

Are Perceptions Towards Covid-19 Vaccination A Barrier To Vaccination Intention Among Inflammatory Rheumatic Disease Patients?

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ABSTRACT

Objectives

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.

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 Inflammatory rheumatic diseases (IRD): Rheumatoid Arthritis (RA), spondyloarthropathy and undifferentiated IRD.

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

This study reflected a low intention to vaccinate against Covid-19 among the IRD population in Morocco. The connection between conspiracy theories about Covid-19 vaccination and vaccine rejection should encourage initiatives to combat the growing scourge of COVID-19 misinformation among IRD patients through awareness campaigns.

Key words: Covid-19, vaccination, perceptions, Inflammatory Rheumatic Disease.

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I. 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.

II. 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 Inflammatory rheumatic diseases (IRD): Rheumatoid Arthritis (RA), spondyloarthropathy and undifferentiated IRD.

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 IRD.

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 IRD and the treatments and previous diagnosis of Covid-19 for the respondent or family member. Disease characteristics included the type of IRD 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."

III. 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.

IV. RESULTS

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 I.

Table I: 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
IRD	
RA (%)	60.7
Spondyloarthropathies (%)	35.8
Other IRD (%)	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

IRD: 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.

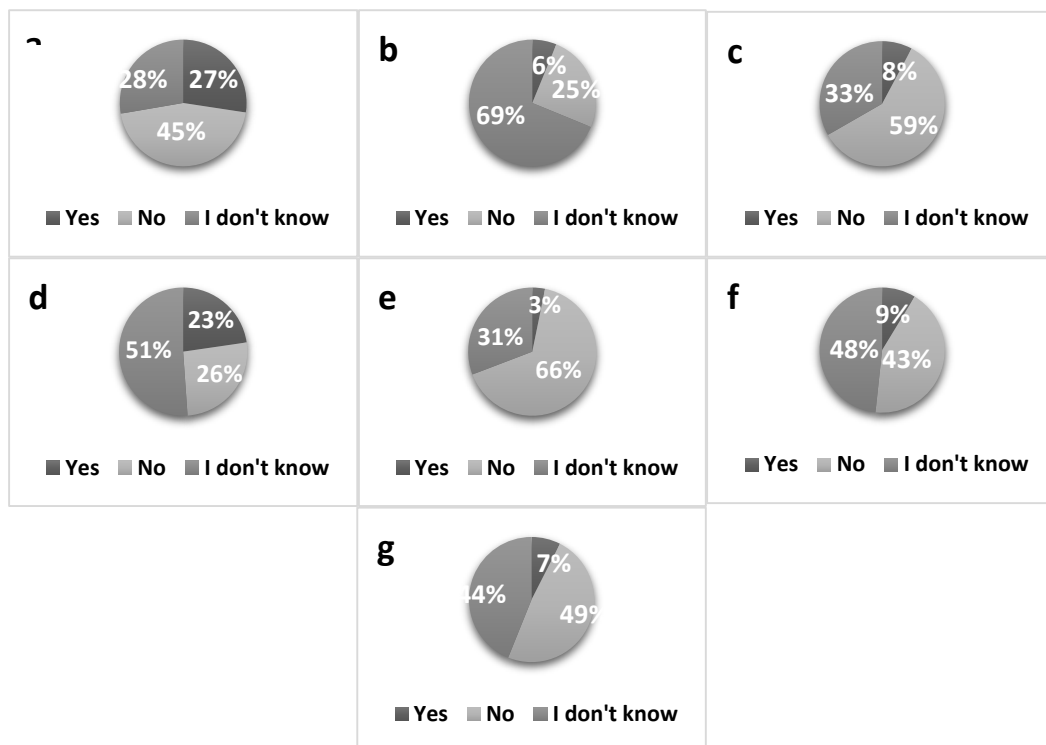
Information was collected on the following comorbidities: Diabetes (1.9%), Cardiovascular diseases (11.5%), Pulmonary diseases (1.2%), Cancer (0.6%), Chronic Kidney disease (0.6%), Obesity (0.9%) and 8.4% had at least 2 comorbidities.

Among patients suffering from IRD, 60.7% had a RA, 35.8% had spondyloarthropathies and 3.4% had other IRD. 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.

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 I: Beliefs and perceptions of Covid-19 vaccine.

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.

Intention to vaccinate against Covid-19

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 ($p < 0.001$).

Table II: 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	0.224			
Yes	42	58				
I don't know	31.5	68.5				
Covid-19 vaccine may alter the genetics of vaccinated people.						
No	41.2	58.8	0.168			
Yes	20	80				
I don't know	33.5	65.5				
Vaccination may cause Covid-19 disease.						
No	37	63	0.538			
Yes	32	68				
I don't know	30.8	69.2				
Covid-19 virus is human-made.						
No	35.7	64.3	0.805			
Yes	37	63				
I don't know	32.9	67.1				
Covid-19 vaccination aims to implant microchips into vaccinated people to control humanity.						
No	34	66	0.188			
Yes	10	90				
I don't know	38.4	61.6				
Covid-19 virus was made to force people to get vaccinated.						
No	26.8	73.2	<0.001	Ref 0.44 0.20	0.27-0.73 0.06-0.61	0.001 0.005
Yes	14.3	85.7				
I don't know	45.2	54.8				
Covid-19 virus was made to reduce the world's population.						
No	27.5	72.5	<0.001	Ref 0.44 0.17	0.27-0.72 0.48-0.58	0.001 0.005
Yes	12.5	87.5				
I don't know	46	54				

Ref: reference group; OR: odds ratio; CI: confidence interval.

V. 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].

VI. CONCLUSION

The findings of this study indicate that intention to vaccinate against Covid-19 is low among Moroccan IRD patients. The connection between conspiracy theories about vaccinations and vaccine hesitancy should raise a red flag to the severe negative consequences of promoting misinformation. These results suggest that wider communication of the scientific consensus on the origin of the novel coronavirus with the public may help future campaigns targeting Covid-19 vaccine hesitancy.

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