PREDICTION OF THE ACCEPTABILITY OF CORONAVIRUS DISEASE 2019 (COVID-19) VACCINATION IN SAUDI ARABIA

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ABSTRACT:

Background: Widespread vaccination coverage is an important aspect for achieving "herd immunity" against Covid-19, however, vaccination resistance hinders effective uptake of vaccination. It is therefore important to identify determinants associated with covid-19 vaccination acceptability.

Objective: To identify determinants associated with Covid-19 vaccination acceptability among Saudi Nationals

Subjects and Methods:

1000 participants were recruited online using snowball sampling technique in which 834 were analyzed after removal of missing and incomplete data. Eligible participants were aged 16 and above who lives in Saudi Arabia and use WhatsApp and Twitter platforms. Without identifying personal information or personal information, the data were gathered from the participants. The process of gathering data was initiated in March 2021 and continued until the end of May 2021, with data coming from different Saudi Arabian provinces. Participants were independent to quit the survey at any moment and finish it whenever it was convenient for them once it began.

Results: The mean age of participants was 27.36 ± 7.33 years, the mean Knowledge, attitude, subjective norm, intention score was 3.04 ± 0.47, 3.19 ± 0.47, 2.63 ± 0.49, 2.89 ± 0.41 respectively and mean Perceived behavioral control score was 2.25 ± 0.72. This study reported that 531(63.7%) participants had the acceptability of COVID-19 vaccination. In current study younger age 0.947[0.926-0.969], gender 1.829[1.319-2.537], work status 1.305[1.086-1.569], attitude score

0.689[0.490-0.967], subjective norm score 2.333[1.655-3.288] and perceived behavior score 1.812[1.423-2.308] were all significant predictors of vaccine acceptability (p-values<0.05 for all). **Conclusion:** Covid-19 vaccination acceptability was found to be among 63.7% of the participants. Factors like age, gender, work status, attitude, perceived behavior and subjective norms were significant in determining the vaccine acceptability. Hence, through timely awareness campaigns about covid-19, possible consequences and myths associated with vaccination, we could decrease the resistance towards covid-19 vaccination.

Keywords: Covid-19 vaccination, acceptability, vaccine resistance, vaccine hesitancy, perception

INTRODUCTION:

Vaccination is an effective preventive measure against a number of infectious diseases. Coronavirus disease 2019 (Covid-19) was declared as Pandemic in 2020 by the World Health Organization (WHO) and effected millions of people globally with more than 700,000 deaths and among 20 million cases[1]. Patients with Covid-19 range from being asymptomatic to experience severe symptoms as high-grade fever, respiratory distress, pneumonia and even death.[2] As Covid-19 continues to ravage the world with its lasting impact globally, the availability of Covid vaccinations has become readable making it easier for the public to avail and minimize the risk of disease.[3] However, certain communities and segment of people still resist taking vaccine due to their own beliefs, myths propagated by media and other concerns. These communities eventually challenge the effectiveness of Covid-19 vaccination making it difficult for everyone to benefit from it.[4]

The WHO has listed the reluctance or hesitancy of getting vaccination despite its availability as one of the top ten threats for the public health.[5] Although vaccination resistant groups have always been present, unfortunately, its frequency has alarmingly increased over the past years and has affected the thought process of other individuals as well hence increasing the risk of worse health outcomes and outbreaks of diseases.[6, 7] One such example is the measles outbreak in the United States (US) and polio vaccination boycotts in many African and Asian countries.[8] Similar reluctance to Covid-19 vaccination poses great threat due to its level of contagiousness and range of symptoms making it difficult to distinguish from other similar diseases like cold and flu. [9,

[10]Vaccine unacceptability will therefore increase the risk of hospital burden, morbidity and even mortality related to Covid-19. [11]

The possible determinants of Covid-19 vaccine acceptability are complex and multifactorial.[11] A person's understanding and knowledge about the disease, consideration of the possible health consequences of the disease especially long-term morbidity and even mortality, personal beliefs, cultural norms and popular myths are some of the commonly described contributors.[12]

Unfortunately, very limited studies are available especially in the Gulf to acknowledge the possible reasons of vaccine reluctance. Saudi society, like other societies in the world, contains some social groups that might be hesitant or refuse to be inoculated due to misinformation and misperception about the COVID-19 vaccines.[13] This is a huge barrier to inoculate against highly infectious diseases and a challenge for public health authority in the country.[12] Using the Theory of Planned Behavior (TPB) along with other factors, we predicted the likelihood of whether taking or rejecting the vaccines in the Saudi population based on their attitude, subjective norms, perceived and actual behavior control, and intention. By quantifiably identifying the possible causative predictors of Covid-19 vaccination resistance, we can strategize and plan better awareness campaigns and policies to reduce the stigma according to the respective societal needs and norms.

Subjects and Methods

Participants

1000 participants were recruited online using snowball sampling technique in which 834 were analyzed after removal of missing and incomplete data. Eligible participants were aged 16 and above who lives in Saudi Arabia and use WhatsApp and Twitter platforms. Without identifying personal information or personal information, the data were gathered from the participants. The process of gathering data was initiated in March 2021 and continued until the end of May 2021, with data coming from different Saudi Arabian provinces. Participants were independent to quit the survey at any moment and finish it whenever it was convenient for them once it began.

Procedure

The study questionnaire was developed using Qualtrics XM software, Version 2020. The questionnaire was originally in English language and then translated into Arabic language using

Brislin's model.[14] The online self-administered survey distributed through WhatsApp and Twitter social media platforms as they are extremely popular in the Saudi Arabia. The primary investigator established a hyperlink to the survey and forwarded it to all of his or her organisations and connections, encouraging them to forward it to their own contacts. Participants would be sent to the consent form by clicking on the link, which they would need to fill out in order to access the research survey. Participants completed an online survey with sample demographics (age, marital status, income, employment status, and education) after providing informed permission, sixteen questions about COVID-19 knowledge and attitude, five questions related to subjective norms, and another, five questions belong to perceived behavioral control and Four questions asked about people intention toward COVID-19 vaccines. Based on a modified version of Icek Ajzen's theory of planned behaviour questionnaire, the scaling technique was used to produce items for attitude, subjective norm, perceived behavioural control, and intention of vaccination. [15]

The dependent variables used in this study were acceptability of COVID-19 vaccines. The main independent variables were age, gender, marital status, education, working status, living area, income, knowledge score, attitude score, subjective norm score, intention score and perceived behavior score. For each of these constructs, the participants answered questions of a 7-points scale

Statistical Analyses

The statistical analyses were implemented with IBM SPSS Statistics (Version 26)). Descriptive statistics were presented as mean ± standard deviation (*SD*) or Median (IQR) or numbers (*%*) as appropriate. Univariate logistic regression was applied and where p-value < 0.2 those independent variables were considered for Multiple Logistic regression models were used to see the predictors of vaccination acceptance. β, p-value of Wald statistics, Unadjusted odds ratio, adjusted odds ratio and 95% CI were presented. P-value ≤ 0.05 was considered as significant.

RESULTS:

Data of 834 subjects were analyzed. The mean age of participants was 27.36 ± 7.33 years, the mean Knowledge, attitude, subjective norm, intention score was 3.04 ± 0.47, 3.19 ± 0.47, 2.63 ± 0.49, 2.89 ± 0.41 respectively and mean Perceived behavioral control score was 2.25 ± 0.72. There were 571(68.5%) male and 263(31.5%) female. There were 259(31.1%) single, 550(65.9%) were married, 17(2.0%) divorced and 8(1%) were Widowed. A total of 9(1.1%) participants had No formal schooling, 49(5.9%) had Intermediate or less, 214(25.7%) had completed high school,

498(59.7%) completed their college / university and 64(7.7%) had their post graduate degree. There were 290(34.8%) were government employee, 223(26.7%) were non-government employee, 30(3.6%) were self-employed, 140(16.8%) were student, 41(4.9%) were retired, 93(11.2%) were unemployed, able to work and 17(2.0%) were Unemployed, unable to work. There were 264(31.7%), 118(14.1%), 105(12.6%), 119(14.3%), 74(8.9%), 69(8.3%), 44(5.3%), 41(4.9%) had income as SR 3000 or less, SR 3001 to 6000, SR 6001 to 9000, SR 9001 to 12000, SR 12001 to 15000, SR 15001 to 18000, SR 18001 to 21000 and > SR 21000 respectively. **Table -1** There were 531(63.7%) participants had the acceptability of COVID-19 vaccination. **Fig-1** Through univariate analysis, variable with p-value < 0.2 were taken for multiple logistic regression i.e. following variables were taken for the logistic model, Age, Gender, Education, Attitude score, Subjective norm score, Perceived behavior score. using forward conditional logistic regression model, age [adj OR = 0.947(0.926-0.969)], attitude score (adj OR = 0.689[0.490-0.967]) had negative impact on vaccination acceptance, Gender [adj OR = 1.829(1.319-2.537)], Education [adj OR = 1.305(1.086-1.569)], Subjective norm score [adj OR = 2.333(1.655-3.288)] and Perceived behavior score [adj OR = 1.812(1.423-2.308)] had positive impact on vaccination acceptance. **Table -2**

Table-1: Descriptive statistics of age (years)

	Mean ± S.D	**Median (IQR)**
Age (years)	27.36 ± 7.33	26.00 (9.00)
Knowledge score	3.04 ± 0.47	3.00(0.50)
Attitude score	3.19 ± 0.47	3.17(0.50)
Subjective score	2.63 ± 0.49	2.60(0.60)
Intention score	2.89 ± 0.41	3.00(0.25)
Perceived behavioral control	2.25 ± 0.72	2.20(0.80)

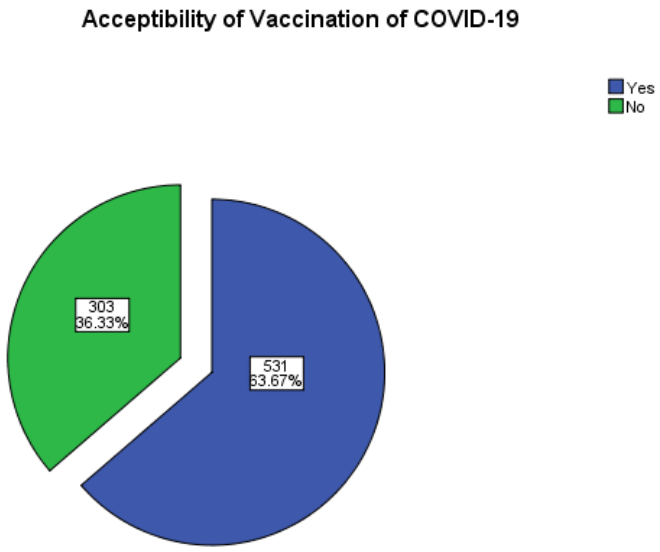

Table -2: Logistic regression model for prediction of acceptability of covid-19 vaccination

	β	p-value	Unadjusted odds ratio [95% CI]	β	p-value	Adjusted odds ratio [95% CI]
Age	-.055	<0.001	0.946[0.924-0.969]	-0.054	<0.001	0.947[0.926-0.969]
Gender	.611	0.001	1.843[1.264-2.685]	0.604	<0.001	1.829[1.319-2.537]
Marital status	-.120	0.430	0.887[0.659-1.194]			
Education	.262	0.007	1.300[1.075-1.571]	0.267	0.005	1.305[1.086-1.569]
Working status	-.011	0.852	0.989[0.883-1.108]			
Living Area	.030	0.248	1.030[0.979-1.084]			
Income	.005	0.918	1.005[0.921-1.096]			
Knowledge score	-.078	0.683	0.925[0.637-1.344]			
Attitude score	-.303	0.119	0.738[0.504-1.081]	-0.373	0.031	0.689[0.490-0.967]
Subjective norm score	.844	<0.001	2.326[1.645-3.289]	0.847	<0.001	2.333[1.655-3.288]
Intention score	-.250	.245	0.779[0.511-1.187]			
Perceived behavior score	.634	<0.001	1.885[1.467-2.420]	0.595	<0.001	1.812[1.423-2.308]
Constant	-3.312	.010	0.036	-4.096	<0.001	

Dependent variable: Acceptability of COVID-19 vaccination.

DISCUSSION:

Effective and widespread coverage of Covid-19 vaccine is imperative to achieve considerably high level of "herd immunity" globally for the status of pandemic to end.[16] Therefore, all possible factors that hinder this vaccination coverage must be identified and rectified in a timely manner.[17] Vaccine acceptability is one such factor characterized by a number of environmental, religious, social, mythical and knowledge related determinants that plays a pivotal role in covid-19 vaccination exposure.[18] However, locally conducted studies on Saudi population regarding the level of acceptability and its determinations are very limited. Hence, this study was conducted to find answers of both these questions.[19]

This study reported that 531(63.7%) participants had the acceptability of COVID-19 vaccination. Although a good percentage, still much higher percentages for willingness to get a covid-19 vaccination shot has been reported studies (59%-78%).[20] Whilst, one other study reported quite similar results of covid-19 vaccine acceptability in general adult population as 64.8%, and 86.6% in physicians.[21] Similarly, one systematic review published that among general public, the percentage of vaccine acceptability was 70%. [20]

In current study younger age 0.947[0.926-0.969], gender 1.829[1.319-2.537], work status 1.305[1.086-1.569], attitude score 0.689[0.490-0.967], subjective norm score 2.333[1.655-3.288] and perceived behavior score 1.812[1.423-2.308] were all significant predictors of vaccine acceptability (p-values<0.05 for all). One other study reported that older age (>45 years), positive perception for safety (80%), fear of side effects, information about covid-19 by the public health authorities and history of influenza were significantly associated with higher acceptance of covid-19 vaccine (p-value<0.05 for all).[22] Similarly another study conducted in Africa reported that covid-19 related high concern, Covid-19 testing irrespective of result, older age>60 years, any chronic illness and considering covid vaccination as important for personal health were significant determinants of covid vaccination acceptability. [21]

One other elaborated study highlighted some of the commonly reported determinants of resistance towards vaccination. They mentioned factors as vaccine hesitancy, attitude & uptake, misinformation, religious values, the roll out plans of immunization and social norms & influences being the top contributors. These studies have shown similar result as ours that a positive behavior, knowledge and attitude towards vaccination, information about disease and its possible

consequences, education and social norms are important for reducing the hesitancy towards vaccination.[23, 24] Hence, systematic control of misinformation and strategic awareness campaigns for benefits of vaccines and possible consequences of a disease can be helpful in increasing acceptance towards getting vaccinated.

CONCLUSION:

Covid-19 vaccination acceptability was found to be among 63.7% of the participants. Factors like age, gender, work status, attitude, perceived behavior and subjective norms were significant in determining the vaccine acceptability. We conclude the through timely awareness campaigns about covid-19, possible consequences and myths associated with vaccination, we could decrease the resistance towards covid-19 vaccination.

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