

The Effect of the COVID-19 Pandemic in Adult Vaccination in Turkey

COVID-19 Pandemisinin Türkiye'deki Yetişkin Aşılamaya Etkisi

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Abstract

Objective: This study aimed to evaluate the impact of the Coronavirus disease-2019 (COVID-19) pandemic on adult vaccination rates in Turkey.

Method: This retrospective descriptive study included individuals aged 18 and over who sought adult vaccination at the Education Family Health Centers of University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital between 11.03.2019 and 11.03.2021. The data were analyzed for one year before and one year after 11.03.2020, which marked the first COVID-19 case in Turkey. Vaccination information was obtained from the family medicine information system, and data analysis was performed using the IBM SPSS program.

Results: A total of 1,139 participants were included in the study, with a mean age of 57.27 ± 17.74 years (min: 18, max: 96). Among the participants, 60.8% were female and 39.2% were male. The total number of vaccine doses administered between 11.03.2019-11.03.2020 (pre-pandemic) was 310, while the total number of vaccine doses administered between 11.03.2020-11.03.2021 (post-pandemic) was 829. Before the pandemic, the most commonly administered vaccines were hepatitis B (54.8%), conjugated pneumococcal (50.7%), and seasonal influenza vaccines (11%). The mean age of those vaccinated before the pandemic was 58.41 ± 15.63 years. Following the pandemic, there was a significant increase in adult vaccination rates among the participants, particularly in females ($p < 0.05$). The vaccination status did not show a significant change with age ($p = 0.781$).

Conclusion: The utilization of adult vaccination services has significantly increased since the onset of the COVID-19 pandemic.

Keywords: COVID-19, pandemics, primary care, vaccination

Öz

Amaç: Bu çalışma, Koronavirüs hastalığı-2019 (COVID-19) pandemisinin Türkiye'deki yetişkin aşılama oranları üzerindeki etkisini değerlendirmeyi amaçlamıştır.

Yöntem: Retrospektif tanımlayıcı nitelikteki bu çalışmaya 11.03.2019-11.03.2021 tarihleri arasında Sağlık Bilimleri Üniversitesi, Prof. Dr. Cemil Taşcıoğlu Şehir Hastanesi'nin Eğitim Aile Sağlığı Merkezleri'nde erişkin aşı olmak isteyen 18 yaş ve üzeri bireyler dahil edildi. Veriler, Türkiye'deki ilk COVID-19 olgusu olan 11.03.2020 tarihinden bir yıl öncesi ve bir yıl sonrası için analiz edildi. Aşı bilgileri aile hekimliği bilgi sisteminden elde edildi ve veri analizi IBM SPSS programı kullanılarak yapıldı.

Bulgular: Çalışmaya yaş ortalaması $57,27 \pm 17,74$ (min: 18, maks: 96) olan toplam 1,139 katılımcı dahil edildi. Katılımcıların %60,8'i kadın, %39,2'si erkektir. 11.03.2019-11.03.2020 (pandemi öncesi) tarihleri arasında uygulanan toplam aşı dozu sayısı 310 iken, 11.03.2020-11.03.2021 (pandemi sonrası) tarihleri arasında uygulanan toplam aşı dozu sayısı 829 oldu. Pandemi öncesi en sık uygulanan aşılardan hepatit B (%54,8), konjuge pnömokok (%50,7) ve mevsimsel grip aşılı (%11) idi. Pandemi öncesi aşı olanların yaş ortalaması $58,41 \pm 15,63$ yılıdır. Pandeminin ardından, katılımcılar arasında, özellikle kadınlarda yetişkin aşılama oranlarında önemli bir artış oldu ($p < 0,05$). Aşılanma durumu yaşla birlikte önemli bir değişiklik göstermedi ($p = 0,781$).

Sonuç: Yetişkin aşılama hizmetlerinin kullanımı, COVID-19 pandemisinin başlangıcından bu yana önemli ölçüde artmıştır.

Anahtar kelimeler: Aşılanma, birinci basamak, COVID-19, pandemi



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Introduction

In the realm of safeguarding public health against infectious diseases, a multifaceted strategy encompassing fundamental preventive measures (such as personal hygiene, access to clean drinking water, and effective waste management) intertwined with the power of immunization, whether through active or passive means, emerges as pivotal (1,2). Vaccination stands out as the most effective and cost-efficient method for preventing infectious diseases. Its primary objectives are to mitigate the risks of disease, disability, and death, thereby promoting overall health (3). The widespread implementation of vaccinations in the 20th century led to a significant reduction in the incidence of most vaccine-preventable diseases, with some, like smallpox, being completely eradicated (4). Vaccines are possibly among the most crucial and impactful interventions in public health history, contributing significantly to saving lives (5).

Vaccinations, considered an integral part of children's health, are often neglected in adults (5,6). Vaccination in adulthood is also necessary because the protective effect of some childhood vaccines ends in adulthood (e.g., tetanus, diphtheria, pertussis) and exposure to vaccine-preventable diseases in work and social life must be considered. While childhood vaccinations are closely monitored by health authorities worldwide, the same monitoring does not exist for adult vaccinations (3,6). In contrast to the remarkable success observed in pediatric immunizations, vaccine-preventable diseases like influenza, pneumococcal disease, and hepatitis B lead to an annual death toll of approximately 40,000 to 80,000 adults in the USA. This results in a substantial strain on healthcare resources, with numerous hospitalizations and associated costs. Neglecting adult immunization leaves individuals with chronic conditions vulnerable, such as heart disease and diabetes, heightening the risk of severe complications from vaccine-preventable illnesses. Regrettably, high-risk adults, in the United States, remain inadequately immunized, with vaccination rates as low as 20 percent for pneumococcal disease and 28.6 percent for hepatitis B among certain groups. This leads to complex and expensive care for infected individuals. Unlike the pediatric population, where immunization coverage disparities have been reduced through programs like Vaccines for Children, significant disparities persist among adults (5).

The Coronavirus disease-2019 (COVID-19) pandemic has caused health resources to be redirected from regular primary care. It has greatly affected global healthcare,

putting a lot of pressure on healthcare systems. Measures such as curfews and quarantine protocols, implemented to slow the transmission of the virus, have hindered access to healthcare services (7,8). Routine health screenings, childhood vaccinations, and adult immunization programs have been disrupted or entirely halted in many countries during certain periods (9-14). However, in Turkey, immunization services for both children and adults have continued uninterrupted throughout the pandemic, with individuals still able to access vaccinations even during quarantine periods (15).

While existing literature predominantly focuses on the impact of the pandemic on childhood vaccinations, no similar studies have been identified in Turkey when considering adult vaccination through searches conducted in databases such as Google Scholar, PubMed, Web of Science, Scopus, and ULAKBIM. Therefore, this study represents the first original research article examining the effect of the COVID-19 pandemic on adult vaccinations in Turkey.

The aim of this study is to assess the impact of the COVID-19 pandemic on adult vaccination rates carried out by primary care services (family health care centers) in Turkey by analyzing the changes in vaccination patterns before and after the pandemic's onset.

Materials and Methods

Ethic

Ethics committee permission for the study was obtained with the decision number 47 of the meeting held on 28.02.2022 at the University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital.

Study Design

This is a descriptive and cross-sectional study. The sample size was calculated as 530 people by taking the total number of patients registered to our primary care outpatient clinic as 4314 on the Open-Epi site, predicting an adult immunisation rate of 35.5% based on the study conducted by Mutlu et al. (16) in 2018, taking a margin of error of 5% and taking the design effect 1 in the 99% confidence interval. Patient data were analyzed retrospectively, one year before and one year after 11.03.2020, when the first COVID-19 case was seen in Turkey. The pre-pandemic period between 11.03.2019-11.03.2020 is defined as pre-pandemic period, the period between 11.03.2020-11.03.2021 is defined as pandemic period. The patient data utilized for this study were acquired from the Family

Health Care Center Information System and the patient files of designated family health units. The Family Medicine Information System is a specialized software infrastructure that enables family physicians to comprehensively document the healthcare services rendered to citizens in an electronic format. This recorded information is then systematically transmitted to a centralized database, adhering to standardized data structures stipulated by the Ministry of Health. Within this system, family physicians possess the capability to administer vaccinations to both adult and pediatric patients, even if these patients are not formally registered with them. This flexibility allows for the timely and appropriate administration of vaccinations in accordance with established schedules. Subsequently, these vaccination records are meticulously logged into the system, capturing critical details such as age, gender, presence of chronic diseases, medications administered, vaccination type, and date of vaccination. In our study, we specifically focused on the adult patient demographic seeking immunization at our family health care units. A total of 1.193 adults presented themselves to the family health center for vaccination during the predefined date ranges. To ensure the integrity of the data, 54 patients were excluded from the study due to incomplete or inaccurate information within their respective personal files. A total of 1.139 adult patients included in our study. During the data collection process, instances of redundant vaccine entries were identified. In these cases, where the same vaccination was recorded multiple times, we meticulously curated the dataset to include only a single instance of each vaccination. This meticulous approach helped maintain the precision and reliability of our study's findings, as we aimed to avoid duplication and ensure that each vaccination entry was uniquely accounted for.

Statistical Analysis

The SPSS 25.0 package program was used for statistical analysis. (IBM Corp. 2011. IBM SPSS Statistics for Windows,

version 25.0. Armonk, NY: IBM Corp.) The distribution of interval data was analyzed using the Kolmogorov-Smirnov or Shapiro-Wilk test. Data were expressed as mean \pm standard deviation and median. The normality of numerical variables was assessed using the Kolmogorov-Smirnov test. The comparison of proportions in independent groups was performed using the chi-square test. Since the numerical variables satisfied the assumption of normal distribution, independent two-group analyses were conducted using the Independent Samples t-test. $p < 0.05$ was considered statistically significant.

Results

The mean age of the participants was 57.27 ± 17.74 years (min: 18, max: 96). While 60.8% of the participants were female, 39.2% were male. The total number of vaccine doses between 11.03.2019 and 11.03.2020 (pre-pandemic period) was 310, and the total number of vaccine doses between 11.03.2020-11.03.2021 (pandemic period) was 829. 5.8% of the participants had diabetes mellitus, 11.6% had essential hypertension, 2.4% had hyperlipidemia, 2.4% hypothyroidism, 2.6% chronic ischemic heart disease, 1.4% COPD, 0.8% osteoporosis was diagnosed. While the mean age of those vaccinated before the pandemic was 54.03 ± 22.15 years, the mean age of those vaccinated after the onset of the pandemic was 58.41 ± 15.63 years (Table 1).

After the pandemic, the rate of adult vaccination of our participants increased significantly ($p = 0.000$), while the rate of vaccination in female gender increased significantly ($p < 0.05$), the vaccination status did not change with age ($p = 0.781$).

Of the vaccines administered before the pandemic, 54.8% were hepatitis B, 50.7% were conjugated pneumococci, and 1% were seasonal influenza vaccines. Of the vaccines administered after the onset of the pandemic, 11.3% were hepatitis B, 75.5% conjugated pneumococci, and 13.1% seasonal influenza (Figure 1, Table 2).

Table 1. Patients' age, gender and chronic diseases and vaccination status according to pandemic

	Vaccination before pandemic		Vaccination after pandemic		p-value*	
	Median + SD	Min, max	Median + SD	Min, max		
Age (year)	54.03 ± 22.15	18-96 (min, max)	58.41 ± 15.63	18-95 (min, max)	0.781	
	Number	Percentage	Number	Percentage	p-value**	
Female	166	23.9%	526	76.1%	0.03	
Male	120	26.9%	327	73.1%		
Chronic diseases	Yes	126	45.4%	152	54.6%	0.08
	No	258	29.9%	603	70.1%	

*Independent t-test, **chi-square, SD: Standard deviation

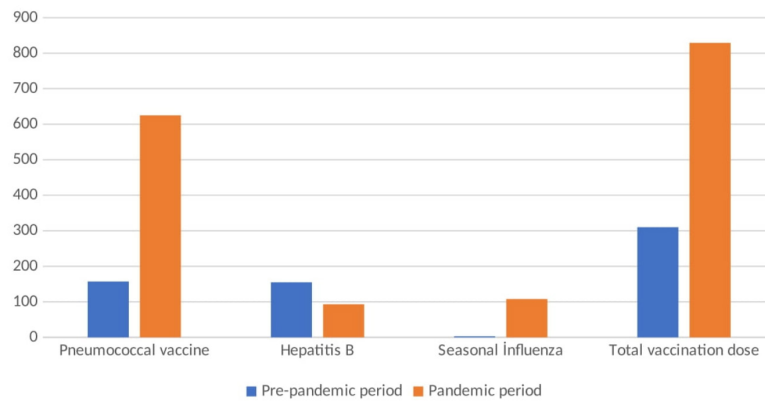


Figure 1. Adult vaccination rates in pre-pandemic and pandemic period

Table 2. Vaccination status at pre-pandemic and pandemic period

	Pre-pandemic period	Pandemic period	p-value*
Pneumococcal vaccine	157	625	p=0.00
Hepatitis B	155	93	p=0.67
Seasonal influenza	1	108	p=0.00
Total	327	826	p=0.00

*chi-square test

Upon analyzing the timeline of adult vaccinations, it becomes evident that there was a substantial surge in demand for adult immunization immediately following the onset of the pandemic. When vaccines administered from March 2020 onwards were examined, a significant increase in adult immunization rates during the months of September, October, and November compared to the remaining months was observed ($p=0.019$). However, as time progressed, this heightened demand has gradually declined (Figure 2).

Discussion

As a result of our study, within a year after 11.03.2020, when the first COVID-19 case was seen in Turkey, adult immunization applications increased significantly ($p<0.05$). Vaccination in the adult population is applied to certain patient groups in many countries around the world, and it is not at the targeted level in most countries. However, adult vaccination is very beneficial for the individual, family, society and country in terms of medical, social and economic benefits. Considering that life expectancy is increasing in most countries, protection

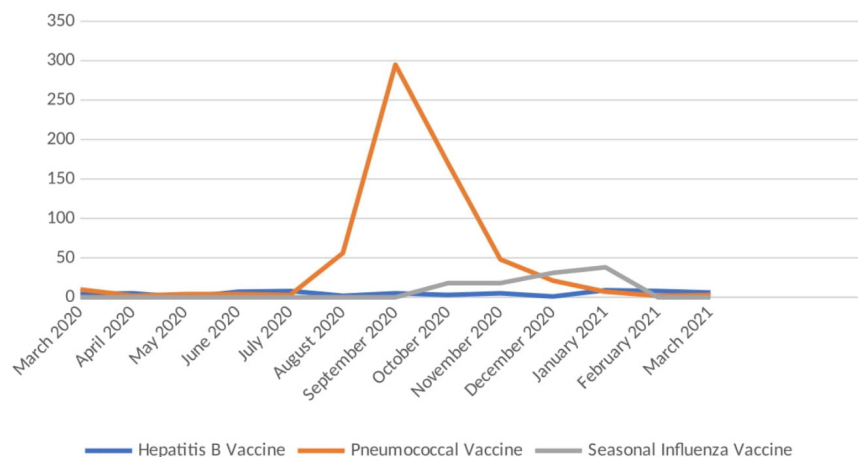


Figure 2. Adult vaccination rates between March 2020-March 2021

from vaccine-preventable diseases is of great importance, and individuals and healthcare practitioners should be prioritized (3). The COVID-19 pandemic has created health anxiety in the adult population, especially in vulnerable people with chronic diseases, immune suppressed people, pregnant women; and has increased preventive health measures such as hand washing, healthy eating, and hygienic behaviors (2,17,18). In addition, it has brought adult routine vaccinations to the agenda. In our study, the vaccination rate increased significantly at the pandemic period compared to pre-pandemic period. The most significant increase in our country was observed during the months of September, October, and November, particularly in pneumococcal vaccination. The reason for this could be attributed to the absence of a definite treatment or preventive method for COVID-19 during that period. Individuals may have turned to vaccination as a means to protect themselves. The subsequent decrease in adult vaccination after these months could be attributed to the initiation of COVID-19 vaccination, leading individuals to prioritize that vaccine.

In our study, the mean age of the participants was 57.27 years, 60,8% were female, and the rate of vaccination in females was significantly higher. 23.1% of the vaccines were hepatitis B, 68.7% of them were conjugated pneumococci, and 9.8% were influenza vaccines. In a study evaluating the vaccination of people over 65 years old between June 2020 and June 2021 in Turkey, the most frequently administered vaccine was conjugated pneumococcus (76.72%), and the least administered vaccine was influenza vaccination (7.03%) (19).

In a study examining the effect of covid-19 on vaccination using September 2019 and July 2020 data in Pakistan, it was found that there was a 52.2% decrease in all childhood vaccinations (10). In a study conducted with 232 Pediatricians in Tuscany during the first quarantine period in Italy (March 11-May 4, 2020), 7% of pediatricians stopped vaccination altogether. Of those who continue to be vaccinated, 31.7% are in the compulsory hexavalent vaccine (diphtheria, tetanus, pertussis, polio, h. influenza type and hepatitis B) and MMRV (measles, mumps, Rubella, varicella) vaccines, 42.3% reported a decrease in non-essential vaccinations (11).

It has been reported that a decrease in childhood vaccination doses was observed 1 week after 8 March 2020 (the date of the New York index case). In the weeks following the index case, the vaccination rate decreased by

62% in children aged 0-24 months and by 96% in children aged 2-18 years, and vaccination campaigns were started at the end of March 2020. As of May-June 2020, the severity of the decrease in vaccination decreased, but at the end of June, vaccination was still lower than the 2019 June data. Similarly, after the measles epidemic in New York in 2018-2019, there was a decrease in childhood vaccinations (12).

In a study conducted in Canada, it was observed that childhood vaccinations and adult population vaccinations were adversely affected, with school immunization studies being the most prominent between March and April 2020. After the first quarantine period (March-April 2020), childhood vaccinations, school follow-ups, maternal/prenatal follow-ups were revised and continued in accordance with the COVID-19 pandemic conditions, while adult vaccinations were partially suspended (13).

In a study conducted in Nigeria evaluating pre- and post-index immunization rates, BCG vaccination decreased from 85.8% to 82.1% before the index case, and HBV vaccination decreased from 63.5% to 60%. Penta 3 decreased from 76.1% to 72%, Oral polio vaccine decreased from 75.4% to 72%, PCV decreased from 75.1% to 71.4%, and IPV from 73.5% to 71.9%. Average coverage rates for yellow fever and measles fell sharply from 77.0% and 74.5% and 64.6% and 58.6%, respectively (14).

Study Limitations

In the study, the data were examined for a period of 2 years, longer-term studies can be made. Five family medicine units were examined in the study, studies can be done with a larger sample.

Conclusion

This study shows an increase in adult vaccination status in the study sample after the COVID-19 pandemic. The findings highlight a significant shift in vaccination rates among participants in the post-pandemic period. This post-pandemic increase in vaccination rates, particularly evident among women, suggests a paradigm shift in public health priorities and awareness.

The data show a significant increase in the total number of vaccine doses administered in the post-pandemic period, indicating a growing awareness of the importance of adult immunisation.

The profound disruptions that the pandemic has brought to routine health care delivery and access are undeniable,

but the post-pandemic increase in vaccination rates is indicative of the health system's continued resilience and people's willing engagement in self-protection and efforts to protect their health in the face of unique challenges.

As the global community moves on in the wake of the pandemic, these insights on shifting vaccine trends can inform targeted interventions and strategies to increase adult immunisation rates.

Ethics

Ethics Committee Approval: Ethics committee permission for the study was obtained with the decision number 47 of the meeting held on 28.02.2022 at the University of Health Sciences Turkey, Prof. Dr. Cemil Taşcıoğlu City Hospital.

Informed Consent: In accordance with the retrospective nature of our study, informed consent from individual patients was not required as the analysis involved anonymized data collected as part of routine medical practice.

Peer-review: Internally and externally peer-reviewed.

Authorship Contributions

Concept: F.E., Design: F.E., Data Collection or Processing: F.E., N.Ç.A., M.M., Analysis or Interpretation: F.E., N.Ç.A., M.M., Drafting Manuscript: F.E., S.A., Final Approval and Accountability: S.A., Technical or Material Support: M.M., Supervision: S.A., Writing: F.E., N.Ç.A., M.M., S.A.

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