

# Willingness and Hesitancy to Vaccinate Against COVID-19 in People with Multiple Sclerosis

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**Summary.** *Introduction.* During the pandemic, vaccination against COVID-19 has become one of the most important ways to prevent severe infection. However, a lack of trust in vaccines among the population, including people with multiple sclerosis (MS) has been identified. In Lithuania, the specific reasons for vaccine hesitancy among people with MS have not been described. We conducted a survey to determine the attitude of people with MS towards vaccination against COVID-19 infection.

*Methods.* An original anonymous questionnaire was created. The survey included the following aspects: patient demographics, MS exacerbation, COVID-19 vaccination status, and attitudes towards the vaccination process. The survey was conducted between November 2021 and February 2022. Data were analyzed using IBM SPSS Statistics 27.0 with Chi-square and Mann-Whitney U tests and p-value (statistically significant at <0.05) for each hypothesis.

*Results.* Of the 80 MS patients, 82.5% (n=66) were vaccinated and only 17.5% (n=14) were not vaccinated. The most popular positive opinions about vaccination were: “COVID-19 vaccines have more benefits than harm” (71.6%) and “the desire to prevent severe symptoms/hospitalization caused by COVID-19 infection” (79.1%), while mostly agreed negative opinion was “fear of side effects of the vaccine” (84.6%). Intended uptake of COVID-19 vaccines was strongly associated with younger age (p=0.021), higher education level (p=0.008), and employment status (p=0.028). There was no further link between other demographic factors such as gender, residency, and even exacerbation of MS between January 1, 2020 and February 1, 2022 (p>0.05).

*Conclusion.* Although there was some hesitancy about the COVID-19 vaccination, people with MS were more likely to take the COVID-19 vaccine due to their positive attitude towards the process.

**Keywords:** multiple sclerosis, COVID-19, vaccination.

## INTRODUCTION

In 2019, the COVID-19 pandemic (caused by the novel virus of SARS-CoV-2) killed more than 780,000 people worldwide and infected more than 22 million people. The rapid spread of the virus and the increasing number of cases demanded urgent development of accurate diagnostic methods, effective treatment methods, and preventive

measures [1]. Throughout the pandemic, vaccination against COVID-19 has become one of the most crucial tools to prevent a more severe infection course [2]. The rapid development of vaccines gives great hope, but it still raises questions about the safety and efficacy of vaccination. This problem is particularly relevant to patients with autoimmune diseases, including multiple sclerosis (MS). The etiopathogenesis of this disease includes a complex interaction between genetic background and several environmental factors, including viral infections that may cause immune reactions against the central nervous system. On the other hand, the exact effect of SARS-CoV-2 on the immune system is not completely clear: the manifestation of acute or chronic COVID-19 infection and the severity of the disease largely depends on the body reac-

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tion to the pathogen [3]. It is not known exactly what kind of autoimmune reactions the vaccination process can cause, but it likely depends on the individual genetic characteristics and the type of vaccine [4, 5]. According to a prospective study conducted by researchers in South America, vaccines against COVID-19 can be considered safe. Their study evaluated adverse vaccination events against COVID-19 infection in patients with MS (n=393). Adverse reactions occurred in 35.6% of patients after the first dose of the vaccine and in 23.6% after the second dose. The most common reactions were pain at the injection site, flu-like symptoms, headache, fever, muscle and joint pain. No life-threatening reactions were noticed [6]. Another team of scientists concluded that vaccination of patients with MS is necessary, except when patients are given immunosuppressive treatment or are vaccinated with live COVID-19 vaccines [7].

On the other hand, during the coronavirus pandemic, a lack of trust in vaccines has been revealed among the population and certain groups of patients, including those with MS. Attitudes towards vaccination may vary between different countries, ethnicities, and age groups. Researchers in the United States and other countries evaluated the correlation between the willingness of MS patients for vaccination, their sociodemographic factors, and MS exacerbations [8–11]. In Lithuania, specific reasons for vaccine hesitancy among people with MS have not yet been described. From November 2021 to February 2022, we conducted a survey in the Neurology and Nervous System Outpatient Department of the Hospital of Lithuanian University of Health Sciences (HLUHS) Kaunas Clinics to determine the attitude of people with MS towards vaccination against COVID-19 disease.

## AIM AND OBJECTIVES

The aim of this study was to evaluate the characteristics of vaccination against COVID-19 infection in patients with MS and the attitudes of these patients towards the vaccination. Research objectives: 1) Determine the frequency of patients with MS vaccinated against COVID-19; 2) Find out the attitude of MS patients towards vaccination against COVID-19; 3) Evaluate the associations between positive and negative attitudes towards vaccination with demographic and clinical characteristics of the disease.

## MATERIALS AND METHODS

Research approval was given by the Bioethics Center of LUHS (protocol number BEC-MF-153). The research was conducted in the Neurology and Nervous System Outpatient Department of the HLUHS Kaunas Clinics by means of an anonymous survey. An original questionnaire was created consisting of 15 questions, of which 9 were closed and 6 open-ended or multiple-choice. Five questions were

general, the rest were specific. The questionnaire aimed to find out the demographic factors of patients (gender, age, place of residence, education level, work status), whether the patient had exacerbations of MS in a specific period (from January 2020 to February 2022), as well vaccination status and opinion on vaccination. The questionnaire on opinions towards the vaccination process contained 10 statements that patients could choose about the negative side of vaccination and 9 statements about the positive side of vaccination. For each statement, it was possible to choose the most suitable answer for the respondent from the possible options: strongly agree, agree, neither agree nor disagree, disagree, and strongly disagree. The questions were original and based on scientific literature and other case studies.

The study was conducted from November 2021 to February 2022. The respondents were patients with MS who understood the Lithuanian language and were selected randomly regardless of their demographic factors (age, gender, place of residence, etc.). The study included patients who agreed to participate and answered all questions. Incompletely answered questionnaires (e.g., missed answers to the questions) were not included in the study. It was possible to participate in the research only once. Before the study, all respondents were introduced to the purpose of the study and informed that participation in the study is anonymous, confidentiality will be maintained, and the results will be published only in summary form.

For analysis, the education and working status of all respondents were divided into several groups. Education was grouped into higher and secondary education. The working status of the respondents was also grouped into separate categories: employed and unemployed.

Statistical analysis was performed using IBM SPSS Statistics software (version 27.0, New York, USA). The obtained data were analyzed using the methods of averages, percentage frequencies, and the Mann-Whitney U test. To test the hypothesis about the correlation between two characteristics (vaccination status with demographic factors and disease exacerbation), the Chi-square ( $\chi^2$ ) test was used. To evaluate each hypothesis, data differences were considered statistically significant at  $p < 0.05$ .

## RESULTS

### Demographics

A total of 80 MS respondents participated in the survey: 66.3% women and 33.7% men. The age of the patients was distributed as follows: 35–44 years (41.2%), 25–34 years (26.5%), 45–54 years (20.6%), 18–24 years (8.8%), and the smallest number of the respondents were aged over 55 years (2.9%). The mean age of the respondents was  $39 \pm 9.8$  years. Among MS patients, 68.8% had higher education and 31.2% had secondary education. The place of residence of the respondents was distributed as follows:

Table. Prevalence of different attitudes towards COVID-19 vaccination by demographic characteristics and multiple sclerosis exacerbation (n=80)

Variable	Total n (%)	Positive attitudes towards COVID-19 vaccination n (%)	Negative attitudes towards COVID-19 vaccination n (%)	p value
<b>Gender</b>				
Female	53 (66.3)	42 (63.6)	11 (78.6)	0.362
Male	27 (33.7)	24 (36.4)	3 (21.4)	
<b>Age</b>				
Median age	39±9.8 years	37±9.9 years	47±8.0 years	0.021
<b>Education</b>				
Higher	55 (68.8)	50 (75.8)	5 (35.7)	0.008
Secondary	25 (31.2)	16 (24.2)	9 (64.3)	
<b>Place of residence</b>				
City (>3000 inhabitants)	51 (63.7)	45 (68.2)	6 (42.9)	0.125
Town (500-3000 inhabitants)	18 (22.5)	14 (21.2)	4 (28.6)	
Rural area	11 (13.8)	7 (10.6)	4 (28.5)	
<b>Employment status</b>				
Employed	52 (65.0)	47 (71.2)	5 (35.7)	0.028
Unemployed	28 (35.0)	19 (28.8)	9 (64.3)	
<b>Clinical exacerbation of multiple sclerosis (from January 1, 2020 to February 1, 2022)</b>				
At least 1	36 (45.0)	33 (50.0)	3 (21.4)	0.075
None	44 (55.0)	33 (50.0)	11 (78.6)	

For analysis, the Chi-square ( $\chi^2$ ) test was used. Data differences were considered statistically significant at  $p < 0.05$ .

63.7% of MS patients lived in the city (>3000 inhabitants), 22.5% in towns (500-3000 inhabitants), and 13.8% in rural areas. Moreover, it was found that 35% of patients with MS were unemployed and 65% were employed.

#### Specific characteristics of COVID-19 vaccination

It was found that 82.5% (n=66) of MS patients reported having received a vaccine against COVID-19 infection, and only 17.5% (n=14) of them were unvaccinated. The median age of the vaccinated respondents was 37±9.9 years and the median age of the unvaccinated respondents was 47±8.0 years. In the vaccinated group, there were twice as many women (n=42) as men (n=24). In the group of unvaccinated respondents, women were also in the majority (n=11), while men were in the minority (n=3).

While 75.8% of MS patients with higher education had a positive attitude towards vaccines against COVID-19 infection, only 35.7% of respondents with similar education had a negative opinion ( $p=0.008$ ). Among those with secondary education, as many as 64.3% had a negative opinion of the vaccination process ( $p=0.008$ ). Moreover, having a job and a positive vaccination status were statistically significant for each other ( $p=0.028$ ). It was found that 71.2% of employed MS patients were vaccinated against COVID-19 infection, while 28.8% of the vaccinated patients were not employed. Among the 14 unvaccinated respondents, the majority were unemployed (n=9), whereas the rest were employed (n=5). However, no associations ( $p>0.05$ ) were found between other demographic factors

such as gender ( $p=0.362$ ), place of residence ( $p=0.125$ ), and MS exacerbation ( $p=0.075$ ). For example, a similar percentage of patients living in urban areas (500-3000 inhabitants) had both favorable and unfavorable attitudes towards vaccination against COVID-19 (21.2% positive and 28.6% negative). Despite the fact that 68.2% of respondents living in urban areas were vaccinated and 42.9% were unvaccinated, this difference did not reach statistical significance ( $p=0.125$ ). There was also no significant association between the frequency of MS exacerbations and vaccination status ( $p=0.075$ ). Among patients with at least one exacerbation between January 1, 2020 and February 1, 2022, the number of vaccinated was 33, while among patients with no MS exacerbation, the number of vaccinated was 11 (Table).

#### Positive and negative attitudes towards the vaccination process

The most popular positive opinions about vaccination were: "COVID-19 vaccines have more benefits than harm" (71.6%) and "the desire to prevent severe symptoms/hospitalization caused by COVID-19 infection" (79.1%). The least frequent reasons for vaccination were: "the vaccine is free" (16.4%), "due to the influence of relatives/other people/media/etc." (17.9%), and "due to the influence of the employer" (19.4%). The distribution of positive attitudes towards vaccination against COVID-19 is shown in more detail in the figure below (Fig. 1). The most common reason given by the respondents for refusing to

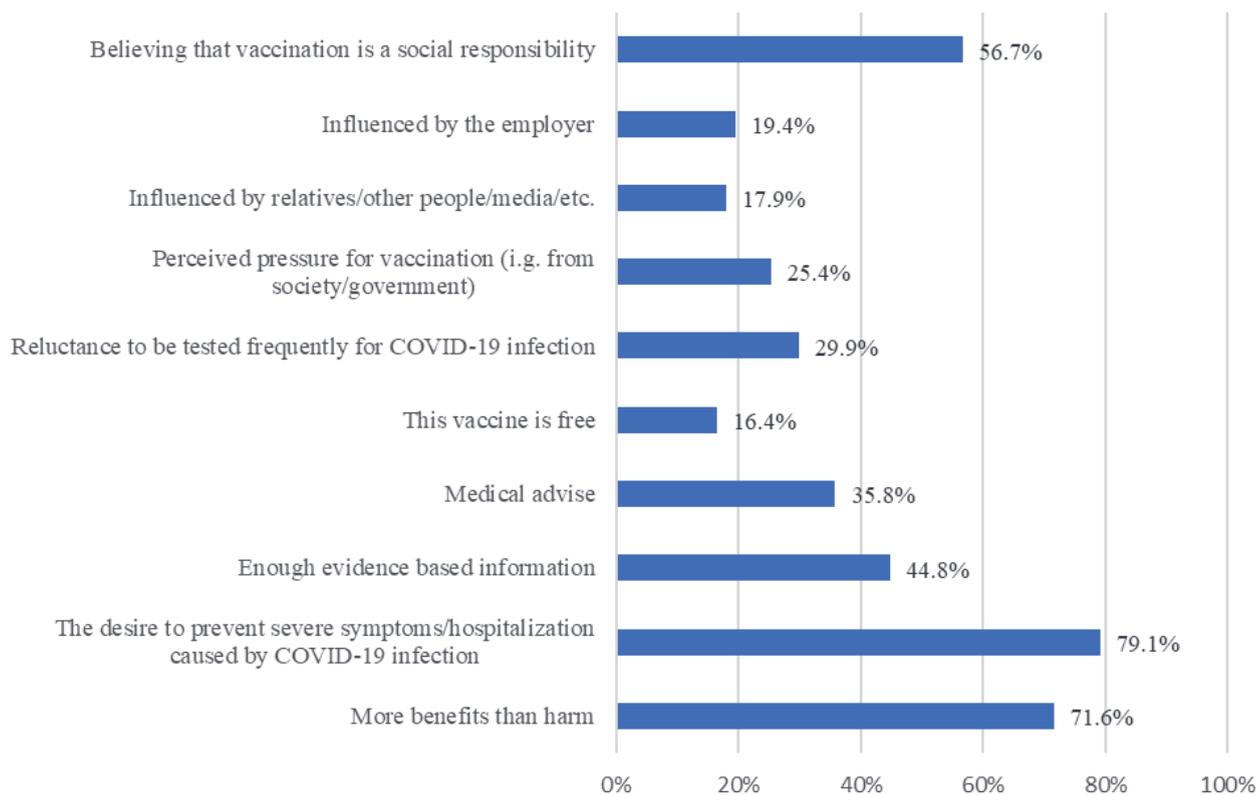


Fig. 1. Positive attitudes towards COVID-19 vaccination

vaccinate was “fear of side effects” (84.6%). The least frequently repeated statements for not vaccinating were: “due to medical advice” (15.4%) and “other vaccines had caused some side effects” (30.8%). A more detailed distribution of negative attitudes towards COVID-19 vaccination is shown in the figure (Fig. 2).

## DISCUSSION

This is the first study in Lithuania aimed at determining different attitudes of patients with MS towards vaccination against COVID-19 infection. According to our study, 82.5% of patients with MS were vaccinated and only

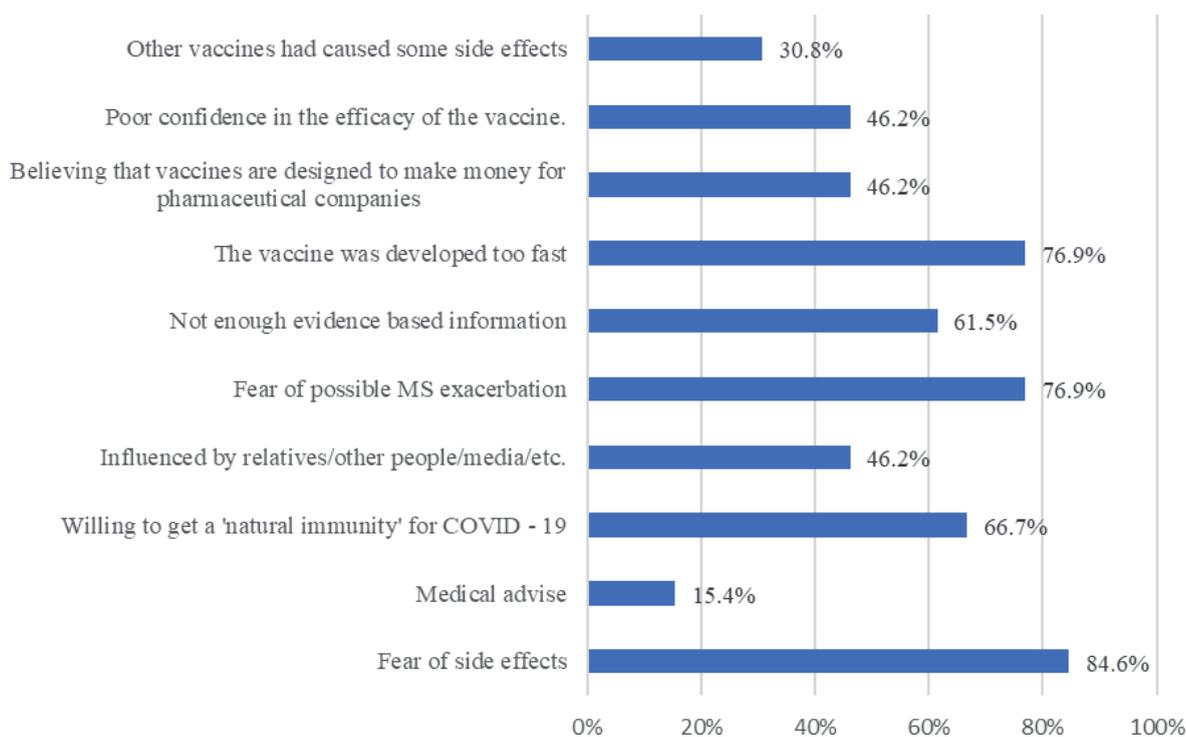


Fig. 2. Negative attitudes towards COVID-19 vaccination

17.5% of patients were not vaccinated. Similar proportions are shown worldwide: 80.9% of patients with MS in Portugal were vaccinated [10], in the UK – 94.4% [9], and in the USA – 73.8% [8]. Our study showed that higher education is associated with a willingness to get vaccinated against COVID-19 ( $p=0.008$ ). This correlation was reflected in similar types of studies in Portugal, the USA, and Italy [10, 12–14]. Moreover, in our study, younger people (median age  $37\pm 9.9$  years) were more likely to be vaccinated than older respondents ( $p=0.021$ ). On the contrary, other researchers have found an association between increasing age and vaccination against COVID-19 [10, 12, 15]. In our survey, vaccination status was not related to gender ( $p>0.05$ ). Even though Australian researchers found no association between willingness to vaccinate and age or gender, the results showed that women were more likely to be unsure if they wanted the vaccine (10.0%) than men (7.0%) [11]. This is different from other studies that showed that women were less likely to be willing to vaccinate [16, 17]. Moreover, our and other previous studies did not find an association between MS exacerbation and willingness to be vaccinated against COVID-19 [2, 18].

People with various chronic diseases, including MS, are more likely to take care of their health and have a constant contact with a range of healthcare professionals. As the COVID-19 pandemic progressed, many patients with MS were deciding whether to vaccinate or not. In our study, patients had positive attitudes towards vaccination because “COVID-19 vaccines have more benefits than harm” (71.6%) and “the desire to prevent severe symptoms/hospitalization caused by COVID-19 infection” (79.1%). A similar opinion about the reduction in the incidence of COVID-19 infection (including the risk of hospitalization) was found in Iran (74.4%) and in the USA (97.0%) [19, 20]. Yet, while there are many positive aspects and opinions about COVID-19 vaccines, unfortunately, there is still some hesitancy about the vaccination process. The most prevalent negative views in our survey were: “fear of side effects of the vaccine” (84.6%), “fear of possible MS exacerbation” (76.9%), and the concern that “the vaccine was developed too fast” (76.9%). According to different researchers in the USA, participants who were hesitant to vaccinate noted concerns about the long-term effects of the vaccines, the rapid approval process, and the potential effects based on health status [9, 19].

Based on the scientific literature and the findings of our survey, it can be concluded that MS patients have similar attitudes towards COVID-19 vaccination. Although there are still some doubts about the vaccination process, when comparing the results of different studies, the prevailing attitude towards vaccination is positive in order to prevent severe symptoms and the risk of hospitalization.

This study had several limitations. It included only patients from one Lithuanian hospital (HLUHS Kaunas Clinics). The survey period was short (only four months) and there was no follow-up survey on attitudes towards the vaccination process. In addition, this study included a small number of respondents, which may not reflect the

more accurate opinion of Lithuanian MS patients. Moreover, we only examined the attitudes of MS patients towards vaccination against COVID-19, but did not investigate the association between the clinical course of their disease and vaccination status. This may lead to inaccuracy in the results as the clinical course may impact the vaccination process. Therefore, large-scale studies and follow-ups are still needed in Lithuania to determine if patient attitudes toward COVID-19 vaccines are changing.

## CONCLUSIONS

1. Of the 80 MS patients: 82.5% were vaccinated, and only 17.5% were not vaccinated.
2. A higher proportion of MS patients were more likely to be vaccinated. The predominant reasons for the positive attitudes of the respondents were: “COVID-19 vaccines have more benefits than harm” and “the desire to protect against severe symptoms/hospitalization caused by COVID-19 infection”. In contrast, the most common reason for vaccine refusal was “fear of adverse effects”.
3. Willingness to be vaccinated was associated with younger age, higher level of education, and the working status of the respondents. However, there was no further link between gender, place of residency, and MS exacerbation.

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## SERGANČIŪJŲ IŠSĖTINĖ SKLEROZE POŽIŪRIS Į COVID-19 VAKCINACIJĄ

### Santrauka

*Įvadas.* Pandemijos metu vakcinacija nuo COVID-19 tapo vienu svarbiausių būdų užkirsti kelią sunkesnei infekcijos eigai. Kita vertus, koronaviruso pandemijos metu atsiskleidė ir didelis visuomenės, įskaitant ir sergančiuosius išsėtine skleroze (IS), nepasitikėjimas vakcinomis. Lietuvoje pacientų, sergančių IS, požiūris į vakcinaciją nuo COVID-19 dar nebuvo vertintas. Atlikome tyrimą, kuriuo siekėme įvertinti sergančiųjų IS nuomonę apie vakcinaciją nuo koronaviruso infekcijos.

*Tiriamieji ir tyrimo metodai.* Sukurta anoniminė originali anketa. Joje buvo siekiama išsiaiškinti pacientų, sergančių IS, demografines ir kliniškes (ar pacientas turėjo IS paūmėjimų) charakteristikas, taip pat vakcinacijos statusą ir nuomonę apie vakcinaciją. Apklausa vykdyta nuo 2021 m. lapkričio mėn. iki 2022 m. vasario mėn. Duomenų statistinė analizė atlikta naudojant IBM SPSS Statistics programą (versija 27.0). Gauti duomenys analizuoti taikant vidurkių, procentinių dažnių metodus, Mann-Whitney U ir Chi-kvadrato ( $\chi^2$ ) testus.

*Rezultatai.* Į tyrimą įtraukta 80 pacientų, sergančių IS. Vakcina nuo COVID-19 infekcijos skiepijosi 82,5 % (n = 66) respondentų ir tik 17,5 % (n = 14) atsakiusiųjų buvo nevakcinuoti. Populiariausias teigiamas nuomonės apie vakcinaciją: „vakcinos nauda yra didesnė nei žala“ (71,6 %) ir „noras apsisaugoti nuo COVID-19 infekcijos sukeltų sunkių simptomų / hospitalizacijos“ (79,1 %). Dažniausiai pasikartojanti priežastis, dėl kurios atsisakyta skiepytis, – „baimė dėl nepageidaujamo vakcinos poveikio“ (84,6 %). Respondentai buvo linkę skiepytis būdami jaunesnio amžiaus (p = 0,021), dirbantys (p = 0,028), su aukštesniu išsilavinimu (p = 0,008). Sąsajų tarp kitų demografinių veiksnių (lyties, gyvenamosios vietos ir IS paūmėjimo) nebuvo nustatyta (p > 0,05).

*Išvada.* Nors ir buvo tam tikrų dvejonių dėl vakcinacijos nuo COVID-19, pacientai, sergantys IS, išreiškė teigiamą požiūrį į šį procesą ir buvo labiau linkę pasiskiepyti.

**Raktažodžiai:** išsėtinė sklerozė, COVID-19, vakcinacija.

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