(RESEARCH ARTICLE)

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COVID-19 vaccine acceptance in Moroccan chronic inflammatory rheumatic disease patients

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Abstract

Objectives: The aim of this study was to assess the general knowledge of Chronic Inflammatory Rheumatic Disease (CIRD) patients concerning Covid-19 vaccination and to analyse factors influencing the acceptance of the vaccine.

Methods: This cross-sectional study is based on a phone survey with anonymous data collection. It included consecutively adult Moroccan patients (aged more than 18 years) suffering from CIRD: Rheumatoid Arthritis (RA), spondyloarthropathy and undifferentiated CIRD.

Results: A total 321 participants responded to the questionnaire. The mean age of patients was 47.6±12 years and women represented 65.7% of the study population. One third of the respondents (30.8%) had a university degree.

Patients that accepted Covid-19 vaccination represented 34.6% of the cases. Older people were more likely to accept the vaccination (p=0.009). Subjects with a history of past Covid-19 infection were less willing to accept vaccination (0.003). Sufficient knowledge of Covid-19 vaccines efficiency and security was associated with higher acceptance of the vaccination. 58.9% of people who accepted the vaccination had been informed by their rheumatologist.

In multivariate analysis, factors significantly associated with vaccine acceptance were past Covid-19 infection (p=0.01), the fact that Covid-19 vaccine was contraindicated in case of CIRD (p=0.02) and that it was recommended by the doctor (p<0.001)

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Conclusion: This study reflected a low level of acceptance of Covid-19 vaccination among the CIRD population in Morocco. Information campaigns on Covid-19 vaccination are needed in order to improve vaccine acceptance.

Keywords: Covid-19; vaccination; Acceptance; Chronic Inflammatory Rheumatic Disease; Rheumatoid arthritis; Spondyloarthropathies.

1. Introduction

The World Health organization (WHO) declared Coronavirus disease 2019 (Covid-19) as pandemic on March 11th 2020 due to the rapidity of transmission and the severity of infection [1]. Health professionals have worked to contain the virus by imposing social distancing, facial mask wearing and lockdowns.

Given the high mortality and morbidity of Covid-19 and the lack of specific antiviral treatments, the development of safe and effective vaccines had been an urgent public health priority.

Vaccines have always been a great strategy to slow the spread of diseases and to mitigate their health effects. In a short period of time scientists around the world deconstructed SARS-CoV-2 genetic code and they managed to design hundreds of possible vaccines and then got the first successful vaccine in less than a year. In Morocco, two vaccines are currently used in the vaccination campaign: SinoPharm developed by China and AstraZeneca developed by Britain's Oxford University.

From the start of the pandemic, questions were raised about a potential risk of more severe forms of Covid-19 disease in patients with Chronic Inflammatory Rheumatic Diseases (CIRD) known to be at risk of complications in case of infections. In addition, the Covid-19 pandemic has affected people with rheumatic diseases through treatment interruptions, delays in accessing outpatient and hospital services, which has increased the frequency of flares and disease activity.

In the middle of the ongoing global health crisis, it is crucial to know if the educational messages of Covid-19 vaccination are being understood by the population, particularly the patients suffering from CIRD. For this reason and in order to support Moroccan patients suffering from rheumatic diseases through the process of vaccination, we conducted this survey to evaluate the general knowledge and the treatment management of CIRD patients concerning Covid-19 vaccination. We also analyzed factors influencing the acceptance of the Covid-19 vaccination.

2. Methods

This cross-sectional study is based on a phone survey with anonymous data collection. It was performed by the Department of Rheumatology B at El Ayachi Hospital (National Reference Center for the Treatment of Rheumatic Diseases), in partnership with Military Training Hospital Mohammed V Rabat, Military Hospital of Marrakech, AMRAR (Moroccan Organization for Research and Social Assistance for Rheumatics) and AMP (Moroccan Association for the Fight against Rheumatoid Arthritis).

The study included consecutively adult Moroccan patients (aged more than 18 years) suffering from Chronic Inflammatory Rheumatic Diseases (CIRD): Rheumatoid Arthritis (RA), spondyloarthropathy and undifferentiated CIRD.

The survey was approved by the Ethics Committee of Mohammed V University, Rabat (Faculty of Medicine and Pharmacy) which waived the provision for informed consent and was performed in compliance with the ethical standards of science.

The working group consisted of a team of experts, including rheumatologists, a methodologist, a sociologist and a senior patient with CIRD.

2.1. Survey items

The questionnaire consisted of three sections with a total of 48 items. The first section is about socio-demographic characteristics and past history of Covid-19 infection and included questions on the following: age, sex, educational level, residence, comorbidities, smoking habits and previous diagnosis of Covid-19 infection for the respondent or a family member. Disease characteristics including the type of CIRD and current treatments.

In order to assess general knowledge about the Covid-19 vaccination, participants were asked to respond to a series of statements and to determine whether these statements were true or false or whether they were unsure of the answer. This section contained 6 items concerning the efficiency and security of Covid-19 vaccination, whether immuno-allergic conditions and comorbidities contraindicated Covid-19 vaccination, the need for Covid-19 vaccination after Covid-19 infection and the need for preventative measures after Covid-19 vaccination.

The third section assessed the patient's source of knowledge about Covid-19 vaccine, allowing the selection of five possible options: Doctor, pharmacist, relatives, internet (Google, YouTube) and social media plateforms (Facebook, Instagram). This section also studies the social media impact by evaluating the trust in the messages circulating on social networks on Covid -19 that are against vaccination.

The last section contains one item concerning the acceptance of Covid-19 vaccine that was inferred if participants indicated that they "definitely will accept vaccination against Covid-19."

2.2. Statistics

The statistical analysis was calculated using SPSS (Statistical Package for Social Sciences) software version 25. Quantitative variables data are presented as mean, standard, median and minimum-maximum deviation. For qualitative variables, data are expressed in numbers and percentages.

Group comparisons were made by using the T Student test (when the measures were normally distributed) or by nonparametric test (Mann-Whitney test) for quantitative variables when the measures were not normally distributed and the Chi-square test for qualitative variables.

Multivariate logistic regression analysis was conducted to identify factors associated with low of acceptance of Covid-19 vaccine in the study population. All independent variables with a p-value≤0.3 in the univariate analysis were taken into account in the multivariate logistic regression analysis. P values less than 0.05 were considered significant.

3. Results

3.1. Patients and disease characteristics

In total, 321 out of 420 participants responded to the questionnaire, with a response rate of 76.4%. The demographic characteristics of the population and the disease description are shown in Table 1.

Table 1 Patients and disease characteristics

Items	(N = 321)
Age (years)	47.6±12
Females (%)	65.7
Residence Urban (%)	92.5
Educational Level Illiterate (%)	29.6
Primary (%)	15.3
Secondary (%)	24.3
University (%)	30.8
Employment status Employed (%)	30.5
Work withdrawal because of Covid-19 (%)	14.9
Active Smoking (%)	5.6
Comorbidities Diabetes (%)	1.9

Cardiovascular diseases (%)	11.5
Pulmonary diseases (%)	1.2
Cancer (%)	0.6
Chronic Kidney disease (%)	0.6
Obesity (%)	0.9
CIRD	
RA (%)	60.7
Spondyloarthropathies (%)	35.8
Other CIRD (%)	3.4
Current treatment (s)	
Analgesic Treatments (%)	26.5
NSAIDs (%)	19.6
Corticosteroids (%)	57.3
cDMARDs	
Methotrexate (%)	52
Hydroxychloroquine (%)	1.9
Sulfasalazine (%)	12.8
Leflunomide (%)	4.7
bDMARDs (%)	34.2
Anti-CD20: Rituximab	3.4
Anti-CD20: Rituximab Biosimilar	0.6
Anti TNF-Alpha: Infliximab	0.6
Anti TNF-Alpha: Infliximab Biosimilar	6.2
Anti TNF-Alpha: Adalimumab	5.6
Anti TNF-Alpha: Etanercept	4.7
Anti TNF-Alpha: Golimumab	6
Anti-IL 17: Secukinumab	5
Anti-IL 6 : Tocilizumab	2.1
Past covid-19 infection:	9.3
Asymptomatic/ paucisymptomatic	8.1
Severe/ critical	1.2

*CIRD: Chronic Inflammatory Rheumatic Disease; RA: Rheumatoid Arthritis; NSAIDs: Non-Steroidal Anti-Inflammatory drugs; cDMARDs: conventional Disease-Modifying Anti-Rheumatic Drugs; bDMARDs: biologic Disease-Modifying Anti-Rheumatic Drugs; TNF-Alpha: Tumor Necrosis Factor Alpha; Anti-IL: Anti Interleukin*The mean age of patients was 47.6±12 years and women represented 65.7% of the study population, 92.5% of all participants lived in urban areas. Most of the respondents (30.8%) had a university degree. Active smoking was found in 5.6% of the cases. Unemployment was noted in 69.5% of the cases and 15% of the participants lost their employment because of the Covid-19 pandemic.

Information was collected on the following comorbidities: Diabetes (1.9%), Cardiovascular diseases (11.5%), Pulmonary diseases (1.2%), Cancer (0.6%), Chronic Kidney disease (0.6%), Obesity (0.9%) and 8.4% had at least 2 comorbidities.

Among patients suffering from CIRD, 60.7% had a RA, 35.8% had spondyloarthropathies and 3.4% had other CIRD. Current symptomatic treatments were essentially corticosteroids and Nonsteroidal Anti-Inflammatories (NSAIDs) noted in 57.3 and 19.6% of the cases respectively. The treatment with conventional Disease-modifying anti-rheumatic drugs (cDMARDs) was: Methotrexate (52%), Hydroxychloroquine (1.9%), Sulfasalazine (12.8%), Leflunomide (4.7%). 33.3% of our patients were under Biologic Disease-modifying anti-rheumatic drugs (bDMARDs): Rituximab (11.8%),

Infliximab (20%), Adalimumab (16.4%), Etanercept (13.6%), Golimumab (17.3%), Secukinumab (14.5%) and Tocilizumab (6.4%).

Thirty patients had a history of past Covid-19 infection among which 8.1% reported asymptomatic or paucisymptomatic Covid-19 infection and in 1.2% of the cases the infection was severe to critical. Covid-19 infection occurred in less than a month in 0.3% of the cases, 1.2% between one and 3 months and 7.7% in more than 3 months.

General knowledge about the Covid-19 vaccine

Four topics concerning general knowledge about Covid-19 vaccine were represented in Figure 1.
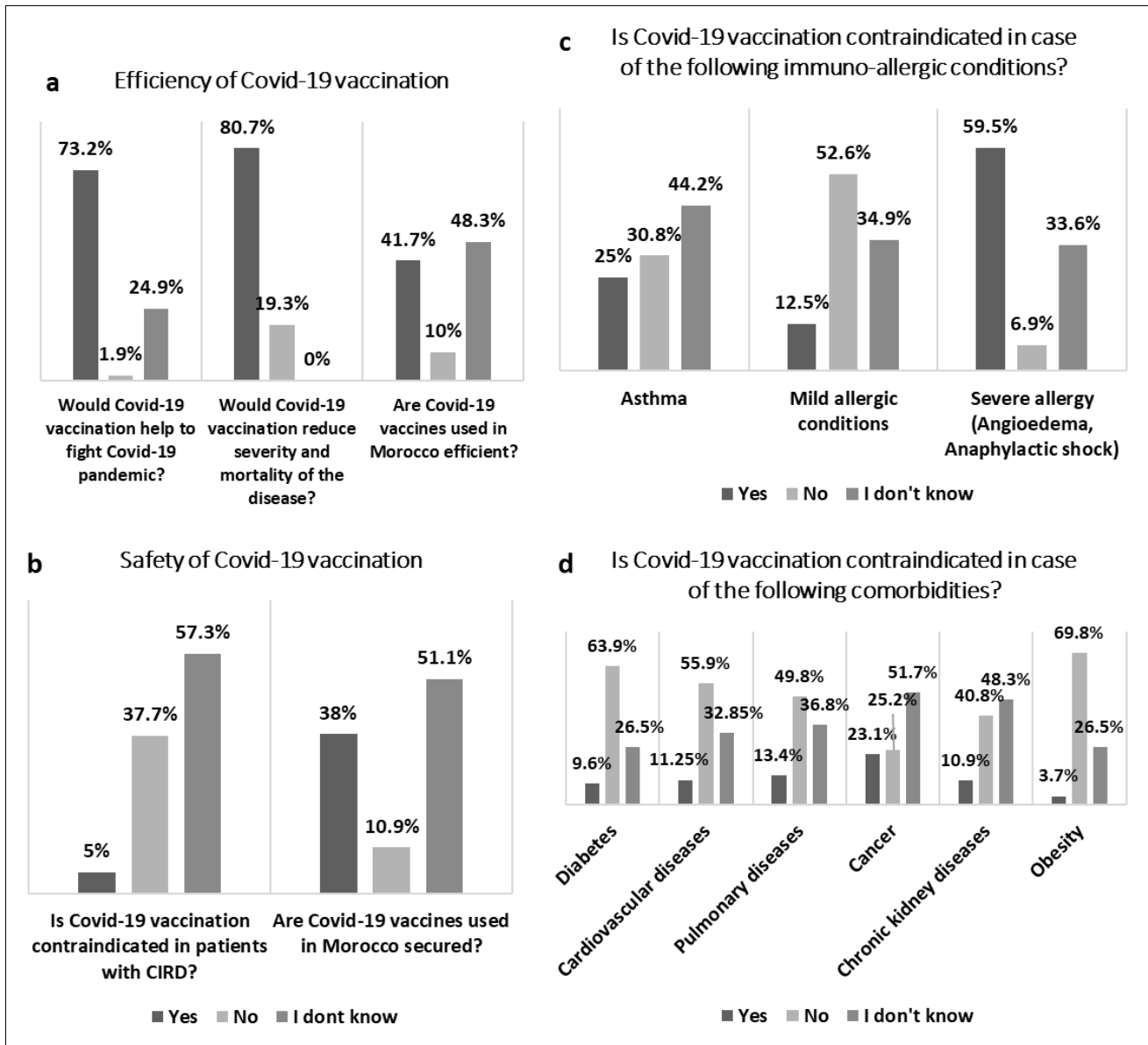

Figure 1 General knowledge about Covid-19 vaccination: Efficiency, security, immune-allergic conditions and comorbidities.

Sufficient knowledge of the Covid-19 vaccines currently used in Morocco was reported in 7.5% of the cases. Patients think that Covid-19 vaccination would help fight the Covid-19 pandemic in 73.2% of the cases, 80.4% believe that it will reduce severity and mortality of the disease, and 41.7% believe there's similar efficiency of the vaccines used in Morocco.

Concerning the safety of the Covid-19 vaccine, 5% of patients were convinced that their CIRD contraindicated vaccination, and 57.3% were unable to answer. In addition, 10.9% of participants believed that Covid-19 vaccines used in Morocco were unsafe and 51.1% of them declared having insufficient information.

Knowledge about immuno-allergic conditions and comorbidities are represented in figure 1 (c et d). Lack of knowledge in situation of asthma, mild allergic conditions and severe allergic conditions were reported in 44.2%, 34.9% and 33.6% respectively. Lack of knowledge in diverse comorbidities ranged from 26.5% to 51.7%.

The last part examined the possibility of stopping prevention measures after Covid-19 vaccination: 8.7% reported that mask wearing may be discontinued, 6.9% responded that social distancing can be discontinued and 4.7% said that handwashing may be abandoned after Covid-19 vaccination.

3.2. Source of information and social media impact

Patients reported that information about Covid-19 vaccination was provided by their doctor, relatives, Internet and Social Media platforms in 31.4%, 42.4%, 40.5% and 35.5% respectively. Patients considered that information about Covid-19 vaccination conveyed conspiracy beliefs in social media in 27.1% of the cases and 3.1% trust these anti-vaccination messages.

3.3. Acceptance of Covid-19 vaccine

Acceptance of Covid-19 vaccine was inferred if participants indicated that they "definitely will accept vaccination against Covid-19." Acceptance of Covid-19 vaccination was noted in 34.6% of the cases. Unwillingness to receive the vaccine was noted in 3.1% of the cases and hesitancy was noted in 62.3% of the cases.

Table 2 represents related factors to acceptance of Covid-19 vaccination.

Table 2 Multivariate analysis of factors related to acceptance of Covid-19 vaccination.

Variables	Univariate analysis			Multivariate analysis		
	Yes (%)	No (%)	p value	OR	95% CI	p value
Age	50±13	46±11	0.009	1.01	0.99-1.04	0.10
Sex Female Male	30.3 42.7	69.7 57.3	0.02	Ref 1.71	1.06-2.76	0.03
Level of education: Less than 6 years More than 6 years	31.2 37.3	68.8 62.7	0.25			
Employment	39.8	60.2	0.19			
Comorbidities	35.8	64.2	0.78			
Type of CIRD Rheumatoid arthritis Spondyloarthropathies Other CIRD	33.8 35.7 36.4	66.2 64.3 63.6	0.94			
Corticosteroids	38	62	0.06			
Methotrexate	33.5	66.5	0.68			
Biologic therapy	31.8	68.2	0.45			
Past Covid-19 infection	10	90	0.003	5.49	1.49-20.25	0.01
Having sufficient knowledge about Covid-19 vaccination No	31.3	68.7	0.003	Ref		

Yes	66.6	33.4		0.95	0.58-1.55	0.83
A little bit	32.5	67.5		4.15	1.67-10.31	0.02
Belief of efficiency of Covid-19 vaccines						
No	28.1	71.9	0.01	Ref		
Yes	44.1	55.9		1.02	0.44-2.37	0.96
I don't know	27.7	72.3		2.05	1.25-3.34	0.004
Security of Covid-19 vaccines						
Is Covid-19 vaccine contraindicated in CIRD patients?						
No	52	48	<0.001	Ref		
Yes	18.7	81.3		3.2	1.97-5.19	<0.001
I don't know	24.5	75.5		0.25	0.03-1.97	0.18
Are Covid-19 vaccines safe?						
No	25.7	74.3	0.008	Ref		
Yes	45.1	54.9		0.86	0.37-1.97	0.72
I don't know	28.7	71.3		2.04	1.25-3.34	0.004
Source of information*						
Medical	58.9	41.1	<0.001	0.33	0.17-0.61	<0.001
Relatives	38.2	61.8	0.23			
Internet	36.2	63.8	0.62			
Social media	36.8	63.2	0.52			

Ref: reference group; OR: odds ratio; CI: confidence interval; * Patients can choose multiple sources of information.

In univariate analysis, age, gender, past Covid-19 infection, belief that Covid-19 vaccination is efficient and safe, having sufficient knowledge about Covid-19 vaccines and valuing doctor's recommendations were factors associated with Covid-19 acceptance.

In multivariate analysis, factors significantly associated with vaccine acceptance were past Covid-19 infection (p=0.01), the fact that Covid-19 vaccine was contraindicated in case of CIRD (p=0.02) and that it was recommended by the doctor (p<0.001)

4. Discussion

In the present study, the acceptance of Covid-19 vaccination was noted in 34.6% of the cases. This level of acceptability is relatively low given the magnitude of Covid-19 pandemic. These findings indicate an urgent need for strategies to increase acceptance of the vaccine among CIRD patients.

Among respondents who accepted Covid-19 vaccination, associated factors influencing their decision to get vaccinated were age, gender, past Covid-19 infection, the belief that Covid-19 vaccination is efficient and safe, having sufficient knowledge about Covid-19 vaccines and valuing doctors' recommendations.

Many studies have investigated the influence of certain demographic characteristics on the acceptance of Covid-19 vaccination [2,3]; since the pandemic has had a huge effect on the work, income and daily life of Moroccan citizens. To overcome these challenges, Morocco has taken drastic measures to control Covid-19 transmission since the disease's outbreak, and these efforts have greatly reduced the spread of the virus. To this date, Morocco has vaccinated more than four million people since the launch of the Covid-19 free immunization campaign that began at the end of January 2021.

We observed an age-related factor with vaccine acceptance. Older people were more likely to accept the Covid-19 vaccine. This might reflect the effectiveness of vaccination campaigns conducted in Morocco at the time of this survey. Indeed, health strategies in Morocco aimed to increase acceptance of Covid-19 vaccination among older adults who are more vulnerable to severe forms of Covid-19 disease [4].

Moreover, men in this study were more likely to accept vaccination than women. These results corroborate other studies findings on vaccination hesitancy in females [5,6,7]. In many societies, especially in developing or low-income countries, the status of women often limits their autonomy and ability to make decisions about their own health. In addition, there were more female patients suffering from rheumatoid arthritis and having comorbidities associated with their disease and their treatments.

Lower educational level was associated in several studies with vaccine hesitancy [7,8,9]. Among the Chinese population, married male respondents were more likely to accept immediate vaccination, while respondent's education or income may not influence their intention [2]. In this study, patients with a higher educational level (more than 6 years) were most likely to accept the Covid-19 vaccine; however, this association was not significant.

The main source of concern was the important proportion of respondents (90%) with a history of past Covid-19 infection who refused to get vaccinated. Previous studies have found that natural protection against SARS-Cov 2 cannot be relied on. Indeed, individuals aged 65 years and older had less than 50% protection against repeat SARS-CoV-2 infection. Therefore, the vaccination is necessary even for individuals known to be previously infected [10].

In our survey, CIRD patients under cDMARDs and bDMARDs who refused vaccination were twice more than those who accepted. This result can be explained by the fear of treatment interaction with the Covid-19 vaccine and the possibility of disease flare during vaccination. However, these treatments were not associated with the acceptance of Covid-19 vaccines. According to the American College of Rheumatology, patients suffering from CIRD should be prioritized for vaccination because they are at higher risk for worse complications of Covid-19 infection compared to the general population [11].

Among the participants of our survey, 66.6% of those who accepted the vaccination had sufficient knowledge of the Covid-19 vaccines currently used in Morocco. These findings are related to higher acceptance of Covid-19 vaccines. The association between the lack of information and the low intent to vaccinate was found by several studies [12]. Well-informed patients were ready to be vaccinated, hence it is crucial to transmit the information.

Furthermore, we found that Moroccan patients suffering from CIRD held strong beliefs about the efficacy and security of Covid-19 vaccination. Among patients who refused the vaccination, 71.9% of them thought that it was not efficient, 74.3% thought that it was unsecured and 81.3% thought that it was contraindicated in their case. This attitude towards Covid-19 vaccination may explain the high level of hesitancy of vaccination among CIRD patients.

These results highlight the importance of reliable sources of information for our CIRD patients. In fact, a large proportion of the individuals who accepted the Covid-19 vaccination (58.9%) had been informed by their rheumatologist. The Patient-Rheumatologist relationship had a strong impact on the decision of receiving the Covid-19 vaccine. Hence, national guidelines concerning Covid-19 vaccination were developed in order to transmit the information to the patient through awareness campaigns.

On the other hand, the role of internet and social media was not associated in our study with higher acceptance of Covid-19 vaccines. This could be explained by the lack of relevant information about CIRD and covid-19 vaccine in these media platforms. But many other studies had shown a significant impact of social media misinformation and the decline of vaccination due to public doubts of Covid-19 vaccine's safety [13].

This is the first study to investigate the acceptance of Covid-19 vaccination among CIRD Moroccan patients, which provided baseline information for national guidelines concerning the Covid-19 vaccination in CRID patients [14]. CIRD patients should be prioritized in the vaccination campaign, in order to increase the vaccine acceptance and uptake among these patients through effective immunization strategies.

5. Conclusion

This study reflected a low acceptance level of Covid-19 vaccination among the CIRD population in Morocco. To expand vaccine uptake, health education and communication will be important to alleviate misconceptions about Covid-19 vaccination. The findings of this study might be used to set priorities in information campaigns by Rheumatologists and media in order to improve vaccine acceptance.

Compliance with ethical standards

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