, PhD
Gulhane Military Medical Academy, School of Nursing, Ankara, Turkey

Ergun Bozoglu, MD
Assoc. Prof, Gulhane Military Medical Academy, School of Medicine, Department of Internal Medicine, Division of Geriatrics, Ankara, Turkey

Ilker Tasci, MD
Assoc. Prof, Gulhane Military Medical Academy, School of Medicine, Department of Internal Medicine, Division of Geriatrics, Ankara, Turkey

Muhammet Cinar, MD
Gulhane Military Medical Academy, School of Medicine, Department of Internal Medicine, Division of Rheumatology, Ankara, Turkey.

Nurittin Ardic, MD
Assoc. Prof, Gulhane Military Medical Academy, School of Medicine, Department of Microbiology and Clinical Microbiology, Ankara, Turkey

Ayla Yava, RN, PhD Assoc. Prof,
Hasan Kalyoncu University, School of Nursing, aycosel@yahoo.com, Hasan kalyoncu Üniversitesi Gaziantep, Türkiye.

Cengiz Han Açıkel, **MD**
Assoc. Prof, Gulhane Military Medical Academy, School of Medicine, Department of Epidemiology and Public Health, Ankara, Turkey

Hüseyin Doruk, MD
Prof, Gulhane Military Medical Academy, School of Medicine, Department of Internal Medicine, Division of Geriatrics, Ankara, Turkey

Correspondence: Hatice Sutcu Cicek, Assoc. Prof, Gulhane Military Medical Academy, School of Nursing. GATA Hemşirelik Yüksek Okulu Etlik 06010 Ankara, Turkey   E-mail: hcicek@gata.edu.tr

Abstract

Background: Vaccination is one of the basic activities in preventive health care. Data related to vaccination in the elderly Turkish population is limited. The aim of the present study was to investigate the vaccination status and related factors among geriatric individuals.
Methods: In this single center, cross sectional study self-reported status of vaccinations for influenza, pneumococcal, tetanus, pandemic influenza A/H1N1 and hepatitis B were recorded in people over 65 years of age. The information was collected separately for the last 12 months and for the last 5 years. Associates of having been vaccinated were also examined systematically.

Results: Between June 2010 and June 2011, a total of 810 subjects (age range 65-101) were interviewed. In the last 6 years as a whole, 47.2% (382) of the participants reported at least 1 vaccination. The frequency of getting vaccinated in the last 12 months was higher compared to the last 5 years. Influenza vaccine was the most administered one both in the last 12 months and the last 5 years (33.7%, 12.1%). The most frequent personal reason reported for vaccination was the need for protection against diseases. Healthcare professionals and media were the most effective factors in inducing awareness of vaccination among the elderly. Unwillingness to get vaccinated was linked to the idea of inessentiality as well as having inadequate information. Higher education, male gender and previous diagnosis of pneumonia were linked to increased likelihood of being vaccinated.

Conclusions: This study showed considerably low rates of vaccination among elderly outpatients in Turkey. Efforts to increasing awareness of vaccination through healthcare professionals and media releases may help improve preventive patient care in this particular population.

Key Words: Vaccination, elderly, influenza, pneumonia, hepatitis, tetanus

Background

Vaccination is one of the most effective methods for the prevention of infectious diseases and related complications. Globally, children are the major target population when vaccination is in question. However, vaccination of children alone is not sufficient to prevent development of vaccine-preventable diseases as well as associated morbidity and mortality (Badur 2008). The importance and necessity of vaccination of elder people have arisen with the increasing number of deaths related to vaccine-preventable diseases (Şimşek &Gülnar 2004). Although the incidence of such preventable diseases has decreased particularly in countries with high to moderate income (Omer et al. 2009), adult vaccination, primarily in the elderly, has generally been a disregarded issue (Zeybek et al. 2004).

Exacerbations of pneumonia and cardiopulmonary diseases comprise the most common causes of deaths in older people (Bader 2007, Kwong et al. 2010, Bennett et al. 2010). Influenza outbreaks affect 3 to 5 million people worldwide every year, with approximately half a million of deaths. The risk of mortality due to pneumonia approximately 20% in people over 65 years of age, reaching 40% in those aged 80 years and over (Bader 2007). Vaccination of old participants against seasonal influenza was reported to decrease hospitalization rates and pneumonia by 26-33%, and to decrease the risk of death by 42-50% (Jefferson et al. 2005, Rivetti et al. 2006, Nichol et al.2007, Bean-Mayberry et al. 2009).

Adult tetanus is mostly seen in individuals who had never been immunized or who had completed the primary immunization but not received the booster dose within 10 years (Gençer 2008). Older people are at higher risk for tetanus since they are prone to injuries primarily due to falls. They also have lower antitoxin levels due to a natural decrease over time. Although recent research demonstrated that many American adults are unprotected against tetanus (Chapman et al. 2008), a significant part disregard the necessity of vaccination against tetanus (Gençer 2008, Chapman et al. 2008).

Hepatitis B virus (HBV) infection is among the most common communicable diseases and is a threat to global health. One third of the world gets infected with HBV and more than 350 million people are chronic carriers of the disease who are under increased risk for chronic hepatitis, cirrhosis or hepatocellular carcinoma (Kalkan & Bulut 2008, Baghianimoghadam et al. 2011).

Scientific information about the status of adult immunization in Turkey is controversial. In this large country, prevalence of vaccination against influenza virus infection varies between 22% and 27.9% (Zeybek et al. 2004, Oncel et al. 2008, Naçar et al. 2011). The prevalence rates of vaccination against pneumococcal infections or tetanus, however, are quite low (2% and 1.8%, respectively) (Zeybek et al. 2004, Akin et al. 2011). These numbers are substantially below the desired levels, and it has been reported that only 10-20% of target adult population have been immunized. Arguments against the efficacy and side effects of vaccines, economic burden of vaccination in developing countries, and weak immunization policies are among the factors that hinder necessary improvements (Adult Immunization Guide 2009). When the estimates of an increase in the proportion of people over 65 years or older in Turkish population from the

current number of 7.3% to 15-16% by 2050 is considered, the importance of vaccination becomes more significant (Hacettepe University Institute of Population Studies 2009, Turkish Statistical Institute 2012).

Data related to vaccination in the elderly Turkish population is limited. The goal of the present study was to investigate the vaccination status in adults aged 65 years and over, with addition of the factors influencing vaccination behavior.

Methods Study area and design

This descriptive, cross-sectional study included participants aged 65 years or older, who were admitted to the outpatient clinic of a research hospital between June 2010 and June 2011. After a brief explanation of the work, participants who did not wish to participate in the study or who had difficulty in verbal communication were not included. The study was approved by the local ethics committee and all participants gave informed, written consent.

Data collection procedure

Demographic characteristics including age, gender and education level were recorded carefully on standard charts. Self-reported history of previously diagnosed chronic diseases, namely hypertension, diabetes mellitus, chronic obstructive pulmonary disease, cardiac disease or bronchial asthma was also noted. Afterwards, participants were given a specific run of explanations regarding communicable diseases, vaccine preventable diseases, and current types of vaccines and protocols, in order to make the participant remember what he or she had known formerly. Then, information about any vaccination procedure within the last 5 years was recorded. The response was not accepted positive unless the participant was completely certain of his/her answer. The type of vaccination was subsequently specified. Any information on personal vaccination cards was used to reach appropriate data where available. This step was finished with the determination of the time of vaccinations either they were in the last 12 months or in the last 5 years. Next, the patients were questioned whether they had influenza and H1N1 virus infection within the last 12 months, along with a query for a history of lifetime pneumonia and hepatitis.

The data evaluation form was based primarily on the ministry of health recommendations on vaccinations. Types of vaccines that were determined included influenza, pneumococcus, tetanus and hepatitis B vaccines which are all included in National Adult Immunization Guideline across all age groups. Influenza H1N1 vaccine which is not included in the current recommendations were also searched.

Vaccinations against influenza and pneumonia are particularly recommended nationwide in the elderly. Influenza vaccination is recommended annually, whereas pneumococcal vaccination is recommended once after the age of 65.

Data analysis

Data were evaluated using the Statistical Package for the Social Sciences (SPSS Inc. Chicago, IL, USA) version 15.0.

Descriptive statistics were given as number (%) for discrete categorical variables and as mean ± standard deviation (SD) for continuous variables. Relation between categorical variables was analyzed by Chi-square test.

Demographic factors (age, gender, education) that influence vaccination status, presence of chronic disease, whether they had influenza or pneumonia in the past were evaluated using multivariable logistic regression analysis. Because the number of participants having a history of hepatitis or influenza A/H1N1 virus infection was quite low (n=2 and n=1, respectively), only vaccinated participants were questioned about the factors associated with the vaccination status (n=382). Similarly, only the unvaccinated participants were questioned about the factors associated with being not vaccinated (n=428). "P" values <0.05 were considered statistically significant.

Results

During the study period, a total of 1102 participants were evaluated for participation in the study. Seventy two patients refused to participate, and 46 patients were not included due to communication failure. Since the data of 174 of 984 voluntary patients were incomplete, the study was finalized with 810 (73%) participants.

The mean age of the study group was 74.44 ± 6.73 years (ranged from 65 to 101), 56.8% (n=460) were female, 41.2% (n=334) were primary-intermediate school graduates, and 83.7% (n=678) had at least one chronic disease. Hypertension (59.9%, n=485), diabetes (27.0%,

n=219) and coronary heart disease (26.4%, n=214) were the most common chronic diseases.

The frequency of having been vaccinated within the past 5 years was 47.2% (n=382). As shown in Table 1 vaccination rates increased for all types in the last 12 months as compared to preceding 5 years. Influenza vaccine had the highest rates in both time intervals (33.7% and 12.1%, respectively).

Among the participants, 38.9% (n=315) had a history of influenza, and 0.1% (n=1) had H1N1 virus infection within the past 12 months. Participants had a history of lifetime pneumonia by 6.7% (n=54) and hepatitis by 0.25% (n=2).

No statistically significant relation was identified between vaccination status and gender, age group, presence of any chronic disease or having a history of influenza (p>0.05 for all). Higher level of education was associated with a significantly higher rates of immunization (p<0.001). Of the uneducated participants, 75.5% were never vaccinated, ones, whereas a majority of participants with a high school or higher education were vaccinated for at least one indication once. The majority of the participants with a lifetime history of pneumonia were found vaccinated, showing a significant association (p<0.05) (Table 2).

Table 3 demonstrates the reasons for being vaccinated or not vaccinated as well as the factors that influence vaccination status. Those who were vaccinated with any of the vaccines (n=382) within the last 5 years were interviewed for the reasons of being vaccinated and influencing factors. Among them 256 participants responded the query and 57.6% pointed out the need for protection against possible infections as the major reason. The question about influencing factors was answered by 334 participants, and recommendations of the health care professionals emerged as the leading factor by 73.6%. The query for being not vaccinated was asked to 428 participants who were never vaccinated. The two most reported reasons were concerns on the necessity of vaccination (39.1%) and having inadequate information (34.7%) (Table 3).

Age, gender, education level, presence of chronic diseases and having a history of influenza or pneumonia infections, which are likely to influence vaccination status, were analyzed by multivariable regression analysis.

The likelihood of being vaccinated was higher in high school graduates by 3.512 times, in university and higher graduate degrees by 3.168 times, in participants with a history of pneumonia by 2.687 times, and in female gender by 1.500 times (p<0.05). Other variables (age, presence of chronic diseases, history of influenza) were showed no effect on vaccination status (p>0.05) (Table 4).

Discussion

Although vaccination has long been regarded an issue of child care, it became a major topic for most medical disciplines with the improvements in living conditions and advances in basic and clinical research (Şimşek & Gülnar 2004). A survey from the Centers for Disease Control and Prevention (CDC) in 2008 reported that 60.1% of the elderly have never been vaccinated with pneumococcal vaccine in their lives (Chapman et al. 2008, CDC 2008).

The rate of vaccination against influenza virus infection in the same group was found 65% in 2009, and a target of 90% vaccination rates for both vaccines by 2020 was projected (CDC 2009a). In the present study, only 47.2% of the participants aged 65 years and over were vaccinated with any of the major vaccines within the last 5 years. However, the rate of self-reported vaccination history increased in the last 12 months, influenza vaccination being the leading one (33.7%).

It is likely that majority of participants had been vaccinated against influenza because of the large campaigns against pandemic H1N1 outbreak occurred just before this study was conducted (Naçar et al. 2011). On the other hand, only 4.3% of the participants reported pandemic H1N1 vaccination which was considerably low and probably related to the concerns regarding true efficacy and possible adverse reactions.

Likewise, Savas and Tanriverdi found the rate of pandemic H1N1 vaccination to be quite low (12.7%) even in health care workers in 2009 (Savas & Tanriverdi 2010). The authors concluded that participants' belief that the vaccine was neither safe nor protective, provoked by the opposite information in mass media and attitudes of political authorities were the leading reasons.

The present study showed that increase in the overall vaccination rate in the last 12 months as

Table 1 Vaccination status of the study participants (n=810)

	Yes	
	n	**%#**
Any vaccinations within the last 5 years	**382**	**47.2**
Last 12 months		
Influenza	273	33.7
Pneumococcus	83	10.2
Tetanus	35	4.3
Pandemic influenza A/H1N1 *	35	4.3
Hepatitis B *	10	1.2
Last 5 years		
Influenza	98	12.1
Pneumococcus	26	3.2
Tetanus	24	3.0

Percentage calculation was performed on 810 participants.

* *All pandemic influenza A/H1N1 and Hepatitis B vaccinations were conducted in the last 12 months.*

Table 2 Determination vaccination status of participants according to characteristics (n=810)

Characteristics	Being vaccinated (n=382) n (%)*	Being unvaccinated (n=428) n (%)*	Test**	p
Gender				
Female	211 (45.9)	249 (54.1)	0.712	0.399
Male	171 (48.9)	179 (51.1)		
Age groups				
65-74	211 (44.5)	263 (55.5)		
75-84	132 (51.6)	124 (48.4)	3.403	0.182
≥85	39 (48.8)	41(51.3)		
Education level				
Illiterate	37 (24.5)	114 (75.5)		
Only literate	23 (37.7)	38 (62.3)		
Primary school	156 (46.7)	178 (53.3)	59.558	**<0.001**
High school	84 (63.6)	48 (36.4)		
University degree and above	82 (62.1)	50 (37.9)		
Presence of chronic disease				
Yes	327 (48.2)	351 (51.8)	2.153	0.142
No	55 (41.7)	77 (58.3)		
Having had influenza Yes				
No	138 (43.8)	177 (56.2)	2.323	0.127
	244 (49.3)	251 (50.7)		
Having had pneumonia				
Yes	34 (63.0)	20 (37.0)	5.798	**0.016**
No	348 (46.0)	408 (54.0)		

* *Percentage of the line was considered.*

** *Chi-square test.*

Table 3 Reasons for being vaccinated or unvaccinated and influencing factors

	n*	%**
Reasons for being vaccinated (n=265)#		
Protection against diseases	178	57.6
Officially recommended for the people aged 65 years and over	74	23.9
Reducing the risk of chronic diseases	57	18.5
Total	309	100
Factors that influence agreement (n=334) #		
Health care professionals (physician, nurse, pharmacist)	262	73.6
Environment (family members, friends, relatives)	39	11.0
Media (television, newspaper, magazines)	55	15.4
Total	356	100
Reasons for being unvaccinated (n=403) ##		
Believing that it is not necessary	202	39.1
Having inadequate information	179	34.7
Ineffective previous vaccinations	110	21.3
Cost concerns	25	4.9
Total	516	100

\# Number of responders among 382 vaccinated patients interviewed
\## Number of responders among 428 unvaccinated participants
*Participants marked more than one item.
**Percentages were obtained within the column.

Table 4 Multivariable logistic regression analysis for the factors associated with vaccination (n=810)

Variables	p	OR	95% (CI)
Education (reference uneducated)			
Only uneducated	**0.027**	0.456	0.227-0.916
Low uneducated	0.284	1.389	0.762-2.532
High school	**0.001**	3.512	1.708-7.222
University degree and above	**0.016**	3.168	1.237-8.112
Having had pneumonia (reference ''No'')			
Yes	**0.001**	2.687	1.461-4.943
Gender (reference male)			
Female	**0.042**	1.500	1.015-2.216

OR=Odd's Ratio; CI=Confidence Interval.

compared to the last 5 years was primarily caused by the increased number of vaccinations against influenza. This could be attributed to the infection's being generally more common than pneumonia, hepatitis and tetanus as well as to a higher personal awareness. Nonetheless, considering the age of participants, low reported rates of vaccination in the last 5 years might have also been influenced negatively by the cognitive decline; because, Naçar et al. found that older participants fail to remember past vaccinations after some time (Naçar et al. 2011).

Studies on the frequency of regular vaccinations in the Turkish elderly are limited, most of which have focused particularly on influenza. Several authors found the rates of vaccination against influenza ranging from 22% to 26.8% among participants aged 65 years and over (Zeybek et al. 2004, Naçar et al. 2011). Starting from 60 years of age the prevalence was reported 27.9% in another survey (Oncel et al. 2008).

The frequency of vaccination against tetanus in the Turkish elderly was recorded much lower, being 1.8% the previous 10 years (Zeybek et al. 2004). Interestingly, Naçar et al. failed to determine the rate of vaccination against tetanus in their elderly cohort since the participants were not be able to remember their vaccinations correctly (Naçar et al. 2011).

The rate of vaccination against pneumococcal infections was found substantially low (0.4%). Although the rates influenza and pneumonia vaccinations in the last 12 months in the present study were higher than previously reported numbers, it is still lower compared to CDC data in 2009.

Moreover, it is clearly seen that the present rate of vaccination against influenza is quite low compared to the "Healthy People-2020" immunization targets of CDC. However, the discrepant results obtained in different studies in terms of vaccination rates might have been resultant from the differences in the study periods, sample size and data collection techniques.

A significant correlation was found between education level and vaccination rates in the present study. Regression analysis revealed an education level of high school or higher as the most effective factor increasing the likelihood of being vaccinated. In accordance with our findings, a previous study reported that participants with a low education level had fewer vaccination rates (Bennett et al. 2010).

Moreover, multiple regression analysis showed that being a female was associated with a higher rate vaccination (OR:1.50, p=0.042) (Table 4). Some earlier studies, however, reported higher rates, at least for influenza or pneumonia, of vaccination in males compared to females (Bean-Mayberry et al. 2009, Bennett et al. 2010).

These heterogeneous results suggest that, in the elderly, equal efforts should be applied to both genders in order to increase the number of vaccinations for indicated conditions.

The majority of participants of the present study had at least one chronic disease and vaccination status showed no significant difference according to presence or absence of chronic diseases. This can be explained primarily by the lack of awareness of the risks their chronic illnesses are linked and how they can be eliminated.

Nevertheless, the rate of vaccination was higher (63.0%) in participants who had a history of pneumonia (Table 2) which was significantly associated with increased ratio of vaccinations (OR:2.687) (Table 4). Such a remarkable behavioral change in terms of ''secondary'' prevention (i.e., prevention of recurrences) could be generalized to most other conditions requiring primary prevention. In this context, not only the patients but also health care professionals and related organizations should pay more attention to preventive measures in chronic illnesses in the elderly.

Indeed, many studies demonstrated that older people are prone to be vaccinated thinking that they are at risk for influenza virus infection and that influenza is a serious and fatal disease (Armstrong et al. 2001, Zimmerman et al. 2003, Chi & Neuzil 2004).

Concerns on the necessity of vaccinations, having inadequate information and considering immunization ineffective were the most common reasons for not being vaccinated in the present survey. Zeybek et al. reported that old people were not adequately informed about the benefits of immunization against pneumonia and tetanus and that only 25% had some degree of knowledge about influenza vaccination (Zeybek et al. 2004).

Moreover, they found that recognition of the efficacy and low risk of adverse events as well as

the protection lasts more than 6 months were the most important factors likely to cause agreement for vaccination (Zimmerman et al. 2003, Nowalk et al. 2004, Lau et al. 2007, Kwong et al. 2009).

In our cohort, contrary to pneumonia vaccine, history of past influenza showed no effect on the later vaccinations. Studies showed that older people might avoid vaccination against influenza with the thoughts of having low personal risk or it is not a dangerous disease, past experiences of vaccine related adverse events, concerns of catching vaccine related influenza or being afraid of injections (Armstrong et al. 2001, Zimmerman et al. 2003, Tabbarah et al. 2005, Kwong et al. 2009); which are all in accordance with the results of the present study.

Moreover, while considering a new vaccination, personal experiences and the perceived risks about influenza might be more effective than the recommendations of health care professionals (Telford & Rogers 2003). Omer et al. reported that public anxiety concerning the adverse reactions due to vaccination leads to an increase in the number of participants that refuse a vaccination (Omer et al. 2009). Therefore, accurately informing the older participants as well as strong recommendations by the health care staff is of great importance.

The present study determined that health care workers, media and social environment where effective measures of increasing the vaccinations. In addition to the sufficient knowledge of the individuals about vaccination, recommendations of the physicians, nurses, family members and friends, and media have positive impacts on the general vaccination status (Zimmerman et al. 2003, Nowalk et al. 2004, Lau et al. 2007, Kwong et al. 2009).

A study on the awareness of influenza A/H1N1 vaccine and immunization procedure reported that participants obtained information mostly through media (85% from television, 52% from newspaper, 46% from radio, and 36% from internet), followed by family members and friends (CDC 2009b).

Similar to the present study, Kwong et al. found that recommendations of physicians and nurses play important role in vaccinations in the elderly (Kwong et al. 2010). Therefore, media channels and health care professionals can be more efficiently used to provoke vaccinations of older participants.

Cognitive decline is a natural course during aging. Therefore, since a 5-year period is not a short period, impairment in recall might have caused limitations in correct data obtaining in our study. Another limitation may be that, other than the information given by the participants, the accuracy of the data related to vaccinations should have been confirmed by hospital or insurance records. However, such data are collected for a very few people and non-systematically in our country

Conclusion

In this survey, vaccination of elderly Turkish participants in the last 5 years was found considerably lower with respect to other populations. The results suggested that vaccinations can successfully be encouraged by the health care professionals and media especially when the understanding of primary or secondary prophylaxis is established.

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