**RESEARCH ARTICLE**

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# Investigation of Pneumococcus, Influenza, Covid-19 Vaccination Rates and Affecting Factors in Patients Aged 65 and Over

**ABSTRACT**

**Objective:** This study was planned to determine the vaccination rates and related factors with Pneumococcal, Influenza and Covid-19 vaccines in adults aged 65 and over who applied to the Family Medicine Outpatient Clinic.

**Methods:** The sample of the descriptive study consisted of 200 volunteer adult patients aged 65 and over who applied to the Family Medicine outpatient clinic between May and October 2021. The data were collected by applying a face-to-face interview with descriptive features.

**Results:** The mean age of the participants was 71.21±5.97 years. Influenza vaccination rate of all participants in the last 1 year was 24.50%, Pneumococcal vaccination rate in the last 5 years was 42%, and Covid-19 vaccination rate was 86%. In our study, having a chronic disease was the factor that increased the rate of influenza vaccination, it was determined that the factor determining the pneumococcal vaccination rate was affected by the habit of going to the family doctor regularly ($p<0.05$). Individuals who did not receive the Covid-19 vaccine stated that they did not have the vaccine because they were afraid of the side effects of the vaccine and did not find the vaccine safe.

**Conclusions:** Our study revealed that adult vaccination rates are low and they do not have enough information about their vaccinations. Health professionals, especially family physicians, have important duties to determine the factors affecting the level of knowledge about immunization in adults, to increase awareness and to make preventive medicine reach more people.

**Keywords:** COVID-19, Pneumococ, Influenza.

# 65 Yaş ve Üzeri Hastalarda Pnömokok, Grip, Covid-19 Aşılama Oranları ve Etkileyen Faktörlerin Araştırılması

**ÖZET**

**Amaç:** Bu çalışma, Aile Hekimliği Polikliniğine başvuran 65 yaş ve üzeri erişkinlerin Pnömokok, İnfluenza ve Covid-19 aşıları ile aşılanma oranları ve ilişkili faktörleri belirlemek amacıyla planlandı.

**Yöntem:** Tanımlayıcı olarak yapılan araştırmanın örneklemini Mayıs -Ekim 2021 tarihleri arasında Aile Hekimliği polikliniğine başvuran 65 yaş ve üzeri 200 gönüllü erişkin hasta oluşturdu. Veriler tanıtıcı özellikleri içeren anket yüz yüze görüşme şeklinde uygulanarak toplandı.

**Bulgular:** Katılımcıların ortalama yaşı 71.21±5.97 yıldı. Tüm katılımcıların son 1 yıl içinde İnfluenza aşılanma oranı 24.50%, son 5 yıl içinde Pnömokok aşılanma oranı 42%, Covid-19 aşılanma oranı 86% olarak bulunmuştur. Çalışmamızda kronik hastalığa sahip olmanın influenza aşılanma oranını arttıran faktör olduğu, Pnömokok aşılanma oranını belirleyen faktörün ise düzenli aile hekimine gitme alışkanlığından etkilendiği belirlenmiştir($p<0.05$). Covid-19 aşısı yaptırmayan bireyler ise aşının yan etkilerinden korktuğu ve aşıyı güvenli bulmadıkları için yaptırmadıklarını ifade etmiştir.

**Sonuç:** Çalışmamız erişkin aşılanma oranlarının düşük olduğunu ve aşıları hakkında yeterli düzeyde bilgi sahibi olmadıklarını ortaya koymuştur. Erişkinlerde bağışıklama ile ilgili bilgi düzeyini etkileyen faktörlerin belirlenmesi, farkındalığı arttırmak ve koruyucu hekimliğin daha çok kişiye ulaşabilmesi için sağlık profesyonellerine özellikle aile hekimlerine önemli görevler düşmektedir.

**Anahtar Kelimeler:** COVID-19, Pnömokok, İnfluenza.

## INTRODUCTION

Among preventive health services, immunization has an important place in terms of both individual health and public health. Many infectious diseases have been brought under control and eradicated with vaccination in the world. Implemented vaccination policies and Expanded Programme on Immunization are important factors in increasing childhood vaccination rates (1). Despite all vaccine studies in our country, the same rates have not been achieved in adult immunization yet. Adult vaccination rates and awareness is low, especially in individuals aged 65 and over (2).

Infections are an important cause of mortality in the elderly. Approximately 80% of the elderly population has at least one chronic disease and 25% has three or more chronic diseases. Chronic diseases of the elderly population cause worsening of the existing disease and increase in morbidity and mortality (3). During life, humans come into contact with various viruses such as Influenza, Herpes simplex, Varicella zoster, Epstein-barr and Cytomegalovirus, and latent infections may occur. Influenza infections also increases susceptibility to pneumococcal infections in elderly individuals. The effectiveness of vaccination has been demonstrated in the prevention of pneumococcal infections (such as meningitis, acute otitis media and invasive pneumococcal disease) and complications Vaccination is very important in the elderly in terms of preventing diseases and complications caused by these factors, and enabling the elderly to continue their daily activities in a healthier way (4).

Immunization programs for elderly individuals are carried out in 75 different countries around the world. Our country also carries out a program in accordance with current guidelines, and conjugated pneumococcal vaccine and influenza vaccine, which are included in the adult vaccination calendar, have an important place in adult immunization. Studies have shown that pneumococcal vaccination in adult hood is a cost-effective way against pneumococcal diseases. In addition, the pneumococ vaccine is an important immune defense tool that we can use in the fight to reduce job losses, disease-related complications and hospitalizations that may occur due to influenza (3).

The Covid-19 pandemic has been one of the most important problems of our century. Among the populations at high risk of Covid-19 identified by the American Center for Disease Control and Prevention [Center for Disease Control (CDC)]; There are also adults 65 years of age and older with underlying comorbidities. Today, Covid-19 vaccines are a very important tool in the fight against the Covid-19 virus (5). Vaccination has gained a much more important place in the fight against the COVID-19 epidemic, which has affected all countries of the world. The implemented vaccine policies, obligations and the epidemic showed that people are encouraged to get the Covid-19 vaccine, but they do not have the same attitude and knowledge towards other necessary vaccines. Based on this, our study aimed to determine the rates of Pneumococcal, Flu and COVID-19 vaccines in the vaccination calendar of adults aged 65 and over and the factors affecting them. As primary care physicians, we aim to inform our patients about the vaccines included in the adult vaccination guide, to reach people who are hesitant about vaccination and provide information about vaccines and their side effects, and to increase vaccination rates by contributing to activities.

## MATERIAL AND METHODS

This study was conducted prospectively with 200 volunteer adults aged 65 and over. All patients aged 65 and over who applied to the family medicine outpatient clinic between May and October 2021 and agreed to participate in the study were included. Local ethics committee approval was obtained for this study Namık Kemal University Faculty of MedicineScientific Research Ethics Committee within accordance with the Declaration of Helsinki (Date: 13.04.2021, number: 2021.91.04.09)

We were informed partipicans about the study, written and verbal consent was obtained. Inclusion criteria for the study were determined as seeing to Namık Kemal University Faculty of Medicine, Hospital Family Medicine Polyclinic, have 65 years old and over, and volunteering for the study. In order to collect data, a questionnaire was filling out face to face to measure the sociodemographic characteristics of the participants and their attitudes and knowledge levels about adult immunization, which was prepared by us in accordance with the literature research. With the questionnaire filled out, data were collected about habits of going to the family physician and attitudes, sources of information and vaccination status about influenza, pneumococcal, Covid-19 vaccines.

**Statistical Analysis:** SPSS (IBM SPSS Statistics 24) program was used for statistical analysis of the study.Variables that didn't show normal distribution were presented as median, min-max. Variables with normal distribution were presented as mean and standard deviation, and categorical variables were presented as numbers and percentages. Pearson-$\chi 2$ cross tables were used to analyze the relationships between two qualitative variables. $p<0.05$ wereconsidered statistically significant.

## RESULTS

A total of 200 people participated in our study, 53.50% (n=93) male and 46.50% (n=107) female, the mean age was 71.21±5.97 years. Details of sociodemographic characteristics of the participants are shown in Table 1.

**Table 1.** Distribution of sociodemographic characteristics of the participants

| Variable (N=200) | N | % |
|---|---|---|
| **Age groups** | | |
| [$\bar{X} \pm$ S.S.→71.21±5.97 (year)] | | |
| ≤65 | 39 | 19.50 |
| 66-70 | 70 | 35.00 |
| 71-75 | 44 | 22.00 |
| >75 | 47 | 23.50 |
| **Gender** | | |
| Famale | 107 | 53.50 |
| Male | 93 | 46.50 |
| **Marital status** | | |
| The married | 151 | 75.50 |
| Single | 49 | 24.50 |
| **Level of education** | | |
| Illiterate | 22 | 11.00 |
| Literate | 21 | 10.50 |
| Primary school | 96 | 48.00 |
| Middle School | 13 | 6.50 |
| High school | 20 | 10.00 |
| University | 28 | 14.00 |
| **Monthly income level** | | |
| Below minimum wage | 58 | 29.00 |
| Minimum wage | 60 | 30.00 |
| Above minimum wage | 82 | 41.00 |
| **Living place** | | |
| Provincial center | 137 | 68.50 |
| District | 40 | 20.00 |
| Village | 23 | 11.50 |
| **Total** | 200 | 100 |

When the participants habits of going to the family doctor were questioned, it was seen that 50.50%(n=101) did not go to the family doctor regularly for health check-ups. When we questioned the reasons why they seen to the family physcian,we were seen that 91.50% of the participants (n=183) went to the family doctor to have the drugs re-prescribed fortheir use chronic diseases. It was observed that 41.50% (n=83) of the participants seen to their family physician to be examined. It was observed that only 6.50% (n=13) of the participantswent to the family physician for preventive health care.

The influenza vaccination rate in the last 1 year and the pneumococcal vaccination rate in the last 5 years were 24.50%(n=49) and 42%(n=84), respectively. We were determined that 14% (n=28) of participants who were not vaccinated for Covid-19. Details of the habits of seeing family physcians and the distribution of findings regarding adult vaccinations are shown in Table 2.

**Table 2.** Distribution of the participants' rates of going to Family Medicine and the findings regarding adult vaccinations

| Variable (N=200) | N | % |
|---|---|---|
| **Going to a regular family doctor for a health checkup** | | |
| Yes | 99 | 49.50 |
| No | 101 | 50.50 |
| **Reasons for going to the family doctor*** | | |
| Printing medicine | 183 | 91.50 |
| To be examined | 83 | 41.50 |
| Obtaining preventive health service | 13 | 6.50 |
| **Known vaccines*** | | |
| Influenza vaccine | 163 | 81.50 |
| Pneumococcal vaccine | 156 | 78.00 |
| Covid-19 vaccine | 199 | 99.50 |
| **Influenza vaccination in the last 1 year** | | |
| Yes | 49 | 24.50 |
| No | 151 | 75.50 |
| **Pneumococcal vaccination in the past 5 years** | | |
| Yes | 84 | 42.00 |
| No | 116 | 58.00 |
| **Getting a Covid-19 vaccine** | | |
| Yes | 172 | 86.00 |
| No | 28 | 14.00 |

* More than one answer was given to the question. Percentages were determined based on the total number of samples on a column basis

93.87% of 49 people who get influenza vaccine in the last 1 year get their vaccine in the primary healthcare centre(PHC). 90.47% of 84 people who get pneumococcal vaccines in thelast 5 year get their vaccine in the PHC. 39.53% of 172 people who get Covid 19 vaccine gettheir vaccine in the PHC (Table 3).

**Table 3.** Vaccination place preferences of the participants

| Variable (N=200) | Influenza vaccine | | Pneumococcal vaccine | | Covid-19 vaccine | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| **Vaccination places*** | | | | | | |
| Family health center | 46 | 93.87 | 76 | 90.47 | 68 | 39.53 |
| Public Hospital | 1 | 2.04 | 6 | 7.14 | 40 | 23.25 |
| University Hospital | - | . | - | - | 54 | 31.39 |
| Private hospital | - | - | 1 | 1.19 | 10 | 5.81 |
| Pharmacist | 2 | 4.08 | 1 | 1.19 | - | - |
| **Total** | 49 | 100 | 84 | 100 | 172 | 100 |

* More than one answer was given to the question. Percentages were determined based on the total number of samples on a column basis.

When the information sources of the participants for the influenza vaccines are analyzed, 38.43% obtained information from the mass media, and 26.52% from the social environment.The rate of participants who learned influenza vaccines from their family physcians is 17.68%, and the rate of

those who learned from other types of physician specialist 8.84%. We were seen that the participants obtained information about pneumococcal vaccine from massmedia (37.61%), social environment (25.10%), family physicians (17.86%), and other types ofphysician specialist (10.34%). The sources of information about the Covid-19 vaccine are rateof 41.78% mass media and rate of 25.92% social environment. Participants who didn't get the influenza vaccine didn't get because 30.14% rates of they didn't need, 17.34% doctors didn't recommend it and 11.04% they were not aware of the vaccine. Inaddition, we were observed that participants who didn't get the pneumococcal vaccine didn'tget because 29.03% rates of they didn't need, %20.73they were not aware of the vaccine and%19.81 doctors didn't recommend it. When we look at the hesitancy of the Covid-19 vaccine, partipants who didn't get the Covid-19 vaccines didn't get, because 26.78% they think thatthe vaccines is not safe, 23.21% it's not their turn, 21.42% were afraid of the side effects of the vaccines (Table 4).

**Table 4**. Information sources and attitudes of the participants about adult vaccines

| Variable (N=200)Vaccine | Influenza | | Pneumococcal | | Covid-19 | |
|---|---|---|---|---|---|---|
| | N | % | N | % | N | % |
| **Information about the vaccine*** | | | | | | |
| Television-Internet | 111 | 33.84 | 105 | 32.91 | 184 | 37.86 |
| Books, magazines | 15 | 4.59 | 15 | 4.70 | 19 | 3.92 |
| Family doctor | 58 | 17.68 | 57 | 17.86 | 59 | 12.13 |
| Otherbranch physicians | 29 | 8.84 | 33 | 10.34 | 30 | 6.19 |
| Due to the pandemic | 19 | 5.79 | 23 | 7.21 | 59 | 12.13 |
| Chemist | 9 | 2.74 | 6 | 1.88 | 9 | 1.85 |
| Social environment | 87 | 26.52 | 80 | 25.10 | 126 | 25.92 |
| **Reason for vaccination*** | | | | | | |
| Caused by chronic disease | 15 | 13.15 | 33 | 16.25 | 62 | 14.51 |
| For the benefits | 35 | 30.74 | 53 | 26.13 | 131 | 30.69 |
| Doctor's recommendation | 35 | 30.68 | 63 | 31.03 | 66 | 15.45 |
| Environmental advice | 17 | 14.91 | 25 | 12.31 | 71 | 16.64 |
| Post pandemic | 12 | 10.52 | 29 | 14.28 | 97 | 22.71 |
| **Reason for not getting vaccinated*** | | | | | | |
| Not informed | 37 | 11.04 | 45 | 20.73 | - | - |
| Not feeling the need | 101 | 30.14 | 63 | 29.03 | 1 | 1.78 |
| Lack of knowledge | 29 | 8.65 | 29 | 13.36 | 6 | 10.71 |
| Allergy/side effects | 12 | 3.58 | 4 | 1.84 | 12 | 21.42 |
| The vaccine is not safe | 15 | 4.47 | 5 | 2.30 | 15 | 26.78 |
| Lack of protection from the vaccine | 38 | 11.34 | 9 | 4.14 | 3 | 5.40 |
| Doctor's disapproval | 58 | 17.34 | 43 | 19.81 | - | - |
| Vaccine causing disease | 11 | 3.28 | 2 | 0.94 | 6 | 10.70 |
| Failure to vaccinate | 14 | 4.19 | 11 | 5.09 | 13 | 23.21 |
| To be paid | 20 | 5.97 | 6 | 2.76 | - | - |

* More than one answer was given to the question. Percentages were determined based on the total number of samples on a column basis.

Education level, level of education of spouse, monthly household income, place of residence,live together with aged 65 and over individuals, live together with chronic diseaseindividuals, number of respiratory tract infections per year,habits of regular health check werenot statistically significant between the getting a influenza vaccines in the last 1 year ($p<0.05$). İnfluenza vaccination behavior in last 1 year was statistically significant betweenthe have a chronic diseases that requires continued medication use ($\chi2=4.746$; $p=0.029$).Education level, level of education of spouse, place of residence, live together with aged 65 and over individuals, live together with chronic disease individuals, number of respiratorytract infections were not statistically significant between the getting a pneumoccocal vaccination in the last 5 year ($p<0.05$). Monthly household income, habits of regular health check were significantly associated with pneumoccocal vaccination behavior [respectively($\chi2=10.703$;$p=0.005$),($\chi2=4.521$; $p=0.033$)].

Education level, level of education of spouse, monthly household income, place of residence,live together with aged 65 and over individuals, live together with chronic diseaseindividuals, number of respiratory tract infections per year,habits of regular health check werenot statistically significant between the Covid-19 vaccination behavior ($p>0.05$).Covid-19vaccination behavior was statistically significant between the have a chronic diseases thatrequires continued medication use ($\chi2=10.631$; $p=0.0001$).

## DISCUSSION

The mean age of the participants was 71.21±5.97 years, with a minimum age of 65 and a maximum age of 95. In another study investigating the rate of vaccination in adults of 65 years and over, the mean age was found to be 71.36 ±5.30 years, which is consistent with our study (2). We were observed that most of the participants primary school education, and only a little amount had university education or higher. In many related studies, when theeducation level is investigated, lower secondary education and below education levelsconstitute the majority, and similar results were obtained in our study (2). In our study it was determined that the majority of the participants lived with their family. This ratio is a point that should be considered interms of approaching the geriatric population, which is a especially risky group. In our study, it was determined that majority of participants had at least one chronic disease that required continuous drug use.

The participants habits of going to the family physicians were questioned. It has been observed that half of participants, that is, 1 out of 2 people, do not go to the family physician regularly for health check-ups, which is a high rate. When we questioned the reasons why they seen to the family physcian,we were seen that majority of the partipicans went to the family doctor to have the drugs re-prescribed for their use chronic diseases. It was observed that less than half of the participants seen to their family physician to be examined. It was observed that only a small amount of the participants went to the family physician for preventive health care.

In a study conducted in Erciyes University in 2018, it was observed that 58.4% of people went to their family physician to re-prescribe their used medications and to be examined with 45.3%(6). The reason for the higher rate of represcribing the drugs they used in our study can be attributed to the fact that only individuals aged 65 and over were included in the study. As the average age increases, the rate of chronic diseases increases and the average age of our study is higher.

The fact that the majority of participants who have get the vaccines have gotten vaccinated in the PHC shows us that PHC are more easy accessible to people. PHC have an important place in obtaining information and preventive health care, and it is obvious that adult immunization studies conducted by PHC will make great contributions to the solution of public health issues.

In our study, rate of influenza vaccination in the last 1 year and rate of pneumococcal vaccination in the last 5 years were found to be 24.50% and 42.00%, respectively. When we investigate the rate of pneumococcal and influenza vaccination in developed countries; the highest rate of influenza vaccination for 65 years and over was found to be 74.7% in the USA, 65.5% in the Netherlands, and 57.4% in Spain (7,8). In 2019, this rate is 69.9% in Canada(9).

Many studies have been carried out on adult vaccination in our country. In a study conducted with 303 people 65 years and older who saw to the Family Medicine outpatient clinic inIstanbul in 2017, it was seen that 33.94% of the elderly got influenza vaccine and 9.91% got pneumococcal vaccine (2). In studies on adults, the most frequently heard, learned, and administered vaccines were influenza, tetanus, and hepatitis B vaccines, respectively (10,11). In our study, the influenza vaccination rate was lower than the pneumococcal vaccination rate. This is because many global influenza epidemics have occurred over the years, and these recurrent outbreaks have affected people's view of the efficacy of influenza vaccines. In addition, the fact that mass media coverage on influenza vaccinesand speculative news in the media can be shown as another reason.

When we asked the participants who knew about influenza, pneumococcal and Covid-19 vaccines their sources of information, it was seen that for all 3 vaccines, they obtained information from the mass media with the highest rate and then from the social environment. Different rates have been obtained in studies conducted in our country. For example, in another study conducted with geriatric patients receiving home health care services in 2018, it was seen that people who were aware of vaccines learned about vaccines mostly from physicians and health workers (10,11). This may be due to the fact that the population of receiving home health care services is in closer contact with health workers. In another study conducted with adults, it was determined that the information sources of participants who know about vaccines are mostly mass media and social environment, and the results are consistent with our study (12).

In our study, it was shown that 26.52% of the individuals who knew the influenza vaccine and 28.20% of the individuals who knew the pneumococcal vaccine learned the information from the doctors. Unfortunately, these rates are lower than the rate of participants who learn the vaccines from the mass media and social environment. The results which demonstrated once again that the importance of physicians providing more counseling and information to people about vaccines.

We were questioned the reasons of the participants whom get vaccinated and don’t get vaccinated. It was observed that 30.74% of the individuals who get the influenza to get it because they believed it would be beneficial, 30.68% as recommended it by doctors, and 10.52% decided to get it due to the Covid-19 pandemic. Again in this study; less than half of the participants stated that they weren’t informed about the vaccines as the

reason for don't getting vaccinated and didn't vaccinated because they thought that the they didn't need to get the vaccines (12).

Our study has some limitations. The research conducted within the scope of the study is limited to those aged 65 and over, and future studies can be carried out with the entire adult age group and more general conclusions can be reached by comparing the results with this study. The superiority of our study is that it is an important study conducted during the pandemic period and reveals the importance of adult immunization.

In our study, it was observed that 31.03% of those who had the pneumococcal vaccine had the vaccine on the recommendation of a doctor. In addition, it was observed that 14.28% of those who had the pneumococcal vaccine decided to have it after the pandemic. The effect of the pandemic is great in both vaccines.

In our study Covid-19 vaccines vaccination rate was found to be 86%. Our study has shown that having a chronic diseases has an impact on getting vaccinated with Covid-19 vaccines. A statistically significant relationship was found between the getting Covid-19 vaccines and the having a chronic disease. It was determined that one third of the participants who got the covid-19 vaccine got it because they thought thevaccine would be beneficial. It was determined that 16.64% of the participants who got the covid-19 vaccine got it because social environment recommended it. In addition, the fact that the Covid -19 disease is more severe in individuals with chronic diseases may have increased the vaccination rates by raising awareness about the vaccine in these people. Considering the reasons for not getting the Covid-19 vaccines, 26.78% of the participants said that they thought the vaccine was not safe and 21.42% said they didn't get it because they were afraid of the side effects of the vaccine. In another study on the Covid-19 vaccines in our country, participants reported that they was afraid of the side effects of the vaccines, didn't trust the producing companies and thought that the vaccine could not protect against COVID-19 as the reason for not getting vaccinated. Our results are similar to this study (13). We think that the newly developed Covid-19 vaccines and the speculative journalism in the mass media have animpact on the rate of getting this vaccine. As seen in all three vaccines, it is seen that the highest rate among the reasons for the participants to have these vaccines is their own attitudes about vaccines and it is obvious that the rate of vaccination will increase if they are informed correctly. The fact that the rate of those who have been vaccinated at the recommendation of a doctor is relatively low, shows us that physicians should attach importance to the issue of immunization, inform and encourage individuals to get vaccinated.

## CONCLUSION

Familyp hysicians have an important role to play that healthy aging of individuals aged 65 and over,who are quite fragile, in increasing the vaccination rates of the target population and informing them about adult immunization. In addition, health care professionals and the media should act together on the prejudices and fears of the society about vaccines, ensuring that people reach the right information and aiming to increase adult immunization rates.

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