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ORIGINAL PAPER

KNOWLEDGE, ATTITUDES, AND PRACTICES TOWARDS THE INFLUENZA VACCINE AMONG ADULT POPULATION IN PLOVDIV, BULGARIA

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Abstract

Introduction. Vaccination is the most effective and safest means of preventing influenza infection. The coverage with influenza vaccine is not satisfactory across Europe and one of the main obstacles is vaccine hesitancy.
The objective of the study was to assess the knowledge, attitudes, and practices of the population towards the seasonal influenza vaccine.
Materials and methods. Between November 2016 – February 2017 a cross-sectional study using a semi-structured questionnaire was conducted in Plovdiv (Bulgaria), covering 545 people over 18 years old. Standard descriptive statistics was used to summarize demographic characteristics. Differences between observed and theoretical distributions were tested using chi-square test for independence. A 2-sided p-value of <0.05 was considered statistically significant.

Résumé

Connaissances, attitudes et pratiques envers le vaccin contre la grippe chez la population adulte de Plovdiv, Bulgarie

Introduction. La vaccination est le moyen le plus efficace et le plus sûr de prévenir l'infection grippale. La couverture vaccinale avec le vaccin antigrippal n'est pas satisfaisante dans toute l'Europe et l'un des principaux obstacles est la réticence à la vaccination.
L'objectif de l'étude était d'évaluer les connaissances, les attitudes et les pratiques du public envers le vaccin contre la grippe saisonnière.
Matériels et méthodes. Entre novembre 2016 et février 2017, une étude transversale utilisant un questionnaire semi-structuré a été menée en Plovdiv (Bulgarie), couvrant 545 personnes de plus de 18 ans. Des statistiques descriptives standard ont été utilisées

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Results. The vaccine uptake was 11%. An association was found between the age of the respondents and administration of the vaccine (χ^2=16.687 p=0.005), vaccination status and educational level (χ^2=27.002, p=0.00002). 27.6% of the unvaccinated respondents were uncertain about the effectiveness of the vaccine and 26.8% had the perception this is not a serious disease. More than half of the respondents (51.1%) were willing to change their attitude towards the influenza vaccination, the recommendation from a doctor being the most important (40.8%).

Conclusions. Seasonal influenza vaccine uptake was low in our study and the main drivers for vaccine hesitancy were concerns regarding its safety and effectivenes. Recommendation of the vaccine from a general physician was the most important source for influencing the attitudes towards the vaccine. This highlights the importance of general physicians' involvement and the need to spread public awareness regarding the efficacy and benefits of seasonal influenza vaccination.

Keywords: influenza, vaccination, attitudes, knowledge, practices, hesitancy.

pour résumer les caractéristiques démographiques. Les différences entre les distributions observées et théoriques ont été testées à l'aide d'un test d'indépendance du chi carré. Une valeur p bilatérale < 0,05 a été considérée comme statistiquement significative.

Résultats. Le taux de vaccination était de 11%. Une association a été trouvée entre l'âge des répondants et l'administration du vaccin (χ2=16.687 p=0.005), le statut vaccinal et le niveau d'éducation (χ2=27.002, p=0.00002). 27,6% des répondants non vaccinés n'étaient pas certains de l'efficacité du vaccin et 26,8% avaient l'impression qu'il ne s'agissait pas d'une maladie grave. Plus de la moitié des personnes interrogées (51,1%) étaient prêtes à changer d'attitude vis-à-vis de la vaccination contre la grippe et la recommandation et les conseils d'un médecin étaient les plus importants (40,8%).

Conclusions. L'absorption du vaccin contre la grippe saisonnière était faible dans notre étude et le principal facteur d'hésitation à la vaccination était les inquiétudes concernant l'innocuité et l'efficacité du vaccin. Dans le même temps, la recommandation du vaccin par un médecin généraliste était la source la plus importante pour influencer les attitudes envers vaccination.

Mots-clés: grippe, vaccination, attitudes, connaissances, pratiques, hésitations.

Introduction

Seasonal influenza is an acute respiratory infection caused by influenza viruses that affects all age groups and is one of the most widespread communicable diseases worldwide[1]. According to World Health Organization's global estimates, 5-10% of adults and 20-30% of children have influenza annually[2]. In moderate climates, influenza seasonal epidemics occur during the winter season, while in tropical areas, influenza epidemics might occur throughout the year[1,3].

Vaccination is the most effective and safest means of preventing influenza infection. Currently licensed influenza vaccines are safe and efficacious and prevent significant annual morbidity and mortality[4]. The latest recommendations of the World Health Organization and the U.S. Center for Disease Control and Prevention state that individuals aged 6 months and older must be encouraged to get vaccinated against influenza in an attempt to expand protection to more people. It is particularly important for individuals in high-risk groups to receive the annual influenza vaccine, to prevent the risk of serious complications[5,6].

The long-standing system of epidemiological surveillance of influenza in Bulgaria shows that the annual influenza epidemics are a serious health and financial problem for our country. In the district cities alone, an average of about 1,400,000 to 1,600,000 cases of acute respiratory illness and influenza occur each year and they account for 10-30% of the cases of temporary disability. At the same time, in Bulgaria the immunization coverage with influenza vaccines is very low, constantly.

The vaccine coverage with influenza vaccine is not satisfactory in most of the countries across Europe and one of the main obstacles in front of a successful vaccination campaign is vaccine hesitancy. Even in the light of the recent coronavirus disease 2019 (COVID-19) pandemic, many remain skeptical and intend to abstain from voluntary vaccinations based upon myths, misinformation, and/or safety concerns[8-12]. Known predictors of vaccination have been described in the literature, including receiving a doctor's recommendation for vaccination, and positive beliefs about vaccine safety and effectiveness[13-15]. However, little is known about attitudes and practices regarding influenza vaccination in Bulgaria. Exploring and understanding the

different sociodemographic and medical factors that may hinder the voluntary vaccination against the seasonal influenza is crucial to formulate an effective national policy aimed at improving the vaccination rate against epidemic, as well as other epidemics and pandemics such as COVID-19.

The objective of the study was to assess the knowledge, attitudes, and practices of the public towards the seasonal influenza vaccine and their possible association with the participant's influenza vaccination history.

Materials and methods

In the period November 2016 – February 2017, a cross-sectional study using a semi-structured questionnaire was conducted in the city of Plovdiv (Bulgaria), covering 545 people over 18 years old. Plovdiv is the second largest city in Bulgaria and the total population of the region at the end of 2016 was estimated to be 671,573 people[16]. The survey included 15 questions, 6 of which with more than one possible answer. The questions were divided into three panels: demographic data – 4 questions, assessment of the knowledge about flu as an infection – 5 questions, and the attitudes for influenza immunization – 6 questions. Three different approaches were used to gather information: visits to outpatient clinics (n = 147), reaching medical university students (n = 166) and online surveys (n = 232). An anonymous survey was generated through the web-based platform provided by Google Forms. Standard descriptive statistics was used to summarize demographic characteristics. Qualitative variables are presented as numbers/totals and percentages (n, %). Differences between observed and theoretical distributions were tested using chi-square test for independence. A two-sided p-value of <0.05 was considered statistically significant. Statistical analyses were performed using SPSS Statistics v. 26 software (IBM Corp., Chicago, IL, USA).

The study received an ethical exemption from Ethics Committee as it met one of the criteria for exemption (an anonymous survey or interview that do not involve collection of identifiable data).

Results

Demographics

A total of 545 people took part in the survey. The demographic characteristics of the respondents depending on their vaccination status are presented in Table 1. The largest share in both groups (vaccinated vs. unvaccinated) were the participants aged between 18-24 years and 25-34 years (25.0% vs. 35.3%, and 23.3% vs. 31.3% respectively). Considering the area of residency, 71.7% of the vaccinated and 76.3% of the unvaccinated respondents were from the

Table 1. Socio-demographic characteristics of the respondents

Characteristics	*Vaccinated respondents (n=60)*	*Unvaccinated respondents (n=485)*	*p-value*
Age group			
18-24 years	15 (25.0%)	171 (35.3%)	
25-34 years	14 (23.3%)	152 (31.3%)	
35-44 years	9 (15%)	70 (14.5%)	0.005
45-54 years	4 (6.7%)	35 (7.2%)	
55-64 years	10 (16.7%)	35 (7.2%)	
≥65 years	8 (13.3%)	22 (4.5%)	
Area of residency			
Plovdiv region	43 (71.7%)	370 (76.3%)	
Smaller regional city	12 (20%)	70 (14.5%)	0.518
Village	4 (6.7%)	37 (7.6%)	
No answer	1 (1.6%)	8 (1.6%)	
Education level			
No education	0	1 (0.2%)	
Below high school	4 (6.7%)	4 (0.8%)	
High school	19 (31.7%)	211 (43.5%)	0.000
University degree	35 (58.3)	253 (52.2%)	
No answer	2 (3.3%)	16 (3.3%)	
Financial situation			
Difficult	17 (28.3%)	130 (26.8%)	
Manageable	26 (43.3%)	200 (41.2%)	0.565
Comfortable	11 (18.3%)	134 (27.6%)	
No answer	6 (10.1%)	21 (4.4%)	

Table 2. Knowledge about influenza among the respondents (n=545)

Characteristics	*Frequency (n)*	*%*
The flu is a contagious disease		
True	523	96.0
False	9	1.6
Do not know	12	2.2
No answer	1	0.2
Influenza infection can lead to serious complications		
True	524	96.1
False	5	0.9
Do not know	13	2.4
No answer	3	0.6
In children and the elderly there is a higher risk for severe complications		
True	534	97.9
False	2	0.4
Do not know	6	1.1
No answer	3	0.6
In which season(s) there is higher incidence from influenza (multiple choice)		
Spring	141	26.0
Summer	55	10.1
Autumn	262	48.3
Winter	463	85.4
Do not know	1	0.2
Who should be vaccinated against influenza (multiple choice)		
People >65 years	42	7.8
Adults, children >6 months suffering from chronic diseases	120	22.3
Persons living in medical and social homes, dormitories, etc.	25	4.7
Persons at increased risk of infection- medical staff, army, and police officers, etc.	83	15.5
All the above	345	64.2

Plovdiv region. When asked about their education level, 58.3% of the respondents who claimed to have received the influenza vaccine and 52.2% of the unvaccinated group had a university degree.

Knowledge

The respondents showed an overall good knowledge of the characteristics of the influenza infection in terms of contagiousness, possible complications, seasonality, and recommended groups for influenza vaccination (Table 2).

Practices

In this study, the overall vaccination rate of the respondents was 11%. Further examination of the vaccinated respondents by age groups demonstrated that the relative part of vaccinated people increased with age (Figure 1). We proved an association between the age of the respondents and administration of an influenza vaccine (χ^2=16.687 p=0.005). Moreover, we found an association between vaccination status and the educational level of the respondents (χ^2=27.002, p=0.00002). Mostly educated respondents with a university degree stated to be vaccinated with an influenza vaccine in the previous flu season. The higher share of the people who have received the influenza vaccine (71.7%, n=43) answered that they have received the vaccine from their general physician. No association was established between the financial situation of the respondents and possible influenza vaccination (χ^2=1.88 p=0.759).

Attitudes

Exploring the attitudes of unvaccinated respondents towards the influenza vaccine, 27.6% of them were uncertain about the effectiveness of the vaccine and almost the same percentage (26.8%) had the perception that this is not a serious disease. Another reason for non-vaccination was the opposition to vaccination stated by 13.6% of the participants. However, more than half of the respondents (51.1%) were willing to change their attitude towards influenza vaccination and the recommendation and advice from a doctor was the most important for them (40.8%).

Discussion

Influenza vaccination is the primary method for preventing influenza and its severe complications. Among healthy adults, influenza vaccine can prevent 70–90% of influenza-specific illness. Among the elderly, the vaccine reduces severe illnesses and

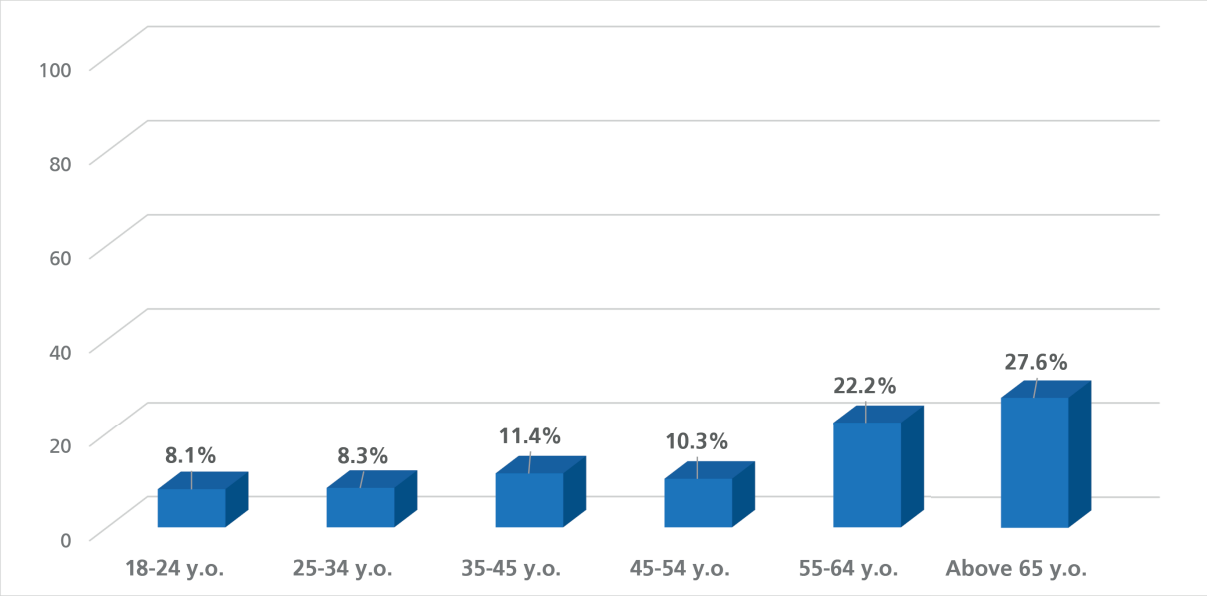

Figure 1. Percentage of vaccinated individuals among different age groups.

Table 3. Attitudes towards the influenza vaccine among the unvaccinated respondents (n=485)

Characteristics	*Frequency (n)*	*%*
The reason you did not vaccinate		
Lack of information	120	25.0
Influenza is not a serious disease	130	26.8
Against vaccines	66	13.6
The vaccine is not effective	135	27.6
No answer	34	7.0
Do you think something can change your mind in the future?		
Yes	248	51.1
No	228	47.0
No answer	9	1.9
What can help to change your mind regarding the influenza vaccine		
Additional information from a doctor and explanation about the indications for use	198	40.8
Information from other sources-TV, internet, newspapers	59	12.2
Recommendation from a friend or relative	51	10.5
Other reasons	91	18.8
No answer	86	17.7

complications by up to 60% and deaths by 80%[17]. However, vaccination coverage is still suboptimal in most European countries[7].

In our study, most of the respondents were aware of some important facts regarding influenza, as the recommendations for vaccination, seasonality, infectivity, and risk groups. Few studies have indicated a weak association between the better knowledge and vaccination. According to two studies, respondents with better knowledge of influenza and vaccination recommendations (OR 1.6-3.3)[18,19] and measures to prevent the spread of the virus (OR 1.59-3.06)[19] were more likely to get vaccinated.

Among the 545 participants, 11% stated that they have received the influenza vaccine in the previous season. This vaccination rate is higher than that reported by a similar study among the general population, that estimated a 6.7% vaccination rate[20] and the national data published from previous seasons[7,21]. The results of our study are significantly lower than the rates reported by other countries such as Germany (40.4%), France (37.5%), Spain (56.4%) and Italy (48.6%)[7,22]. Due to this fact, a program to increase the coverage with influenza vaccine was developed in our country for the period 2019-2022[21]. Such programs are essential, considering the present COVID-19 pandemic.

Looking at the age of vaccinated respondents, we found that the coverage increases with age and there was an association between older age and vaccination status (χ^2=16.687 p=0.005). This result might be explained by the perceived risk of influenza

complications, and it corresponds with other studies in European and Asian populations[18,23-25].

We found an association between the higher education of the respondents and the possibility for administration of an influenza vaccine ($\chi 2$=27.002, p=0.00002), which correlates with studies of other authors[26]. It might seem intuitive that higher education predisposes to a higher vaccination rate, but in the literature this theory is inconsistent. Higher education has been identified as a potential barrier toward vaccination in USA, China, Lebanon, Bangladesh and Israel[27-31].

Barriers to vaccination included the belief that the vaccine was not effective, and that influenza is not a serious disease that might lead to complications. Similarly, an Australian study found that in the general population the two most stated reasons for not accepting the vaccine were "situation is not serious enough" and "I am not at risk"[32]. The positive view toward the influenza vaccine safety and efficacy has been identified as strongly associated with higher rates of vaccine uptake[26]. The European Centre for Disease Prevention and Control studied the so-called "vaccine hesitancy" phenomenon and determined that the major determinants for opposition to vaccination were concerns about vaccine safety and mistrust of the pharmaceutical industry[33-35]. Future work is needed to increase education, promote awareness, and combat myths of the clinical consequences of influenza in the population and the risk/benefit profile of influenza vaccines.

Physicians play a key role in the public's acceptance of vaccines and their recommendations are an important determinant of vaccination[36-39]. In our study, the highest share of the respondents who haven't been vaccinated in the previous season (40.8%) stated that the recommendation and further information from a physician might help them to change their attitude towards influenza vaccine. Other studies also suggested that the recommendation from a physician for regular vaccination was a positive predictor of compliance[40,41].

To the best of our knowledge, this is one of the few studies to measure the general population's knowledge, attitudes, and practices towards the seasonal influenza vaccine in Bulgaria. However, our study contributes to the effort to further describe the situation in Bulgaria in terms of vaccination rates and provides insightful details that may lead to an increase of the national vaccination rates, not only with influenza vaccine, but with other vaccines, in light of the current COVID-19 pandemic and the strive to reach higher vaccine uptake among the population.

Conclusions

The present study showed that seasonal influenza vaccine uptake was low in Plovdiv (Bulgaria) and the main driver for vaccine hesitancy was the concern regarding the safety and effectiveness of the vaccine. The recommendation from a physician might help change the negative attitude of some of the respondents. These results emphasize the need to spread public awareness regarding the efficacy and benefits of seasonal influenza vaccination, as well as increasing the involvement of general physicians in carrying out promotional activities on recommended vaccines, such as influenza.

Authors contributions

V.R conceived the original draft preparation. V.R, A.K., R.R, were responsible for conception and design of the study. M.A, D.A, and S.S were responsible for the collection of data. All authors contributed equally to the present work. All authors contributed to the critical revision of the manuscript for valuable intellectual content. All authors have read and agreed with the final version of the manuscript.

Compliance with Ethics Requirements:

"The authors declare no conflict of interest regarding this article"

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