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VACCINATION FOR NEWLY EMERGED INFECTIOUS DISEASES AS A BLESSING OR CURSE FROM THE PERSPECTIVE OF THE LEBANESE POPULATION: A TWO-PHASE STUDY

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Abstract

Although vaccination campaigns have been vital in mitigating the spread of many pandemics, false information about COVID-19 vaccine through social media might have a negative impact on its acceptance. In Lebanon, prior to the vaccination campaign, the acceptance rate of COVID-19 vaccination did not exceed 20 %. In the current study, the acceptance of vaccination by Lebanese participants was studied following the launching of the vaccine. The aim of the work is to reveal the actual intention of the studied sample once the vaccine is available and investigate the change in the perception and acceptance rate of Lebanese citizens about vaccination as influenced by many factors over time. A cross-sectional questionnaire-based study was conducted in two separate phases (March 2021 and May 2021). In the first phase, the questionnaire included socio-demographic data and reasons for vaccine's refusal. In the second phase, 2 sections were added, addressing the change in the attitude of participants towards vaccination, and the reasons behind this change. Data were analyzed using SPSS-version 20 and the results were considered statistically significant with p values ≤0.05. In both phases, the willingness to take the vaccine did not significantly change (p>0.05). Although 80 % of participants consider vaccination important, only 50 % of the studied sample were willing to take the vaccine. Such findings confirm hesitancy that can be attributed to worries about long-term effects and incomplete information about the safety and efficacy of the vaccine. Therefore, awareness campaigns about false beliefs should be extensively conducted, with more emphasis on tailored education for special subpopulations, and other measures should be implemented more efficiently (e.g. restricted access to public places for unvaccinated individuals) to accelerate the vaccination rate.

Keywords

1. INTRODUCTION

The spread and evolvement of coronavirus species (i.e. SARS CoV and MERS CoV) pose a high risk to public health (de Wit *et al.,* 2016). Recently, new species have evolved, namely, SARS-CoV-2, resulting in around half a billion infected cases, and nearly 6 million deaths that were documented globally (WHO, 2022). In addition to the threats of the disease named COVID-19 and its impact on the health system, it has brought economic burden and social disorder by disrupting communications on both national and international levels (Nicola et al., 2020).

COVID-19 has spread rapidly to be declared a pandemic by the World Health Organization in March 2020. The symptoms ranged from mild ones, such as fever, fatigue, cough, sore throat, and loss of taste and smell, to more severe ones such as pneumonia. The severity of the disease can lead to multi-organ failure namely; cardiovascular, kidney, and liver. Moreover, neurologic complications as well as thrombosis have been detected (Tsai *et al.*, 2021). Furthermore, other comorbidities such as chronic lung disease, cardiovascular disease, hypertension, obesity, and diabetes are linked to a poor prognosis (Fadlallah *et al.*, 2022; Gebru *et al.*, 2021; Noureddine *et al.*, 2021). The susceptibility to SARS-CoV-2 increases with age, where older age is associated with increased disease morbidity and mortality (Fadlallah *et al.*, 2022; Gebru *et al.*, 2021). Consequently, the burden of COVID-19 has increased drastically to include over 450 million confirmed cases worldwide and around one million cases in Lebanon with more than ten thousand deaths by March 2022 (WHO, 2022).

The sustainable success of health systems to cease this pandemic depends on extensive vaccination campaigns (Adhami *et al.*, 2021; Bhattacharya *et al.*, 2020; Saha *et al.*, 2020). Nevertheless, the disease outbreak is coinciding with an apparent mistrust regarding COVID-19 vaccines (Abdul & Mursheda, 2020). Findings from previous studies that were conducted in different countries revealed the refusal of vaccination by more than 25 % of the population (Neumann-Böhme *et al.*, 2020; Peretti-Watel *et al.*, 2020; Thunström *et al.*, 2021). The spread of misinformation through social media might have contributed to the skepticism clouding the vaccines (Abdul & Mursheda, 2020). Most identified concerns include uncertainty about the novelty and safety of COVID-19 vaccines as well as worries about its potential side effects (Neumann-Böhme *et al.*, 2020; Rhodes *et al.*, 2021; Sherman *et al.*, 2021; Williams *et al.*, 2020). In Lebanon, a previous study has been conducted to investigate the acceptance rate of COVID-19 vaccination. The study revealed a vaccination acceptance rate of around 20 % by the Lebanese population (Al Halabi et al., 2021). However, the data was collected during a period preceding the start of the vaccination program in the country (November 2021) which rose the doubt about the vaccine safety and efficacy. In the current work, the attitude and perception of Lebanese population towards COVID-19 vaccines were studied after launching the national vaccination program, in 2 separate phases. The aim of the work is to investigate the change with time in the perception and acceptance rate of Lebanese citizens about vaccination as influenced by the educational campaigns, the change of their social cognitive behavior that would be influenced by the vaccination experience as perceived by their relatives and friends, and other factors.

2. METHODOLOGY

A cross-sectional anonymous questionnaire was designed in March 2021 targeting Lebanese people living in all 5 areas of Lebanon (Beirut, North, South, Beqaa, and Mount Lebanon). The sample size was calculated using "Raosoft®" online tool assuming a total population of 6.825 million. The results revealed that a sample size equal or above 384 participants represents the population, considering a 5% error and 95% confidence level. Data was collected over 2 phases; the first phase was carried out in March 2021, whereas the second phase took place in May 2021. Confidentiality and autonomy of participants were respected, and an informed consent was given by those who filled the survey. Accordingly, the study was exempted from ethical approval. Due to COVID-19 restrictions and preventive measures, the study was carried out using google form, and the link was shared on WhatsApp. The questionnaire was designed in both English and Arabic languages (the latter is native language in Lebanon), where both forms were available to choose between. As a first step, the survey validity was evaluated by three experts. In the second step, a pilot study was carried out on 20 participants. The collected data helped to check for readability and comprehension of the survey and was excluded from the study. According to the collected feedback, the questionnaire was

revised and modified. In the first phase, the survey was divided into 2 sections; The first section consisted of sociodemographic questions. In the second section, the participants were asked if they have already taken the vaccine, followed by justifying the reason to not taking it. In the survey of the second phase, 2 additional sections were added to the previous ones. The third section addressed the change of attitude of participants towards the vaccination, and the fourth section stated the reasons behind this change. In the second and fourth section of the survey, the participants had the option to choose more than one answer. Statistical analysis was carried out using Statistical Package for the Social Science software (SPSS®) version 20. Data were expressed as frequencies and percentages.

3. RESULTS AND DISCUSSION

In the first phase, 565 participants responded to the survey. Out of which 68.1% were female. Age of less than 30 years accounted for 63.9%. More than two-third of the respondents had a university degree (71.0 %), around one-third were employed (30.1 %) and 62% did not have any medical background. Most of the respondents were non-smokers (66.7%), and avowed having a normal weight (65.5 %). The investigation about the health condition of the studied sample has revealed that only 21.4 % of the participants had past medical history. The highest percentage of the studied sample (35.4 %) lived in Beirut area (the capital of Lebanon). In the second phase, the survey link was sent to the same respondents of phase 1, yet, only 277 participants have responded, where the demographic characteristics were quite similar to those of the previous phase.

Table 1: Demographic characteristics of the studied samples in phase 1 and phase 2

Characteristic		Phase 1* Frequency (%)	Phase 2** Frequency (%)
Gender			
	Male	180 (31.9)	108 (39.0)
	female	385 (68.1)	169 (61.0)
Age (years)			
	18-29	361 (63.9)	153 (55.2)
	30-49	120 (21.2)	63 (22.7)
	50-59	48 (8.5)	33 (11.9)
	60-69	24 (4.2)	19 (6.9)
	>70	12 (2.1)	9 (3.2)
Educational level			
	Uneducated	4 (0.7)	3 (1.1)
	Middle school	44 (7.8)	26 (9.4)
	High school	88 (15.6)	51 (18.4)
	University degree	401 (71.0)	179 (64.6)
	Diploma (BT/TS)	28 (5.0)	18 (6.5)
Employment			
	Student	289 (51.2)	130 (46.9)
	Employed	170 (30.1)	84 (30.3)
	Unemployed	86 (15.2)	48 (17.3)
	Retired	20 (3.5)	15 (5.4)
Medical background			
	Medical	212 (37.5)	119 (44.4)
	Non-medical	353 (62.5)	149 (55.6)
Smoking			
	Smoker	146 (25.8)	83 (30.0)
	Ex-Smoker	42 (7.4)	18 (6.5)
	Non-Smoker	377 (66.7)	176 (63.5)
Obesity			
	Obese	23 (4.1)	13 (4.7)
	Overweight	137 (24.2)	62 (22.4)
	Normal	370 (65.5)	189 (68.2)
	Underweight	35 (6.2)	13 (4.7
Comorbidities			
	Yes	121 (21.4)	68 (24.5)
	No	444 (78.6)	209 (75.5)
Residency			

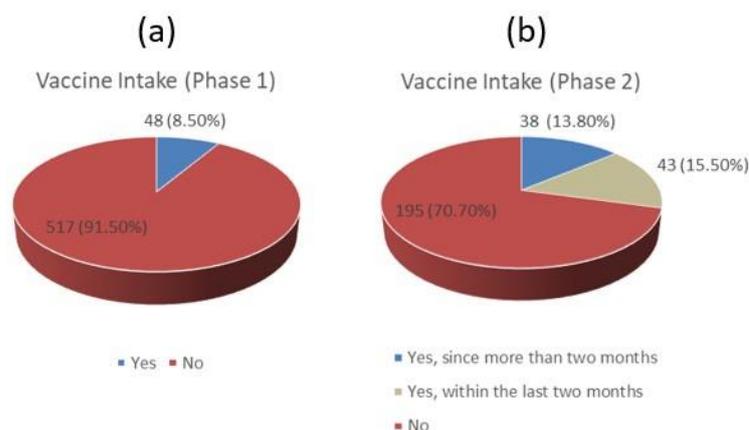| Characteristic		Phase 1* Frequency (%)	Phase 2** Frequency (%)
	Beirut	200 (35.4)	121 (43.7)
	North	77 (13.6)	19 (6.9)
	South	134 (23.7)	56 (20.2)
	Beqaa	21 (3.7)	26 (9.4)
	Mount Lebanon	133 (23.5)	55 (19.9

*N= 565
**N=277

Fig.1:Vaccine intake by respondents. (a) Phase 1, (b) Phase 2

In the first phase, the majority of participants (91.5%) did not take the vaccine (Figure 1).

The main rationale behind not taking the vaccine was that more than half of these respondents (56.8 %) were still waiting their turn for vaccination, whereas, the rest (43.2 %) have refused vaccination for other reasons (Table 2). An earlier study conducted in Lebanon just before the release of the vaccine, revealed that around 20 % of the Lebanese population were willing to get vaccinated (Al Halabi *et al*., 2021). Interestingly, in the present study, positive responses toward vaccination were higher than those of the preceding study. The current work showed the actual intention of participants to be vaccinated at a time when vaccines were already available.

Reasons of vaccination refusal that were most frequently encountered during the first phase include their concerns about the safety and efficacy of the vaccine (21.5 % and 13.1 %, respectively), and to lesser extent their belief of acquiring a good immune system (4.3 %), being pregnant or breastfeeding (1.1 %), and others (Table 2). Likewise, earlier studies have reported that concerns about vaccine safety and efficacy were the main reasons for refusal of vaccination against any newly evolving infectious disease (Determann *et al*., 2014; Fisher *et al*., 2020; Lin *et al*., 2021; Neumann-Böhme *et al*., 2020) .

It is noteworthy to mention that the limited knowledge and the spread of false information through the media might have contributed in increasing uncertainty toward vaccination (Fisher *et al*., 2020; Kourlaba *et al*., 2021; Loomba *et al*., 2021). Moreover, multiple deaths of vaccinated individuals have been reported in several countries making people anxious about the vaccine and its side effects.

When it comes to the vaccine efficacy, concerns would be mainly attributed to a bad experience of COVID-19 vaccination as perceived by relatives and friends. In one study, the mistrust about yearly flu vaccine efficacy was investigated. Findings revealed that some people had concerns about flu vaccine's safety as, although being vaccinated, they have had upper respiratory tract infections (Cowling *et al*., 2012).

In the second phase, the percentage of participants who did not take the vaccine dropped remarkably to 70.7 % (figure 1b). This would be attributed to the intake of the vaccine by some of the participants who were willing to get vaccinated in the first phase, yet, they were still waiting for their turn (15.5 %). When justifying the reasons behind not taking the vaccine, the statistical data (odd's ratio) did not reveal any significant difference in their responses in both phases ($p>0.05$), with the exception of the following responses stating "I have a good immune

system" and "I am pregnant or breastfeeding" (Table 2). The aforementioned two reasons of refusing the vaccine were more frequently stated by respondents in the second phase, recording a significantly higher response rate (13.9 % vs 4.3 % for having a good immune system, and 11.5 % vs 1.1 % for being pregnant or breastfeeding) with a p value of less than 0.001.

Table 2: Reasons behind not being vaccinated in the two phases of the study

Reason	Phase 1* Frequency (%)	Phase 2** Frequency (%)	P value	OR (CI)
I am willing to take it and I am waiting my turn	209 (56.8)	83 (50.3)	0.164	0.770 (0.533-1.113)
I have a good immune system	16 (4.3)	23 (13.9)	0.000	3.563 (1.829-6.944)
I got infected previously and I acquired the immunity	23 (6.3)	16 (9.7)	0.158	1.611 (0.827-3.136)
I am concerned about the vaccine efficacy	49 (13.3)	24 (14.5)	0.703	1.108 (0.654-1.877)
I am concerned about the vaccine safety	79 (21.5)	29 (17.6)	0.335	0.793 (0.494-1.272)
I am pregnant or breastfeeding	4 (1.1)	19 (11.5)	0.000	11.810 (3.950-35.309)
I am religious and God will protect me	4 (1.1)	5 (3.0)	0.108	2.836 (0.752-10.700)
I don't feel I am at risk	16 (4.3)	9 (5.5)	0.576	1.269 (0.549-2.935)
I believe that this pandemic will end very soon by its own	16 (4.3)	11 (6.7)	0.252	1.582 (0.717-3.488)

*N=288
**N=195
Chi square test done
Odds for phase 1/phase 2

In the second phase, the change in attitude towards COVID-19 vaccination was investigated by asking the participants about the importance of vaccination (Table 3). Around half of the participants (132, 47.7 %) have responded that they consider the vaccination important since the beginning of the campaign, whereas, about one-third of respondents (91, 32.9 %) were not initially convinced about its importance but they changed their mind.

Table 3: Attitude toward the vaccine (Phase 2)

Importance of the vaccine	Phase 2 Frequency (%)
Yes, since the beginning of the vaccination campaign	132 (47.7)
No, since the beginning of the vaccination campaign	43 (15.5)
I was not convinced at the beginning but I have changed my mind and I am currently convinced about its importance	91 (32.9 %)
I was convinced at the beginning but I have changed my mind and I am not currently convinced about its importance	11 (3.9 %)

N=277

The reasons behind the positive attitude of participants' toward COVID-19 vaccination was investigated (Table 4). It was found that the highest percentage of respondents (47.7 %) have been convinced by health care providers, including their physicians and pharmacists. Moreover, the influence of the educational campaigns via social media and television was also remarkable (36.4 %), as well as good experience of vaccination as perceived by friends and family (34.1 %). Other less frequently encountered reasons include the inability of the participants to withstand quarantine and social distancing, and their fear to be forbidden from traveling if unvaccinated (20.4 % and 15.9 %, respectively). Surprisingly, none of the participants related their attitude change, and, hence, conviction about the vaccination, to receiving news about death cases due to COVID-19 infection. This would be mainly attributed to the low death rate in Lebanon (~ 1 %), according to the number that has been reported to WHO and published to this date (WHO, 2022).

Earlier studies have reported that people used multiple resources to receive health information about COVID-19 infection, as such resources would help in changing the attitude and perception of people about vaccination and contribute to the decision-making process to accept or refuse the vaccination (Ali *et al*., 2020). Healthcare providers have proven to be a trustful source of information; in a study conducted in France, MMR- and HBV-vaccine acceptance rates by parents were higher when they received the information from health care providers rather than from the internet or relatives (Charron *et al*., 2020). In another study conducted in South Carolina, 74 % of participants were convinced to take COVID-19 vaccine after receiving relevant information and education from their healthcare providers (Qiao *et al*., 2020).

Table 4: Reasons behind the positive change of participants' attitude toward the vaccine

Reason	Phase 2 Frequency (%)
A good experience of COVID-19 vaccination as perceived by relatives and friends	30 (34.1 %)
Educational Campaigns (social media, TV)	32 (36.4%)
Health care providers advise	42 (47.7 %)
I am afraid that if being unvaccinated I would be forbidden from travelling	14 (15.9 %)
Can no longer withstand social distancing and quarantine	18 (20.4 %)

N=91

Although the vaccine is considered important for around 80 % of the studied sample during phase 2, only 50.3 % of the respondents were willing to take it. This would be explained by the significant increase in the number of participants who believe in acquiring a good immune system and those who are pregnant or breastfeeding mothers. Although COVID-19 infection would increase the risk of premature birth (Khoury *et al*., 2020), and sometimes the death of the fetus (Popescu *et al*., 2021), the lack of studies about COVID-19 vaccination in pregnant and breastfeeding women during the early stages of vaccination campaigns might have arisen the concerns about its safety and efficacy and consequently contributed to the hesitancy of its intake. Therefore, reliable information from healthcare providers and most particularly gynecologists on the safety and effectiveness of the vaccination would contribute to reducing their anxiety (Januszek *et al*., 2021). Moreover, public health campaigns that stress the preventive role and safety of the vaccine rather than the risk of the infection itself would be beneficial among this category of the population (Chervenak *et al*., 2021).

When analyzing the participants' response 'I have a good immune system', we may attribute such findings to their healthy status and practicing a healthy lifestyle. In addition, these participants would have been consuming immune-boosting supplements (magnesium, zinc, vitamin C, D, and E) that would prevent and fight against COVID-19 infection (Arshad *et al*., 2020). Even though such information was supported by some research, yet, most of the studies were carried out in-vitro, hence, lacking clinical evidence (Galanakis *et al*., 2020).

Despite the fact that some of the aforementioned factors may have played a role in the decision-making of the Lebanese population to refuse the vaccine, more than half of unvaccinated people were waiting their turn to be called for vaccination. Since the launching of the COVID-19 vaccine in Lebanon, educational campaigns were conducted in the country to raise awareness about its importance, which was supported by the advice of healthcare providers. The phases of the study were separated by a two-month period hence, the insignificant change in the response of participants toward vaccination would be attributed to their concern about the long-term effects of the vaccine, and the lack of evidence-based information about its safety in specific populations at that time. The willingness of around half of the unvaccinated Lebanese population to get the vaccine has been translated into the increasing number of vaccinated cases in Lebanon that recorded approximately 1 % at the beginning of the vaccination campaign, reaching 7.5 % after two months, and approaching 40 % of the population during March 2022. On the other hand, countries such as United Arab Emirates, Singapore, France and united states have reported higher vaccination rates attaining 99%, 91 %, 80 %, and 76 %, respectively (Our World in Data, 2022).

4. CONCLUSION AND RECOMMENDATIONS

As a conclusion, even though 80% of the studied sample consider COVID-19 vaccination important to prevent the spread of the disease, only 50% were willing to be vaccinated which was influenced by the false information received from social media. Consequently, awareness campaigns about false beliefs should be more extensively conducted to reduce the concerns of the population toward newly developed vaccines. In addition, more emphasis on tailored education should be spent for special subpopulations such as pregnant, breastfeeding women, and children. Although recently, unvaccinated individuals are not allowed to travel, other measures should be taken more seriously to hasten the vaccination rate in Lebanon (only ~40 % till this date when compared to ~65 % worldwide), such as restricted access to public places for those who do not acquire a vaccination certificate.

5. LIMITATIONS

Due to COVID-19 protective measures, the questionnaire was circulated through email and WhatsApp. Consequently, WhatsApp consisted the main limitation of the study, although it included a large number of participants. The team was eager to spread the survey to all socioeconomic classes; however, illiterate people or those without mobile phones or computers may have been underrepresented. Moreover, participants were partially enrolled in the second phase, hence reducing the sample size, which may have affected the findings of the study.

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