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Original Article

Determination of Vaccination Rates for Influenza and Pneumococcal Vaccines in Patients with Chronic Obstructive Pulmonary Disease and Factors Affecting Vaccination

Hasibe Çiğdem Erten,[1] Ülkü Aka Aktürk,[2] Özlem Soğukpınar,[2] Makbule Özlem Akbay,[2] Dilek Ernam[2]

[1]University of Health Sciences Kartal Dr. Lütfi Kırdar City Hospital, İstanbul, Türkiye
[2]University of Health Sciences Sureyyapasa Chest Diseases and Thoracic Surgery Training and Research Hospital, İstanbul, Türkiye

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Correspondence: Hasibe Çiğdem Erten,
University of Health Sciences Kartal Dr. Lütfi Kırdar City Hospital, İstanbul, Türkiye
E-mail: hct@windowslive.com

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ABSTRACT

Objective: Influenza and pneumococcal vaccines are recommended for chronic obstructive pulmonary disease (COPD) cases in national and international guidelines. In this study, it was aimed to determine the vaccination rates for influenza and pneumococcal diseases in COPD patients and to determine the demographic and clinical, characteristics that affect the vaccination of the patients.

Methods: Our study included 297 COPD patients aged 18 years and older who were diagnosed with COPD for at least 1 year according to the Global Initiative for Chronic Obstructive Lung Disease criteria. Pulmonary function tests of the patients, staging of the disease, and the Modified Medical Research Council scale were recorded.

Results: When the 297 patients included in the study were evaluated according to the inclusion and exclusion criteria. In the study, the rate of influenza vaccination in COPD patients in the last year was 29.4% and the rate of pneumococcal vaccination at least once in their lifetime was 34.5%. Vaccination rates of patients aged 65 and over were significantly higher in influenza vaccination (p=0.036). In pneumococcal vaccination, the vaccination rate was statistically high in those with a high education level (p=0.001). It was observed that the vaccination rates were significantly lower in patients with low-income levels in both vaccine groups (p=0.044, p=0.034). When asked about the reason for the unvaccinated patients, they were told that they were not aware of the vaccine (41.3%, 76.0%) in the first place and that their doctor did not recommend it (28.2%, 27.6%) in the second place for influenza and pneumococcal vaccines.

Conclusion: Influenza and pneumococcal vaccine application rates in patients with COPD were found to be low in our country, in line with the literature. The lack of doctor's advice and lack of knowledge about the vaccine was important factors in unvaccinated individuals.

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a common, preventable, and treatable disease characterized by persistent respiratory symptoms and airflow limitation due to abnormalities in the airway and alveoli, usually due to extensive exposure to harmful particles and gases.[1] COPD exacerbation is acute worsening requiring additional treatment, excluding day-to-day variability in respiratory symptoms.[1]

COPD is a disease that progresses with every acute exacerbation. Respiratory tract infections trigger exacerbations the most. Influenza virus and pneumococcal infections increase mortality and morbidity by causing frequent exacerbations in this group of patients, facilitating the development of pneumonia and secondary bacterial infection. Therefore, according to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2019 guide-

line, both evidence of B-level influenza vaccine for COPD cases and evidence of B-level pneumococcal vaccine is recommended to prevent community-acquired pneumonia.[1]

Despite these recommendations, influenza and pneumococcal vaccination rates in COPD patients are at a different levels. The American National Immunization program stated the targeted vaccination rate for COPD patients at 90%. However, studies have reported that influenza vaccination rates in the USA were 70%, and pneumococcal vaccination rates were 49.9%-56.3%.[2] In Italy, Chiatti et al. showed that the influenza vaccination rate was 30.5% in their study involving COPD patients.[3] In the limited number of studies conducted in our country on this subject, the influenza vaccination rate was found to be 37.9%-36.5%, respectively, and the pneumococcal vaccination rate was 13.3%-14.1%, respectively.[4,5] In these studies, it was observed that the frequency of influenza and pneumococcal vaccination in COPD patients in our country was far below the expected values. By determining why the patients are not vaccinated and the presence of factors that may affect their vaccination, the measures for the causes can be increased, and more benefits can be obtained from the vaccines.

Determining the patients' knowledge level about vaccination and determining the attitudes that may affect the vaccination behavior positively or negatively will contribute to the production of solutions. For these reasons, we aimed to determine the current vaccination rates and the factors affecting vaccination in COPD patients who applied to our hospital.

MATERIALS AND METHODS

Patients with COPD for at least 1 year, according to the GOLD who applied to our clinic between August 01, 2019 and December 01, 2019 have been enrolled in this study.

This research has been designed as a cross-sectional study. Based on the data obtained from the literature reviews, a questionnaire has been created, including the sociodemographic characteristics, smoking status, age of COPD, history of chronic respiratory failure, hospitalization and intensive care unit (ICU) stay in the last year, comorbidities, flu vaccination in the last year, whether they had pneumococcal vaccination throughout their lives, who recommended if vaccinated or why not vaccinated.

The questionnaire has been conducted through face-to-face interviews by the same person. At the same time, pulmonary function tests are performed by trained technicians in accordance with standard criteria. Staging of the disease has been performed according to the GOLD guideline and Modified Medical Research Council (MMRC) scale.

Informed consent form was signed and obtained from the patients before the survey. Local ethics committee approval was granted for the study (116.2017.098).

RESULTS

The study enrolled 297 patients but 4 of them were excluded; 2 due to cancer and 2 due to rheumatologic disease. The mean age of the participants was 65.8±9.51 years. Of these patients, 57% were aged 65 and over. The gender distribution was 84.6% male and 15.4% female. In terms of educational status, 62.1% were primary school graduates, 4.8% were university graduates, and 14% had never been to school. When the occupational groups were examined, 173 (59%) patients were retired blue-collar, 34 (12%) patients were housewives, and 33 (11%) patients were retired white-collar employees. A majority of the patients (n=214) had minimum wage and below income level.

Hundred and three patients had chronic respiratory failure. It was determined that 62.3% of the patients had hospitalization due to COPD attacks in the last year, and 14.3% were hospitalized in the ICU. The comorbidities of the patients (n=160/293) could be elaborated as hypertension (31%), coronary artery disease (21.8%), and diabetes mellitus (4.8%).

Table 1. Distribution of those recommending influenza and pneumococcal vaccines to patients

	Influenza vaccine		Pneumococcal vaccine	
	Percentage	Number	Percentage	Number
Vaccination rate	29.7	87	34.5	101
Recommending vaccination				
Chest diseases specialist	57.5	50	89.1	90
Family physician	23.0	20	6.9	7
Other branch specialist	1.1	1	1.0	1
Pharmacy	6.9	6		
Other patients	4.6	4		
Media	3.4	3	1.0	1
Auxiliary health personnel	1.1	1		
Other	3.4	3	2.0	2

Table 2. Reasons for not being vaccinated for influenza and pneumococcal vaccines

	Percentage	Number
Those not vaccinated against ınfluenza	70.3	206
Reasons for not vaccinating		
I didn't know about the vaccine.	41.3	85
My doctor didn't recommend it	28.2	58
I didn't need to get vaccinated	11.2	23
I didn't mind getting vaccinated.	10.7	22
I forgot to vaccinate	6.8	14
I believe vaccination is harmful	3.4	7
I don't believe the vaccine is effective	3.4	7
Some doctors do not recommend the flu vaccine.	3.4	7
The vaccine can cause side effects.	2.9	6
The vaccine can cause me to get the flu.	2.9	6
I think vaccination costs money	0.5	1

According to the GOLD classification, 6.5% of the patients were mild, 41.3% moderate, 38.6% severe, and 13.6% had very severe COPD. In the pulmonary function test, the mean forced vital capacity (FEV1) value of the patients in the first second was 49.69%, and the ratio of the FEV1 compared to FVC was 60.23. According to MMRC dyspnea scores, 3.4% of patients were grade 0, 30.7% of patients were grade 1, 30.7% of patients were grade 2, 28.7% of patients were grade 3, and 6.5% of patients were grade 4.

The influenza vaccination rate in COPD patients was 29.4% in the last year, and the rate of pneumococcal vaccination at least once in their lifetime was 34.5%. Only 5% had been vaccinated within 5 years. Vaccination was recommended by a pulmonologist for 57.5% of those vaccinated against influenza and 89.1% of those vaccinated against pneumococcus, while 23% of influenza and 6.9% of the pneumococcus has been recommended by a family physician (Table 1).

When the reason for not being vaccinated was asked, a majority of the individuals claimed that they were not informed about the vaccination, followed by the answer that their doctor did not recommend it (Table 2).

There was no significant relationship between vaccination rates for influenza and pneumococcal vaccines, and gender, marital status, and occupation ($p>0.05$). Vaccination rates of patients aged 65 and over in influenza were significantly higher ($p=0.036$). The vaccination rate was statistically significantly higher in those with a higher education level in pneumococcal vaccination ($p=0.001$). Vaccination rates for influenza and pneumococcal vaccines were found to be significantly lower in the low-income group ($p=0.044$, $p=0.034$). When both vaccine groups were evaluated according to spirometric COPD severity and MMRC dyspnea score, no significant difference was observed between vaccination rates ($p>0.05$) (Tables 3 and 4).

DISCUSSION

In our study, the rate of influenza vaccination in COPD patients in the last year was 29.4% and the rate of pneumococcal vaccination at least once in their lifetime was 34.5%. When the demographic, clinical, sociocultural, and socioeconomic characteristics of the patients affected the vaccination rates, a significant relationship was found between the vaccination rates for both vaccine groups and the income level and educational status. At the same time, age was found to be an effective factor in influenza vaccination. One of the most important indicators in increasing the vaccination rate was the 'recommendation of the vaccine to the patient by the physician. When the reasons for not being vaccinated were examined, the most striking reason was 'lack of knowledge about the vaccine' and the second was 'the doctor did not recommend the vaccine'.

In Italy, Chiatti et al. showed that the influenza vaccination rate was 30.5% in their study involving COPD patients. [3] Arinez-Fernandez et al. Stated that the pneumococcal vaccination was 32.5% and Vandesbos et al. published the vaccination rate as 55.3%.[6,7] Aktürk et al. Found the pneumococcal vaccination rate as 14.1%, and influenza vaccination rate as 36.5% in a cohort of 296 COPD patients. [5] Bülbül et al. identified pneumococcal vaccination rate as 12% in COPD patients.[8] Özlü et al. conducted a multicenter study with 4968 COPD patients, and found the influenza vaccination rate as 37.9% and the pneumococcal vaccination rate once in a lifetime as 13.3%.[4] In our study, the influenza vaccination rate was lower than the global and national average, while the rate of pneumococcal vaccination was higher. This situation may be due to the free-of-charge pneumococcal vaccine service in our institution. The fact was supported by the data that 61% of the pneumococcal vaccinated patients were vaccinated within the last year and 34% within the last 5 years.

In the multicenter study conducted by Özlü et al., it was determined that the influenza vaccination rate of patients

Table 3. Comparative values of influenza vaccination status of patients according to their sociodemographic characteristics

	Influenza vaccination		Those not vaccinated against influenza		Total		p-value
	Percentage	Number	Percentage	Number	Percentage	Number	
Age							
<65	34.5	30	46.6	96	43.0	126	0.036)e
≥65	65.5	57	53.4	110	57.0	167	
Gender							
Male	29.8	74	70.2	174	84.6	248	0.526
Female	28.9	13	71.1	32	15.4	45	
Marital Status							
Married	29.7	73	70.3	173	84.0	246	0.557
Single	29.8	14	70.2	33	16.0	47	
Education Status							
Primary School	31.3	57	68.7	125	62.1	182	0.005
Did not go to school	12.2	5	87.8	36	14.0	41	
High School	46.7	14	53.3	16	10.2	30	
Middle School	38.5	10	61.5	16	8.9	26	
University	7.1	1	92.9	13	4.8	14	
Profession Group							
Retired blue collar	28.3	49	71.7	124	59.0	173	0.383
Housewife	29.4	10	70.6	24	11.6	34	
Retired white collar	36.4	12	63.6	21	11.3	33	
Blue collar	27.6	8	72.4	21	9.9	29	
Tradesmen	20.0	2	80.0	8	3.4	10	
Retired tradesmen	60.0	6	40.0	4	3.4	10	
Unemployed	0.0	0	100.0	3	1.0	3	
White collar	0.0	0	100.0	1	0.3	1	
Income Status							
Below minimum wage	22.5	29	77.5	100	44.0	129	0.044
Minimum wage	32.9	28	67.1	57	29.0	85	
Above minimum wage	38.0	30	62.0	49	27.0	79	
Spirometric COPD Severity							
FEV1 ≥ 80%	10.5	2	89.5	17	6.5	19	0.263
50% ≤FEV1 <80%	30.6	37	69.4	84	41.3	121	
30% ≤FEV1 <50%	32.7	37	67.3	76	38.6	113	
FEV1 <30%	27.5	11	72.5	29	13.7	40	

aged 65 and over was significantly higher.[4] In our study, influenza vaccination rates of patients aged 65 and over were found to be significantly higher. Influenza vaccination is reimbursed for people aged 65 and over and those with chronic respiratory disease, but influenza vaccination in COPD patients under 65 years was found to be far below the expected level.

One of the most important indicators in increasing the vaccination rate is the recommendation by the doctor. In a study conducted in Germany, it was reported that the most important factor that increased vaccination was the doctor's recommendation also.[9] Özyurt et al. showed that the influenza vaccine was administered at a rate of 82.5% in COPD patients with the recommendation of a doctor, whereas Aktürk et al. stated that influenza vaccine was administered at a rate of 72% and the pneumococcal vaccine was administered with a doctor's recommendation at a rate of 49.4%.[10,5] In our study, 81.6% of the patients had the influenza vaccine and 89.1% the pneumococcal vaccine with the recommendation of a doctor. These data are compatible with the data in the literature. When asked which branch physician it recommended to patients who received influenza vaccine on the recommendation of a doctor, it was said that it was recommended by chest disease physicians at a high rate of 57.5%. Pneumococcal vaccination was recommended by chest disease physicians with a rate of 89.1%.

In the study conducted by Aktürk et al., when patients were asked why they were not vaccinated against influenza and pneumococci, 57.2% of the patients who were not

Table 4. Comparative values of pneumococcal vaccination status of patients according to sociodemographic characteristics

	Pneumococcal vaccination		Not vaccinated against pneumococcal disease		Total		p-value
	Percentage	Number	Percentage	Number	Percentage	Number	
Age							
<65	42.6	43	43.2	83	43.0	126	0.507
≥65	57.4	58	56.8	109	57.0	167	
Gender							
Male	35.9	89	64.1	159	84.6	248	0.306
Female	26.7	12	73.3	33	15.4	45	
Marital Status							
Married	35.8	88	64.2	158	84.0	246	0.318
Single	27.7	13	72.3	34	16.0	47	
Education Status							
Primary School	34.1	62	65.9	120	62.1	182	0.001
Did not go to school	9.8	4	90.2	37	14.0	41	
High School	53.3	16	46.7	14	10.2	30	
Middle School	50.0	13	50.0	13	8.9	26	
University	42.9	6	57.1	8	4.8	14	
Profession group							
Retired blue collar	34.1	59	65.9	114	59.0	173	0.130
Housewife	23.5	8	76.5	26	11.6	34	
Retired white collar	54.5	18	45.5	15	11.3	33	
Blue collar	24.1	7	75.9	22	9.9	29	
Tradesmen	30.0	3	70.0	7	3.4	10	
Retired tradesmen	40.0	4	60.0	6	3.4	10	
Unemployed	66.7	2	33.3	1	1.0	3	
White collar	0.0	0	100.0	1	0.3	1	
Income status							
Below minimum wage	26.4	34	73.6	95	44.0	129	0.034
Minimum wage	40.0	34	60.0	51	29.0	85	
Above minimum wage	41.8	33	58.2	46	27.0	79	
Spirometric COPD severity							
FEV1 ≥ 80%	15.8	3	84.2	16	6.5	19	0.243
50% ≤FEV1 <80%	35.5	43	64.5	78	41.3	121	
30% ≤ FEV1 <50%	33.6	38	66.4	75	38.6	113	
FEV1 <30%	42.5	17	57.5	23	13.7	40	

vaccinated against influenza and 46.8% of the patients who were not vaccinated against pneumococcus responded as no physician recommendation.[5] In our study, 41.3% of the patients who were not vaccinated against influenza were not aware of the vaccine, 28.2% were not vaccinated because the doctor did not recommend it, 76% of the patients who did not have the pneumococcal vaccine were "unaware of the vaccine," and second, 27.6%, of them said that they were not vaccinated because the doctor did not recommend it. These data suggested that informing the patient about the vaccine and recommending the vaccine by the doctor may increase the vaccination rates.

When the effect of sociodemographic characteristics on vaccination was examined, it was reported that females were vaccinated at a higher rate.[6] Özlü et al. showed that female gender and patients with higher education levels in both vaccine groups were vaccinated at a higher rate in pneumococcal vaccination.[4] In our study, in parallel with the data of Aktürk et al., gender and marital status did not affect vaccination rates; A significant relationship was found between the income status of the patients and the vaccination rates.[5] Non-vaccination rates were observed to be significantly higher in those with income below the minimum wage. In addition to these data, when the education levels of the patients in our study were examined, the rate of not getting vaccinated in those who did not go to school was statistically significantly higher than those, who went to school. We would like to emphasize that, unlike other study data, in our study, the rate of unvaccinated in university graduate patients was similar to that of patients

who did not go to school. This situation supports the image of anti-vaccination that is emerging among people with a high level of education in society.

Arinez-Fernandez et al. showed that COPD severity was an important determinant in pneumococcal vaccination. [6] Kohlhammer f. similarly emphasized that the severity of COPD was important for vaccination.[9] In the study performed by Özlü et al., the influenza vaccination rate was found to be high in advanced-stage COPD patients. In our study, no relationship was demonstrated between the severity of COPD and vaccination rates.[4]

As in all survey studies, patient statements were taken as the basis for our study. There may be data bias due to patients' memory. The main limitation of this study could be attributed to being a single-center study with the limited number of patient population. The inability to obtain detailed information from the patients about where they received the vaccine and what type of vaccine they received and the lack of adult vaccination cards in our country can be counted on these limitations.

Conclusion

The rate of influenza and pneumococcal vaccine administration in COPD patients was found to be low in our country, in line with the literature. To increase the vaccination rate, doctors should advise patients on vaccination at each visit, and pharmacies and media organizations should be supported in this regard. Vaccination rooms should be established in hospitals and studies should be carried out to increase the rate of vaccination in these centers. Patients should be given detailed information about the importance of vaccination and the time of application, and training should be provided. It should be reminded that vaccines are within the scope of reimbursement for the eligible patient group.

Ethics Committee Approval

This study approved by the Sureyyapasa Chest Diseases and Thoracic Surgery Training and Research Hospital Clinical Research Ethics Committee (Date: 03.07.2019, Decision No: 116.2017.098).

Informed Consent

Retrospective study.

Peer-review

Externally peer-reviewed.

Authorship Contributions

Concept: Ü.A.A., H.Ç.E.; Design: Ö.S., H.Ç.E.; Supervision: H.Ç.E., D.E.; Fundings: H.Ç.E., M.Ö.A.; Materials: Ö.S., Ü.A.A.; Data: M.Ö.A., H.Ç.E.; Analysis: Ü.A.A., H.Ç.E.; Literature search: D.E., M.Ö.A., H.Ç.E.; Writing: H.Ç.E.; Critical revision: Ö.S., D.E.

Conflict of Interest

None declared.

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Kronik Obstrüktif Akciğer Hastalığı Hastalarında İnfluenza ve Pnömokok Aşıları İçin Aşılanma Oranlarının Tespit Edilmesi ve Aşılanmayı Etkileyen Faktörlerin Belirlenmesi

Amaç: İnfluenza virüsü ve Streptococcus pneumoniae enfeksiyonları kronik obstrüktif akciğer hastalığı (KOAH) hastalarında sık alevlenmelere yol açarak, pnömoni ve ikincil bakteriyel enfeksiyon gelişimini kolaylaştırarak mortalite ve morbiditeyi arttırmaktadır. Bu nedenle KOAH olgularına ulusal ve uluslararası tanı ve tedavi kılavuzlarında influenza ve pnömokok aşısı önerilmektedir. Çalışmamızda, KOAH hastalarında influenza ve pnömokok aşıları için, aşılanma oranlarının tespit edilmesi, hastaların aşılanmasını etkileyen demografik, klinik, sosyokültürel ve sosyoekonomik özelliklerin belirlenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmamıza Global Initiative for Chronic Obstructive Lung Disease (GOLD) kriterlerine göre en az bir yıldır KOAH tanısı almış ve çalışmaya katılmayı kabul eden 18 yaş ve üzeri 297 KOAH hastası dahil edildi. Hastaların solunum fonksiyon testleri, hastalığın GOLD kılavuzunda göre evrelemesi ve Modifiye Tıbbi Araştırma Konseyi (MMRC) skalası kaydedildi. Tek anketör tarafından hastalara yüz yüze anket yapıldı.

Bulgular: Çalışmaya alınan 297 hasta dahil edilme ve dışlanma kriterlerine göre değerlendirildiğinde dört hasta çalışma dışı bırakıldı. 293 hastanın %84.6'sı erkek, %15.4'ü kadın, yaş ortalaması 65.8±9.51 yıl olarak saptandı. Çalışmada KOAH hastalarında son bir yıl içerisinde influenza aşılanma oranı %29.4 ve yaşamları boyunca en az bir kez pnömokok aşılanma oranı %34.5 olarak bulundu. İnfluenza aşılanmasında 65 yaş ve üzeri hastaların aşılanma oranlarının anlamlı derecede yüksek olduğu görüldü (p=0.036). Pnömokok aşılanmasında eğitim seviyesi yüksek olanlarda aşılanma oranı istatistiksel olarak yüksek saptandı (p=0.001). Her iki aşı grubunda da gelir düzeyi düşük olan hastalarda aşılanma oranlarının anlamlı derecede düşük olduğu görüldü (p=0.044, p=0.034). Aşılanmayan hastalara nedeni sorulduğunda influenza ve pnömokok aşıları için ilk sırada 'aşıdan haberdar olunmadığı' (%41.3, %76.0) ikinci sırada ise 'doktorunun tavsiye etmediği' (%28.2, %27.6) söylendi.

Sonuç: KOAH hastalarında influenza ve pnömokok aşısı uygulama oranı ülkemizde literatür ile uyumlu olarak düşük seviyede bulunmuştur. Aşı yapılmamış bireylerde doktor önerisinin olmaması ve aşı hakkında bilgi sahibi olunmaması önemli bir etken olarak saptanmıştır.

Anahtar Sözcükler: İnfluenza aşısı; kronik obstrüktif akciğer hastalığı; pnömokok aşısı.