World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(RESEARCH ARTICLE)

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COVID-19 vaccine hesitancy among patients with chronic inflammatory rheumatic diseases

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World Journal of Advanced Research and Reviews, 2024, 23(01), 255–262

Publication history: Received on 22 May 2024; revised on 28 June 2024; accepted on 01 July 2024

Article DOI: https://doi.org/10.30574/wjarr.2024.23.1.1986

Abstract

Objectives: This survey explores how patients with inflammatory rheumatic diseases perceive the COVID-19 vaccine and what factors influence their decision to get vaccinated.

Methods: This anonymous phone survey employs a cross-sectional design to gather data from adult Moroccan patients (over 18 years old) diagnosed with chronic inflammatory rheumatic diseases (CIRD), including rheumatoid arthritis (RA), spondyloarthropathy, and undifferentiated CIRD.

Results: A total of 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. The intention to vaccinate against Covid-19 was reported in 34.6% of the cases. Beliefs that Covid-19 vaccines were man-made, and that they are intended to inject microchips into recipients and that the vaccines were made to force people to get vaccinated were found in 22.7%, 3.2% and 8.7% of respondents, respectively. In univariate and multivariate analysis, the conspiracy beliefs that were associated with vaccination intention were the idea that Covid-19 vaccine was made to force people to get vaccinated ($p<0.001$) and to reduce world's population ($p<0.001$).

Conclusion: The study revealed a low vaccination intention against COVID-19 among Moroccan CIRD patients. This association between COVID-19 vaccine conspiracy theories and vaccine hesitancy highlights the need for targeted awareness campaigns to combat misinformation and improve vaccine acceptance within this population.

Key words: Covid-19; Vaccination; Perceptions; Inflammatory Rheumatic Disease.

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1. Introduction

The Coronavirus disease 2019 (Covid-19) has been defined as a global public health emergency by the World Health Organization (WHO) due to the rapidity of transmission [1].

This current pandemic reflects a state of anxiety, and confusion, which is thought to be an ideal setting for misconceptions to spread [2]. Many facets of the Covid-19 pandemic have been tainted by conspiracy theories, including the nature of the novel virus and the goal of vaccination [3].

Vaccination uptake among the general population continues to be critical to the pandemic's effective containment. A connection between vaccine hesitancy and conspiracy beliefs has been replicated and it is consistent with works showing that a conspiracy mentality is associated with rejection of vaccine [4].

In fact, misinformation surrounding Covid-19 vaccines can have a negative impact on the individual by increasing the risk of having the disease and on the community by having potentially a greater virus transmission. Furthermore, the Covid-19 pandemic has impacted people with rheumatic diseases by causing care interruptions and delays in accessing outpatient and hospital facilities, increasing the incidence of flares and disease activity.

The aim of this survey is to understand perceptions of Covid-19 vaccination by patients suffering from Inflammatory rheumatic diseases, and to determine the factors influencing the intention to vaccinate against Covid- 19.

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 on socio-demographic characteristics and prior experience with Covid-19 contained questions on the following: age, sex, educational level, residence, history of any chronic illness, smoking status, data on the type of CIRD and the treatments and previous diagnosis of Covid-19 for the respondent or family member. Disease characteristics included the type of CIRD and current treatments.

The second section was designed to capture the endorsement of some Covid-19 conspiracy theories currently popular in Morocco. It is a 4-item measure designed to assess belief that the Covid-19 disease provides better immunity than the Covid-19 vaccine, Covid-19 vaccine may cause genetics alteration, Covid-19 vaccine would cause Covid-19 disease, Covid-19 was man-made, belief that SARS-CoV-2 was manufactured to force the public to get vaccinated and to reduce the number of the world's population, and belief that the Covid-19 vaccine is a way to implant microchips into people to control them.

The third section assessed the sources of knowledge about Covid-19 vaccine, allowing the selection of five possible options: Doctor, pharmacist, relatives, internet (Google, YouTube) and social media platforms (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 intention to vaccinate against Covid-19 that was inferred if participants indicated that they "definitely intend to vaccinate 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

A total of 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 I.

Table 1 Patients and disease characteristics

Items	**(N = 321)**
Age (years)	47.6±12
Female sex (%)	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	52
Methotrexate (%)	1.9
Hydroxychloroquine (%)	12.8
Sulfasalazine (%)	4.7
Leflunomide (%)	34.2
bDMARDs (%)	3.4
Anti-CD20: Rituximab	0.6
Anti-CD20: Rituximab Biosimilar	0.6
Anti TNF-Alpha: Infliximab	6.2
Anti TNF-Alpha: Infliximab Biosimilar	5.6
Anti TNF-Alpha: Adalimumab	4.7
Anti TNF-Alpha: Etanercept	6
Anti TNF-Alpha: Golimumab	5
Anti-IL 17: Secukinumab	2.1
Anti-IL 6 : Tocilizumab	9.3
Past covid-19 infection:	
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.

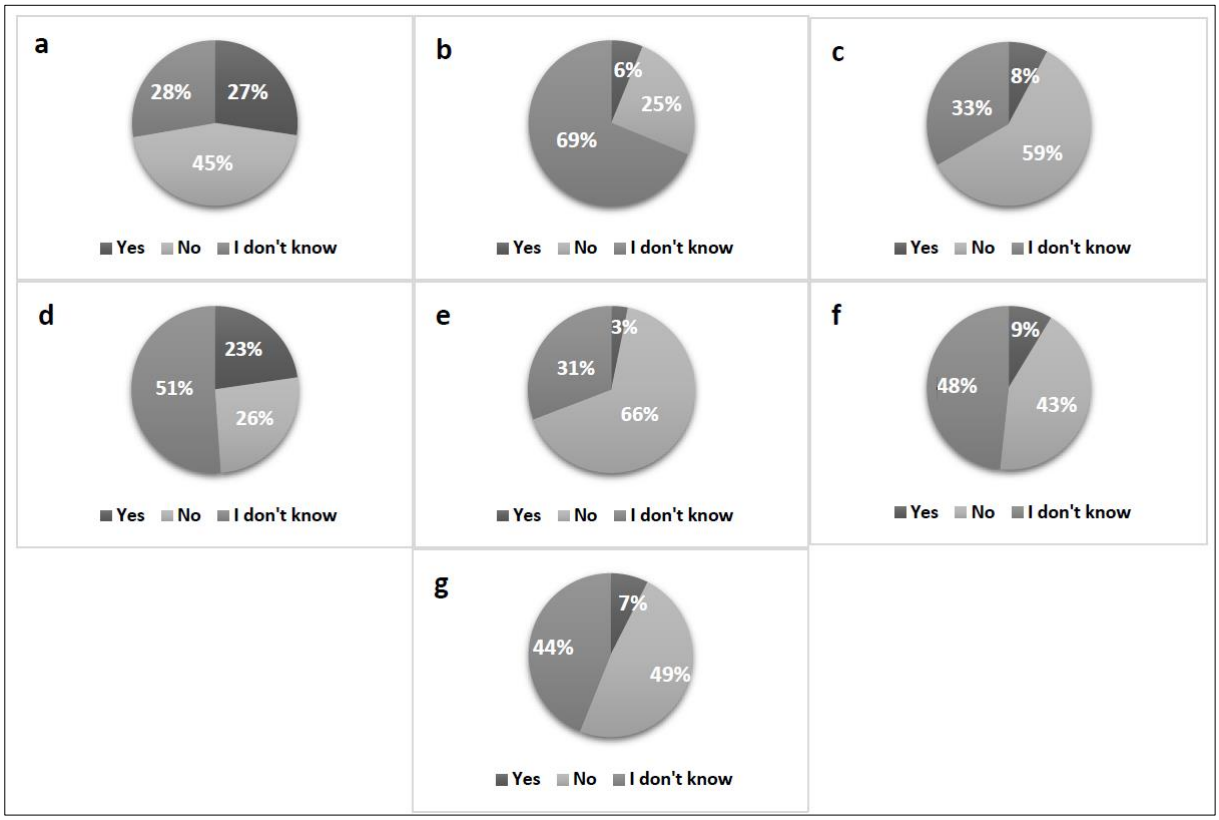
Among patients suffering from CIRD, 60.7% had a RA, 35.8% had spondyloarthropathies and 3.4% had other CIRD. Current symptomatic treatments were essentially corticosteroids and Nonsteroidal Anti-Inflammatories (NSAIDs) noted in 57.3 and 19.6% of the cases respectively. The treatment with conventional Disease-modifying anti-rheumatic drugs (cDMARDs) was noted: 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.

3.2. Perception and beliefs about Covid-19 vaccine

In the present study, 27.4% of the respondents said that natural Covid-19 disease immunity is better than the immunity provided by the vaccine. The belief that Covid-19 vaccine may alter the genetics of vaccinated people was noted in 6.2% of the cases, while 7.8% responded that the vaccine may cause Covid-19 disease. Regarding conspiracy beliefs, 22.7% of the participants stated that Covid-19 virus is human-made, and 3.2% of them believed that the Covid-19 vaccine is a way to implant microchips into vaccinated people to control humanity. In addition, 8.7% of the respondents answered

that Covid-19 virus was made to force people to get vaccinated and 7.5% of them said that it was made to reduce the world's population (Figure I).



a. Natural disease immunity is better than the immunity provided by Covid-19 vaccine; b. Covid-19 vaccine may alter the genetics of vaccinated people; c. Vaccination may cause Covid-19 disease.; d. Covid-19 virus is human-made.; e. Covid-19 vaccination aims to implant microchips into vaccinated people to control humanity; f. Covid-19 virus was made to force people to get vaccinated; g. Covid-19 virus was made to reduce the world's population.

Figure 1 Beliefs and perceptions of Covid-19 vaccine

3.3. Source of information and social media impact

The sources of information for Covid-19 vaccine were medical sources (Doctor and Pharmacist) (31.4%), relatives (42.4%), the internet (40.5%), and social media platforms (35.5%).27.1% think that the messages circulating on social networks were against Covid-19 vaccination, and 3.1% trust these anti-vaccination messages.

3.4. Intention to vaccinate against Covid-19

Table 2 Related factors to intention to vaccinate against Covid-19 vaccine

Variables	**Univariate analysis**			**Multivariate analysis**		
	Yes (%)	No (%)	*p* value	Odds Ratio	95% CI	*p* value
The immunity provided by Covid-19 vaccine is better than natural disease immunity.						
No	31.9	68.1				
Yes	42	58	0.224			
I don't know	31.5	68.5				
Covid-19 vaccine may alter the genetics of vaccinated people.	41.2	58.8				
No	20	80	0.168			

Yes I don't know	33.5	65.5				
Vaccination may cause Covid-19 disease. No Yes I don't know	 37 32 30.8	 63 68 69.2	 0.538			
Covid-19 virus is human-made. No Yes I don't know	 35.7 37 32.9	 64.3 63 67.1	 0.805			
Covid-19 vaccination aims to implant microchips into vaccinated people to control humanity. No Yes I don't know	 34 10 38.4	 66 90 61.6	 0.188			
Covid-19 virus was made to force people to get vaccinated. No Yes I don't know	 26.8 14.3 45.2	 73.2 85.7 54.8	 <0.001	 Ref 0.44 0.20	 0.27-0.73 0.06-0.61	 0.001 0.005
Covid-19 virus was made to reduce the world's population. No Yes I don't know	 27.5 12.5 46	 72.5 87.5 54	 <0.001	 Ref 0.44 0.17	 0.27-0.72 0.48-0.58	 0.001 0.005

Intention to vaccinate against Covid-19 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 II represents factors associated to intention to vaccinate against Covid-19. In univariate and multivariate analysis, the conspiracy beliefs that were associated with vaccination intention were the idea that Covid-19 vaccine was made to force people to get vaccinated ($p<0.001$) and to reduce world's population ($p<0.001$).

4. Discussion

This survey was conducted in March 2021, at a time when vaccination campaign started in Morocco. At that point, there was intense media coverage and community members were being encouraged to get vaccinated. On the other hand, people were increasingly turning to social media platforms for information, while conspiratorial misinformation about vaccination were current.

Our results point at a concerning level of Covid-19 vaccine hesitancy among IRD patients. In fact, Intention to vaccinate against Covid-19 was noted in only 34.6% of the cases. This rate is low compared to other surveys conducted in United States (67–69%) [5,6], Indonesia (67 to 95%) [7] and 73% in parts of Europe [8].

Our findings suggest that the largest barriers to receiving Covid-19 vaccination were conspiracy theories and misinformation. Indeed, we found a strong association between intention to vaccinate and conspiracy theories, since 63% of the respondents refusing the vaccination think that Covid-19 vaccine was man-made and 87.5% of them think that it was made to reduce the world's population.

The observed connection between virus origin beliefs and Covid-19 vaccine hesitancy may be explained by our acquired cognitive biases. Some beliefs spread more quickly because they are more consistent with our intuitions and hence easier to understand and recall. Scientific evidence is often non-intuitive, making it difficult to disseminate [9,10].

A large proportion of patients (85.7%) who refused to be vaccinated think that the vaccine was made to force people to get vaccinated. Indeed, the idea that Covid-19 vaccine was considered as a conspiracy of pharmaceutical companies to sell their products also have become popular through social media platforms adding the list of conspiracy theories [11].

Different theories can emerge and cause specific anxieties within different contexts and groups. In African settings, rumors of Africans being used in experiments or poisoned by Western vaccines are spreading on social media [12,13].

The development of the use of social media offers possibilities for the spread of false information regarding the Covid-19 vaccine [14].

Enormous efforts have been made to invent an effective vaccine that might be the best measure to end the current Covid-19 pandemic. However, the effectiveness of the vaccine not only will depend on its efficacy but also the uptake of the vaccine in population which is largely influenced by media coverage. Researchers have found that exposure to false information was likely to lower the reported intention to be vaccinated against Covid- 19.

Nearly half of the respondents in our survey (40.5%) use the internet to get information about Covid-19 vaccination, and 35.5% of them use social media platforms. Traditional media and social media play a crucial role in spreading health-related information and influencing behavior. It has also provided other podiums to multiple anti-vaccine messages through which they reach the general population to diffuse the wrong or negative messages [15].

In our survey, 27.1% of the respondents think that the messages circulating on social networks were against Covid-19 vaccination, and 3.1% trust these anti-vaccination messages. This echoes some previous works showing that anti-vaccination contents on internet have widely broadcast inaccurate beliefs regarding vaccines and they are barriers to vaccine uptake [16].

As part of its efforts to maintain the safety and serenity of citizens, the Moroccan security services are fighting firmly and seriously, against fake news on this epidemic, in order to stop the dissemination of false information or allegations undermining health security and public order. The Moroccan Society of Rheumatology has developed national guidelines concerning Covid-19 vaccination among IRD patients, in order to transmit the correct information to the patient through awareness campaigns [17].

5. Conclusion

This study in Morocco found low COVID-19 vaccination rates among patients with chronic inflammatory rheumatic diseases (CIRD). The link between vaccine conspiracy theories and hesitancy highlights the dangers of misinformation. To address this, future vaccine campaigns could benefit from broader communication of the scientific understanding of the virus's origin.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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