

PROTECTION AGAINST COVID-19 INFECTION – OPINIONS ON THE EFFECTIVENESS OF SELECTED METHODS USE IN PRACTICE AGAINST INFECTION

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A. Study design/planning • B. Data collection/entry • C. Data analysis/statistics • D. Data interpretation • E. Preparation of manuscript • F. Literature analysis/search • G. Funds collection

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ABSTRACT

Introduction: The aim of the study was to examine the public’s opinion on the effectiveness of various methods of preventing SARS-CoV-2 infection and their practical application.

Material and methods: This pilot study was conducted in January 2022 among 307 people (225 women and 82 men) in the age range 18-87 years. The study was conducted by a diagnostic survey method using a survey technique (author’s questionnaire).

Results: It was more common for vaccinated than unvaccinated individuals not to get sick (15.61% vs. 4.90%). In addition, among the unvaccinated, 50.0% indicated that they were likely to get sick but did not take the test, while such a response was indicated by 24.89% of the vaccinated. The majority of respondents considered proper and frequent hand washing ($n = 205$, 66.76%) and hand disinfection ($n = 176$, 57.33%) to be the most effective methods of preventing COVID-19 infection. The more methods of preventing SARS-CoV-2 infection respondents considered effective, the more they used ($\rho = 0.75990$). Those who were vaccinated reported using more of these methods in practice, compared to unvaccinated individuals (mean 6.48 vs. 5.14, respectively). In addition, those who were rather sick, used more methods to prevent COVID-19 infection than those who were sick with COVID-19.

Conclusions: Vaccinated individuals considered significantly more methods of preventing SARS-CoV-2 infection to be effective, and also used more of these methods in practice. An association was shown between the incidence of COVID-19 and use of infection prevention methods in practice.

Key words: prevention, vaccination, protection, pandemic, COVID-19.

INTRODUCTION

In December 2019, a new coronavirus infection (COVID-19) broke out in Wuhan, China [1]. An epidemic state for COVID-19 was implemented in Poland on 20 March 2020 [2]. From the beginning, scientists stressed the need to urgently address strategies to strengthen prevention and interrupt transmission of the infection [3]. To control the epidemic and prevent further spread of the virus, basic and necessary strategies such as early screening, diagnosis, isolation, and treatment were introduced [4].

In May 2020, the Central Institute for Labour Protection published guidelines and a checklist on occupational safety and health during the COVID-19 epidemic. The chapter titled “Measures to reduce the risk of exposure to SARS-CoV-2” included solutions to issues such as ensuring physical distance, limit-

ing direct contact with people outside the workplace, adhering to hygiene rules, and personal protective equipment, among others [5].

Available data indicate that the virus causing COVID-19 is transmitted between people through close contact and the droplet route. The most effective preventive measures, outside of health care facilities, include the following: frequent hand hygiene – washing hands with soap and water and an alcohol-based disinfectant; avoiding touching one’s own face, eyes, nose, and mouth; respiratory hygiene – covering the mouth with an elbow pit or handkerchief when coughing or sneezing (the handkerchief should be discarded immediately after use); using a medical mask for respiratory symptoms and hand hygiene immediately after discarding the mask; and keeping a distance of at least one metre from people with symptoms of respiratory infection [6].

On 16 May 2022, the state of epidemic in Poland was lifted and replaced by the state of epidemic emergency. The state of epidemic emergency will remain in effect until further notice [7].

AIM OF THE STUDY

The aim of the study was to examine the public's opinion on the effectiveness of various methods of preventing SARS-CoV-2 infection and their application.

MATERIAL AND METHODS

The study was carried out by a diagnostic survey method using a proprietary survey questionnaire (17 closed-ended questions). Implementation period:

January 2022. The survey was conducted through social media using the Google Forms platform. The link to the survey was made available on groups of residents of Tarnów and the surrounding region. The inclusion criteria were as follows: minimum age 18 years, consent to participate in the survey, and a correctly completed survey questionnaire. A total of 348 people completed the survey, of whom 307 correctly completed the questionnaires (225 women and 82 men) and were finally included in the analysis. The respondents were in the age range 18-87 years. The study was conducted in accordance with ethical principles (including adherence to the principles of the Declaration of Helsinki).

The questions included opinions on the effectiveness of methods to prevent COVID-19 infection, use of the aforementioned methods in practice, history of COVID-19 infection, and having received vaccination against COVID-19.

Calculations were performed using Excel and Statistica. Relationships between the 2 variables were tested using the chi-square test of independence, ANOVA, and Spearman's correlation. The statistical analyses assumed a significance level of $p = 0.05$.

RESULTS

The study group was dominated by women (73.29% vs. 26.71%), city residents (62.21% vs. 37.79%), and those with secondary education (55.37%). The largest number of respondents indicated that they had pupil/student status (55.70%) or held clerical jobs (24.43%) (Table 1).

At the time of the survey, a significant percentage declared that they had received the COVID-19 vaccination ($n = 205$, 66.78%): single-dose vaccine ($n = 25$, 8.14%), one dose of multi-dose vaccine ($n = 6$, 1.95%), 2 doses of multi-dose vaccine ($n = 137$, 44.63%), or 3 doses of multi-dose vaccine ($n = 37$, 12.05%).

Having had a positive test result for COVID-19 (antigen test, platelet test, by RT-PCR and/or anti-SARS-CoV-2 antibody level) was declared by 27.69% of the respondents ($n = 85$). A significant percentage (33.22%, $n = 102$) believed that they had been sick with COVID-19 but were not tested for it, 12.05% ($n = 37$) had had a negative test result (antigen, platelet, by RT-PCR and/or anti-SARS-CoV-2 antibody level), and the remaining 27.04% ($n = 83$) marked the answer "don't know".

It was shown that there was a significant relationship between the incidence of COVID-19 and vaccination. It was more common for vaccinated than unvaccinated individuals not to become sick (15.61% vs. 4.90%). In addition, 50.0% of the unvaccinated participants indicated that they had probably been sick but did not take the test, while such a response was indicated by 24.89% of the vaccinated (Table 2).

Table 1. Characteristics of the study group

Variables	n	%
Age (mean 26.23 ±9.52 years, min. 18, max. 87)		
Gender		
Female	225	73.29
Male	82	26.71
Place of residence		
Urban	191	62.21
Rural	116	37.79
Education		
Primary	13	4.23
Vocational	14	4.56
Secondary	170	55.37
Higher	110	35.83
Current occupation		
Unemployed	5	1.63
Retiree/pensioner	9	2.93
Physical worker	43	14.01
Clerical worker	75	24.43
Farmer	4	1.30
Pupil/student	171	55.70

Table 2. COVID-19 incidence vs. COVID-19 vaccination

Category	Unvaccinated n (%)	Vaccinated n (%)
I don't know	17 (16.67)	66 (32.20)
No, negative test	5 (4.90)	32 (15.61)
Yes, based on the level of anti-SARS-CoV-2 antibodies in the blood (the test was performed before the first dose of vaccine if received)/positive test result	29 (28.43)	56 (27.32)
I think I got sick, but I didn't have the test done	51 (50.00)	51 (24.89)
Statistic	$\chi^2 = 25.52, p < 0.001$	

People were asked about wearing the same disposable mask more than once. The largest number of people – 44.30% ($n = 136$) indicated that they often did this, 28.99% ($n = 89$) reported that they sometimes did this, 11.73% ($n = 36$) answered that they wore a reusable mask, 4.23% ($n = 13$) indicated that they did not wear a mask, and the remaining 10.75% ($n = 33$) reported that they wore a disposable mask as intended, i.e. only once. Few declared that they had familiarized themselves with the manufacturer's recommendations on how long to use the mask ($n = 13$, 4.23%).

Next, respondents were asked to indicate the methods of preventing SARS-CoV-2 infection that they considered effective. Respondents' statements included (percentages do not add up to 100% – multiple-choice question): proper and frequent hand washing ($n = 205$, 66.76%), hand disinfection ($n = 176$, 57.33%), keeping a safe distance ($n = 174$, 56.68%), avoiding clusters of people ($n = 142$, 46.25%), using a nose and mouth mask ($n = 141$, 45.93%), using protective gloves ($n = 117$, 38.11%), adherence to quarantine and isolation if infected ($n = 117$, 38.11%), proper nutrition and hydration ($n = 114$, 37.13%), vaccination against COVID-19 ($n = 108$, 35.18%), frequent disinfection of touch surfaces ($n = 98$, 31.92%), avoiding touching your eyes, nose, and mouth with your hands ($n = 86$, 28.01%), not using the phone while eating ($n = 83$, 27.04%), shopping online ($n = 74$, 24.10%), keeping leaving the house to a minimum ($n = 62$, 20.20%), taking prophylactic tests against COVID-19 ($n = 53$, 17.26%), getting plenty of rest ($n = 42$, 13.68%), frequently ventilating rooms and keeping them clean ($n = 38$, 12.38%), and sneezing or coughing into the shoulder/elbow ($n = 34$, 11.07%). Among the above-mentioned effective methods of preventing SARS-CoV-2 infection, respondents marked an average of 7.62 methods (± 4.40). On the other hand, the use of these methods in practice was already marked slightly lower, by an average of 6.04 (± 3.50) people. The more methods of preventing SARS-CoV-2 infection respondents considered effective, the more they used in practice ($\rho = 0.75990$, $p < 0.001$).

There was a significant difference between COVID-19 vaccinated and unvaccinated individuals in the number of COVID prevention methods they considered effective: vaccinated respondents (regardless of the number of doses) marked significantly more methods that they considered effective than the unvaccinated respondents (mean 8.32 vs. 6.21). In addition, vaccinated persons declared the use of more of these methods in practice (mean 6.48 vs. 5.14) (Table 3).

It was ascertained whether being sick with COVID influenced the respondents' opinion of the effectiveness of given methods of preventing infection. Those who were sick or rather sick with COVID-19 marked significantly fewer effective methods of preventing infection than those who were not sick, or they

Table 3. The fact of being vaccinated against COVID-19 vs. opinion on the effectiveness of methods of preventing COVID-19 infection and the use of the above methods in practice

Vaccination	<i>n</i>	Mean	SD	ANOVA
Effective methods to prevent COVID-19 infection according to respondents				
No	102	6.21	4.13	$p = 0.000065$
Yes	205	8.32	4.38	
Methods used by respondents to prevent COVID-19 infection				
No	102	5.14	3.59	$p = 0.001453$
Yes	205	6.48	3.39	

Table 4. COVID-19 infection vs. marked number of effective methods of prevention of infection and use of the above methods in practice

Category	<i>n</i>	Mean (SD)
Effective methods to prevent COVID-19 infection according to respondents		
COVID-19 infection	I don't know	83 6.34 (4.25) ^{a*}
	No, negative test	37 6.76 (4.27) ^{a,b*}
	Yes, based on the level of anti-SARS-CoV-2 antibodies in the blood (the test was performed before the first dose of vaccine, if received)/ positive test result	85 8.51 (4.39) ^{c*}
	I think I got sick, but I didn't have the test done	102 8.23 (4.36) ^{c,d*}
Statistic	$p = 0.003$	
Methods used by respondents to prevent COVID-19 infection		
COVID-19 infection	I don't know	83 5.17 (3.66) ^{a*}
	No, negative test	37 5.65 (3.25) ^{a,b*}
	Yes, based on the level of anti-SARS-CoV-2 antibodies in the blood (the test was performed before the first dose of vaccine, if received)/ positive test result	85 6.39 (3.38) ^{c*}
	I think I got sick, but I didn't have the test done	102 6.59 (3.47) ^{c,d*}
Statistic	$p = 0.03$	

*The different letters ^{a, b, c, d} in one cell means not statistically significant differences between denoted groups (Tukey's test)

marked the answer "don't know". In addition, those who tended to be sick used more methods to prevent COVID-19 infection than those who were sick with COVID, and those who were sick used more than those who were not sick, while the lowest number of preventive methods were used by those who did not know whether they had contracted COVID (Table 4).

DISCUSSION

Data from previous studies indicate that the virus is mainly transmitted by the droplet route to people in close contact or through contact with contaminat-

ed objects and surfaces when proper hygiene (hand washing) is not observed [8]. As reported by Liu *et al.*, distribution of SARS-CoV-2 is more likely through environmental surfaces than through the air (the analysis was conducted in a hospital environment) [9]. The author's survey provided disturbing data showing that too small a percentage of respondents believed in the effectiveness of proven sources for preventing COVID-19 infection. Of the methods listed, they considered the following to be effective: frequent disinfection of touch surfaces – 31.92%, avoiding touching eyes, nose, and mouth with hands – 28.01%, not using the phone while eating – 27.04%, and sneezing or coughing into the arm/elbow – 11.07%.

The most recommended protection against COVID-19 infection is the proper wearing of a protective face mask. Researchers from the University of Massachusetts Lowell and California Baptist University looked at three-layer surgical masks, which are commonly used not only by health care professionals, but also by average users. Through computer modeling, the researchers found that the air inhaled by the new masks is 65% filtered, while that of used masks is only 25% filtered. That is because the shape of a protective mask changes after each use [10]. In the author's study, respondents were asked about wearing a disposable mask more than once; a significant percentage indicated that it happens to them often (44.30%) or sometimes (28.99%). In view of the results cited above, it seems natural to think that wearing a mask, no matter how new or old, is always better than nothing.

COVID-19 vaccines are a key tool to control the ongoing global pandemic. Large, randomized, controlled trials have concluded that each vaccine is safe and effective in preventing COVID-19 [11-13]. Despite the high level of vaccine efficacy, a small percentage of fully vaccinated individuals (i.e. those who have received all recommended doses of COVID-19 vaccine) will develop symptomatic or asymptomatic SARS-CoV-2, the virus that causes COVID-19 (breakthrough infections). As of 30 April 2021, a total of 10,262 post-vaccine SARS-CoV-2 infections have been reported in 46 states and US territories. Among these cases, 2725 (27%) vaccine breakthrough infections were asymptomatic, 995 (10%) patients were hospitalized, and 160 (2%) died [14]. On the basis of our own study, we found that unvaccinated individuals were significantly more likely to contract COVID-19 than vaccinated individuals. The lack of confirmation of the disease by test in the group of unvaccinated people indicates their general attitude to sanitary-epidemiological recommendations; these people were less likely to test, which could be due to the need to quarantine when a positive result was confirmed.

Analysis of our study provided another interesting finding: vaccinated persons declared the use of

more of these methods of preventing COVID-19 infection in practice than unvaccinated persons (mean 6.48 vs. 5.14). Studies on psychological characteristics associated with "vaccine resistance" were conducted, among others, by Murphy *et al.*, on adult populations from Ireland and the UK. They showed that people resistant to COVID-19 vaccination were less likely to obtain information about the pandemic from traditional and authoritative sources. In addition, it was shown that people who were opponents of the COVID-19 vaccine (vaccine resistance) had a higher rate of internal locus of control over their own health and a lower rate of influence of others (powerful others) compared to vaccine supporters (vaccine acceptance) [15]. There is a lack of research in the national literature on the psychological characteristics of those who follow and resist health-promoting recommendations, so it is recommended that research is undertaken in this direction.

CONCLUSIONS

Unvaccinated individuals were significantly more likely to contract COVID-19 than vaccinated individuals. The lack of confirmation of the disease by test in the group of unvaccinated people indicates their general attitude to sanitary-epidemiological recommendations – these people were less likely to test.

The more methods of preventing SARS-CoV-2 infection that the respondents considered effective, the more they used in practice.

Vaccinated individuals considered significantly more methods of preventing SARS CoV-2 infection effective, and they used more of these methods in practice.

A relationship was shown between COVID-19 incidence and use of infection prevention methods in practice.

Disclosure

The authors declare no conflict of interest.

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