

# Vaccinations Rates in the Elderly with Diabetes Mellitus

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## Abstract

Infections are a major cause of morbidity and mortality in the elderly. Improvements in health care prevention including vaccinations and treatment have led to an increase in the birth life expectancy. The vaccines that are now recommended for people over 60 are influenza, herpes zoster and a vaccine combining tetanus toxoid, reduced diphtheria toxoid, and pneumococcal vaccine. Our aim was to estimate the prevalence of vaccination among diabetic patients attending in Tepecik Training Hospital and in Ege University Faculty of Medicine. Patients and Methods: Individuals at or over the age of 60 who were attending to Tepecik Training Hospital and at Ege University Faculty of Medicine. Department of Internal Medicine was targeted from February to May 2014. Our data are collected from the patients face to face by questionnaire. Results: A total of 274 elderly patients with a mean  $\pm$  SD (range) age of 72  $\pm$  6 (62 - 93) years were questioned. The vaccination ratios were determined as 34% (93) for influenza, 9.5% (26) for pneumococcal, 10.6% (27) for tetanus vaccine. The patients were divided in two groups as diabetics and non-diabetics. The influenza vaccination rate is 38.1% in diabetic patients, rate of 31.8% in non-diabetic patients, the pneumococcal vaccine rate is 13.4% in diabetic patients, rate of 7.39% in non-diabetic patients. The tetanus vaccination rate is 9.28% in diabetic patients, rate of 11.36% in non-diabetic patients. No statistically significant difference between two groups was determined.

## Keywords

Vaccine, Diabetic, Elderly

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## 1. Introduction

Infections are a major cause of morbidity and mortality in the elderly. Improvements in health care prevention

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including vaccinations and treatment have led to an increase in the birth life expectancy. The vaccines that are now recommended for people over 60 are influenza, herpes zoster and a vaccine combining tetanus toxoid, reduced diphtheria toxoid, and pneumococcal vaccine [1]. In our country three vaccines are recommended for people over 60: influenza vaccine, pneumococcal vaccine, tetanus vaccine and are reimbursed by government [2].

In the elderly both innate and adaptive immune system functions are affected by aging. This is termed immunosenescence which results as people get older, including changes in the function of antigen-presenting cells, loss of native T cells and reduced B cell affinity, production and half-lives. Immunosenescence is the main reason for lower effectiveness of vaccines in the elderly [3]. Diabetes mellitus (DM) is a serious and growing health problem worldwide. A total of 439 million adults are estimated to be affected with DM by 2030 with a 20% increase in developed countries and 69% increase in developing countries from 2010 to 2030 [4]. In Turkey prevalence of diabetes was 16.5% and the prevalence of isolated-IFG and impaired glucose tolerance and combined prediabetes was 14.7%, 7.9%, and 8.2% respectively [5]. There has been a significant increase in the number of patients with diabetes among elderly population, and the number is estimated to increase further. About a quarter of people aged 65 years or older have diabetes mellitus nearly all of whom have type 2 disease [6] [7]. Abnormal glucose metabolism has been associated with the dysfunction of leukocytes, such as phagocytosis, chemotaxis and leukocyte adherence [8]. And these patients have a high morbidity and mortality from infection [9]. Although the necessity of influenza, tetanus and pneumococcal immunization in diabetic patients is widely accepted vaccination rates are unsatisfactory [10] [11]. Our aim was to estimate the prevalence of influenza, tetanus and tetanus vaccination among diabetic patients attending in Tepecik Training Hospital and in Ege University Faculty of Medicine.

## 2. Patients and Methods

In our study; individuals with good cognitive functions who completed the volunteer consent form and at or over the age of 60 that were attending to Tepecik Training Hospital and at Ege University Faculty of Medicine Department of Internal Medicine were targeted from February to May 2014. *Individuals at the age below 60 who did not complete the consent form and whose cognitive functions were not in place were excluded.* Our data are collected from the patients face to face by questionnaire included age, the presence of ischaemic heart disease, chronic pulmonary disease, chronic renal disease an immunodeficient state (e.g. aspleni), sickle cell disease.

### Statistical Analysis

All statistical analysis was performed using SPSS for Windows (Version 15). A p value < 0.05 was considered statistically significant. The distributions of demographic status (including age, sex) and comorbidities (diabetes, coronary artery disease, congestive heart failure, hypertension, chronic obstructive pulmonary disease, renal disease, cancer, chronic hepatitis). The patients were divided in two groups as diabetics and non-diabetics. Both of the groups influenza vaccine, pneumococcal vaccine, tetanus vaccine rates were compared. The  $\chi^2$ , the student's t tests were used when appropriate.

The study protocols were approved by the appropriate institutional review committee and performed in accordance with the Helsinki Declaration of 1975, as revised in 2000 (Date 21.01.2014 No. 14-1/2).

## 3. Results

A total of 274 elderly patients with a mean  $\pm$  SD (range) age of  $72 \pm 6$  (62 - 93) years were questioned (February to May 2014). Education status was as follows: 22% (59) illiterate, 53.6% (146) literate or primary school or secondary school, 24.7% (67) high school or university. Demographic data of patients were presented in **Table 1**. 65.2% (178) had hypertension, 4.3% (11) had chronic renal disease, 9.5% (26) chronic obstructive pulmonary disease. The vaccination ratios were determined as 34% (93) for influenza, 9.5% (26) for pneumococcal, 10.6% (27) for tetanus vaccine. Only eight (2.9%) patients had both vaccines.

The patients were divided in two groups as diabetics and non-diabetics. The mean age of diabetic patients was  $71 \pm 5$ , the mean age of non-diabetic patients was  $72 \pm 6$ . The influenza vaccination rate of 38.1% in diabetic patients, rate of 31.8% in non-diabetic patients, the pneumococcal vaccine rate of 13.4% in diabetic patients, rate

of 7.4% in non-diabetic patients, the tetanus vaccine rate of 9.3% in diabetic patients, rate of 11.4% in non-diabetic patients. The tetanus vaccination rate is 9.28% in diabetic patients, rate of 11.36% in non-diabetic patients. No statistically significant difference between two groups was determined (Table 2).

#### 4. Discussion

To our study, 274 patients with the average age of  $72.20 \pm 6.19$ , most of whom were women and were not literate, attended; and the most frequently observed disease was hypertension. Patients were basically divided into two groups as diabetic or non-diabetic. Although there was no statistical difference between the groups; pneumococcus vaccination incidence was 13.4% for diabetic elder and 7.39% for non-diabetic elder. Influenza vaccination rate was 38.14% for diabetic elder and 31.8% for non-diabetic.

The morbidity and mortality of influenza is high among the elderly and those with chronic diseases such as a diabetes mellitus [12]. According to the recommendations of the Advisory Committee on Immunization Practices (ACIP), the influenza vaccine should be considered by DM patients [13]. In the USA influenza vaccinated rate was 69.9% in all elderly in individuals in 2003 [14].

DM is a risk factor for pneumonia because these patients have an increased risk of aspiration, hyperglycemia, impaired immunity, decreased lung function, pulmonary microangiopathy and coexisting illnesses such as renal failure and heart disease [15]. Patients also have an increased risk of death from influenza and complicating pneumonia [16]. In our study, influenza vaccination rate of 38.14% in diabetic patients, 31.8% in non-diabetic patients were determined. The pneumococcal vaccine rate was 13.4% in diabetic patients, 7.39% in non-diabetic patients. Although no statistically significant difference was determined between diabetic and non-diabetic groups in our study, a higher influenza and pneumococcal vaccination rate was found in the diabetic group.

In this study the influenza vaccination rate of 34% of patients is lower than reported rate and rate of pneumococcal vaccine 9.5% is substantially lower than the rate reported [17]. In our country, in a study the vaccination ratios were determined as 26.8% for influenza although no pneumococcal vaccination [18]. For ten years, uptake of pneumococcal vaccination among the elderly remains in the 40% to 60% [17] [19].

**Table 1.** Demographic features of patients.

Age, Mean $\pm$ SD	72 $\pm$ 6
Gender	%, (n)
Women	60% (165)
Men	40% (109)
Comorbidity	
Hypertension	65.2% (178)
DM	35.40% (97)
CAD	20.8% (56)
Cancer	10.5% (28)
COPD	9.5% (26)
CHF	8.7% (23)
Chronic Renal disease	4.3% (11)
Hemoglobinopathy	0.3% (1)

CAD, coronary artery disease; CHF, congestive heart failure; COPD; chronic obstructive pulmonary disease, DM, diabetes mellitus.

**Table 2.** Vaccination rates in older people who are diabetic and non-diabetic.

	Diabetic patients (97)	Non-diabetic patients (177)	p value
Influenza vaccine	38.14% (36)	31.8% (56)	(p = 0.29)
Pneumococcal vaccine	13.4% (13)	7.39% (13)	(p = 0.10)
Tetanus vaccine	9.28% (9)	11.36% (20)	(p = 0.59)

Even though vaccination is promoted as a health policy in our country, we found vaccination rates low even in a metropolitan city such as İzmir. The most important limitation of our study is low number of cases.

Limitation of the study is that 274 patients were reached over a period of only four months. For a more significant study to be conducted, a long-term research involving greater number of patients is required. Another factor that limited our study is that the reasons for the vaccination of patients were unknown.

## 5. Conclusion

In conclusion, vaccination rates are low in our diabetic patients. Extensive research directed towards low vaccination rates in diabetic patients is required.

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