Scholars Academic Journal of Pharmacy
Abbreviated Key Title: Sch Acad J Pharm
ISSN 2347-9531 (Print) | ISSN 2320-4206 (Online)
Journal homepage: http://saspublishers.com

OPEN ACCESS

Pharmacy

Knowledge, Attitudes, and Acceptance toward Coronavirus Disease 2019 Vaccine

Hatem A Hejaz[1*], Raghad A Fallah[1], Rawand Al-Jabari[1], Duha Z Abdeen[1], Maha Jabari[1]

[1]Department of Pharmacy, College of Pharmacy and Medical Sciences, Hebron University, P. O. Box 40; Hebron-Palestine

DOI: 10.36347/sajp.2021.v10i12.003 | **Received:** 12.11.2021 | **Accepted:** 16.12.2021 | **Published:** 19.12.2021

***Corresponding author:** Dr. Hatem A Hejaz

Abstract | **Original Research Article**

Background*:** Several people are resistant or hesitant to take a Coronavirus Disease 2019 (COVID-19) vaccine. Negative attitudes towards vaccines and the spread of misinformation about the ongoing pandemic can lead to vaccine take hesitancy and that could be a serious problem for managing the COVID-19. ***Objectives: This study aimed to determine the knowledge, acceptance, perception, and to evaluate the attitudes towards the prospective COVID-19 vaccines. ***Methods:*** The research study was carried out using a questionnaire that consisted of questions about the disease and on knowledge, acceptance, and perception of the COVID-19 vaccine. The data collected was analyzed using Statistical Package for the Social Sciences (SPSS) version 26. ***Results*:** The overall acceptance rate of the participants to take the COVID-19 vaccine was 23% (n= 250 of 1085 who completed the questionnaire). Acceptance of COVID-19 vaccines in the study sample was affected by several factors such as age, gender, education level, income, health status, smoking, and the history of coronavirus infection. About 39.3% (n= 335) of the participants in the study think that COVID-19 was a man-made virus to achieve political goals or economic goals, while approximately half of them (n= 580, 53.4%) think that the COVID-19 vaccine is a purpose to inject microchips into people to control and monitor them. The main reasons for the people willing to get vaccinations were to eradicate the pandemic (31%) and fear for the relatives and friends from the disease (26.1%). While the reasons for refusing to take the vaccine were due to the side effects of the vaccine (29.2%), or for getting natural immunity (28.8%), and because they distrust vaccines (18.7%). ***Conclusions*:** The knowledge about vaccine COVID-19 was inadequate; the majority of the respondents were not willing to get vaccinated. High rates of COVID-19 vaccine hesitancy are due to its side effects.

Keywords: Coronavirus; COVID-19; Pandemic, Vaccine; Knowledge, Attitude; Acceptance; Palestinian.

INTRODUCTION

A new form of coronavirus has been established as the causative agent of coronavirus disease-19 (COVID-19), a respiratory illness that has emerged in the world [1]. COVID-19 is one of seven coronaviruses that are known to cause disease in humans which belong to the subfamily coronavirinae one of the coronaviridae family [2, 3]. Coronaviruses cause disease in a lot of species, like bats, birds, cats, dogs, pigs, mice, horses, whales, and humans but recent studies suggest that bats can also act as a natural reservoir for coronaviruses. Coronaviruses can affect respiratory, enteric, hepatic and they can cause neurological diseases [4]. COVID-19 is a novel disease that has outbreak rapidly from its origin in Wuhan City of Hubei Province of China to every country worldwide [5]. It is the newly emerged severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The ongoing pandemic with COVID-19 has affected above 119,205,673 cases and 2,643,610 death cases worldwide [6]. The coronavirus genome is a linear molecule of continuous positive-sense single-stranded molecules of RNA. The size of the molecule is about 6 X 106 [7, 8]. Some COVID-19 are known to cause respiratory and intestinal diseases, presenting a public health hazard worldwide [9]. All coronavirus virion particles contain three to four structural proteins [10], contained phosphorylated nucleocapsid (N) protein with genomic RNA as core nucleocapsid [11], a small integral membrane glycoprotein (M), a large spike glycoprotein (S) that mediate disease to binding to angiotensin-converting enzyme 2(ACE-2) [12], and envelope (E).

People who are infected with the COVID-19 virus most of them will suffer from mild to moderate respiratory disease and they will be able to heal without

the need for any special treatment. The success of the public health response to the (COVID-19) pandemic will depend on acquired immunity for the people when they are affected with COVID-19 (herd immunity) [13]. Older people and people who have medical problems like cardiovascular disease, diabetes mellitus, chronic respiratory disease like Chronic obstructive pulmonary disease (COPD), and who have cancer are more likely to suffer from COVID-19 more than younger people [14]. Elimination of covid-19 by herd immunity, letting people become infected that may cause a new strain of covid-19 and would cause millions of deaths worldwide. Therefore vaccination is crucial for managing the covid-19 pandemic [15].

Given COVID-19's rapid dissemination and asymptotic distribution, an effective vaccine with global immunization coverage is needed to restore people's lives to normalcy [15]. The challenge of creating a vaccine against COVID-19 is a top priority for a molecular biologist, and it is regarded as a crucial global issue [16]. Vaccination is considered to be one of the most helpful achievements of public health. Vaccination programs have helped to reduce mortality and morbidity of various infectious diseases, and have contributed to the elimination of poliomyelitis and the eradication of smallpox. To be successful in reducing the prevalence of diseases by vaccination programs rely on how much people accept that. Vaccination provides direct protection for vaccinated individuals, also by slowing disease spread, protecting the whole population (herd immunity), thereby decreasing the risk of infection between people who remain susceptible in the community [17]. Several types of COVID-19 vaccines are now available to be used and have also been studied in humans [18]. First, there was mRNA, a synthetic form of coronavirus genetic material [19], encodes stabilized spike, lipid nanoparticle such as Pfizer-BioNTech, Moderna, the second technic in vaccination is non-replicating viral vector include Oxford-AstraZeneca, Sputnik V and Sinopharm whole-inactivated vaccine [20]. The third one is a protein subunit that contains S protein in its entirety or S1/S2 subunits [21] such as Novavax, GSK-Sanofi, and Johnson & Johnson [22]. World Health Organization estimates that 54 more vaccines "candidates" are being created [23]. The limiting factor among these vaccinations is the degree of protection given by these vaccines due to their expanded variety [24].

Vaccines promote viral immunity, but they may also cause inflammation in the body. This can manifest as pain or inflammation at the injection site, or as general symptoms like fever or exhaustion symptoms similar to COVID-19 disease. Most vaccination reactions are minor and concern only a limited percentage of people [25]. As safe and effective vaccines are being made available, the next challenge will be dealing with vaccine hesitancy. Vaccine hesitancy, identified as one of the ten most important current health threats, is defined as the reluctance or refusal to vaccinate despite the availability of vaccines [26]. Vaccine hesitancy is characterized as a hold, unwillingness, or inability to receive a vaccine. The World Health Organization has named it as one of the top ten public health challenges for 2019 [27]. However, vaccination remains one of the most efficient and cost-effective health-improvement strategies ever developed. Vaccines have saved many lives and enhanced global health and wellness [28]. To decrease vaccine hesitancy, health care providers should be well-informed and address parents' questions. Health care providers should make clear recommendations to vaccinate but should avoid "overselling" vaccination, as this can also increase hesitancy [29].

Vaccination could be an effective strategy for slowing the spread of the current coronavirus disease 2019 (COVID-19) pandemic. But, misconceptions and misbeliefs about vaccines can affect people's ability to obey health and political authorities' guidelines. In the background of the Covid-19 pandemic, it's important to reduce the effect of disinformation on the decision not to get vaccinated [30]. Individuals to receive misinformation from a variety of sources, including the media, social media, and people who are around them. Public health authorities and policymakers must continue developing proactive messaging and strategies before residents are vaccinated [31]. Vaccine hesitancy could pose a serious problem for COVID-19 prevention. The Palestinian government has planned to obtain the coronavirus disease 2019 vaccine through multiple agencies and companies to vaccinate the population. To develop an effective vaccine, we should make public trust and preparation to vaccinate against COVID-19. In this study, we aimed to determine the knowledge, acceptance, and perception of Palestinian adults regarding the COVID-19 vaccine in order o reduce the vaccine hesitancy ratio and conspiracy theories to achieve effective COVID-19 vaccination. We also wanted to see if there was a correlation between vaccination reception and conspiracy theories. Thus, we performed an online survey in Palestine to assess the knowledge and attitude toward the COVID-19 vaccine.

METHODOLOGY

An online-based questionnaire (Arabic version) was used to collect data for this cross-sectional analysis on knowledge and attitudes and acceptance toward the coronavirus disease 2019 vaccine among the general public in Palestine. The questionnaire was set up using Google Forms and the generated link was shared on social media. The research study was carried out for one month; between the 31st of January 2021 (21:30) and the 2nd of March 2021 (21:50) before the COVID-19 vaccine was available in Palestine. The online survey targeted Palestinians aged 18 and up and the participants were recruited through advertising on social media sites (such as Facebook, Instagram, and

Twitter) and free messaging services (such as WhatsApp and Snapchat), beginning with the authors' contacts in Palestine. The total number who completed the questionnaire was 1085 people. The participants were asked to rate their likelihood of receiving the COVID-19 vaccination. The survey had questions about the participants' socio-demographic traits, behaviors, and opinions about COVID-19 infection and vaccination.

The questionnaire has consisted of three parts. The first part was about demographics (governate, gender, age, educational level, profession, monthly income, and smoking). There were also questions about the person's health status and for any previous history of chronic disease he has. The second part of the questionnaire was a set of questions the knowledge and attitudes about COVID-19; including their beliefs, infection, symptoms, and source of their information, The third and last part of the questionnaire was about the vaccine, which included the effectiveness, the motivations of acceptance or hesitation of the uptake, the side effects, the quality, and the costs. The data collected and the correlation between demographic factors with knowledge, attitudes, and acceptance about the COVID-19 vaccine was analyzed using Statistical Package for the Social Sciences (SPSS) version 26, $p = 0.464$ was assessed for statistical significance. The participants could select more than one answer for some questions in the questionnaire.

RESULTS

A total of 1085 respondents participated in this online survey, with an average age ranging from 20-35 years old, among them 883 (81.4%), were female. and most of them are from the Hebron governorate (n= 804, 74.1%). About half of the participants (n= 608) had completed a bachelor's degree. The majority of respondents (92.7%, n= 1006) do not suffer from any chronic disease and 81.8% live in cities. 573 (52.8%) people are singles while 485 (44.7%) are married, and 455 (41.9%) are students, About one-fourth of the individuals (260, 24%) are not working and others are either employed or retired, only a few working in the medical field (n= 33, 3%). Regarding their income; 29.7% have an average income and 28.5% have less than an average income. Most of them (86.3%) don't smoke. Their health status is either very good (55.7%) or excellent (32.1%), only 5 individuals have weak health status. Previous COVID-19 self/family experience was with 586 people (54%). The detailed characteristics of the respondents are shown in Table 1.

The majority (80.5%) is with vaccination in general for infectious diseases and only 17.8% are against it. Most of them (93.9%) believes there is a Corona disease and 53.8% of them either have been infected with the Coronavirus or one of their family member. About 65.3% know the complications that the Coronavirus may cause. Most of them (91%) did not take a flu vaccine or a flu nasal spray in the past year. Nearly 23.9% have already been infected with the Coronavirus, 31.2% don't think they will be infected with Coronavirus and 38.1% think they will have a mild case of Coronavirus if they are infected. Only 18.6% think that getting a Coronavirus vaccine can prevent and protect against the disease. The overall acceptance rate of the participants to take the COVID-19 vaccine was 23% (n= 250). An approximately good number of them (28.4%) will take the vaccine even if it is not free and the remaining will not take it even it is free of cost. Furthermore, 71% of the people think it is not acceptable for the government to force everyone to take the COVID-19 vaccine. When they asked about the safety of the vaccine; 31.6% think that the Coronavirus vaccine is safe and can be given to pregnant women and 63.7% they did not know if it is safe.

Table 1: Characteristics of the study sample stratified by the city of residence

Respondents	City	Hebron	Ramallah	Bethlehem	Jerusalem	Jericho	Nablus	Jenin	Tulkarm	Gaza
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
		804(74.1)	55 (5.1)	25 (2.3)	58 (5.3)	15 (1.4)	32 (2.9)	9 (0.8)	18 (1.7)	69 (6.4)
Age	**20 years**	226 (20.8)	14 (1.3)	10 (0.9)	12 (1.1)	5 (0.5)	15 (1.4)	0 (0.0)	4 (0.4)	21 (1.9)
	20-35 years	385 (35.5)	25 (2.3)	14 (1.3)	29 (2.7)	4 (0.4)	14 (1.3)	6 (0.6)	6 (0.6)	38 (3.5)
	36-50 years	145 (13.4)	11 (1.0)	2 (0.2)	12 (1.1)	3 (0.3)	2 (0.2)	2 (0.2)	5 (0.5)	8 (0.8)
	Over 50 years	47 (4.3)	5 (0.5)	0 (0.0)	4 (0.4)	3 (0.3)	1 (0.1)	1 (0.1)	3 (0.3)	2 (0.2)
Gender	**Male**	152 (14)	12 (1.1)	8 (0.7)	6 (0.6)	2 (0.2)	5 (0.5)	1 (0.1)	7 (0.6)	11 (1.0)
	Female	651 (60.1)	43 (4.0)	18 (1.7)	51 (4.7)	13 (1.2)	27 (2.5)	8 (0.7)	11 (1.0)	58 (5.4)
Educational level	**School**	191 (17.6)	10 (0.9)	5 (0.5)	11 (1.0)	7 (0.6)	7 (0.6)	3 (0.3)	4 (0.4)	15 (1.4)
	Diploma	122 (11.3)	6 (0.6))	3 (0.3)	9 (0.8)	2 (0.2)	3 (0.3)	1 (0.1)	4 (0.4)	6 (0.6)
	Bachelor	440 (40.6)	32 (3.0)	16 (1.5)	35 (3.2)	5 (0.5)	21 (1.9)	4 (0.4)	10 (0.9)	44 (4.1)
	Postgraduate	50 (4.6)	7 (0.6)	2 (0.2)	2 (0.2)	1 (0.1)	1 (0.1)	1 (0.1)	0 (0.0)	4 (0.4)
Monthly income	**< US$ 650**	210 (25.3)	17 (2.1)	7 (0.8)	21 (2.5)	6 (0.7)	10 (1.2)	4 (0.5)	2 (0.2)	32 (3.9)
	US$ 650-1300	259 (31.2)	16 (1.9)	9 (1.1)	11 (1.3)	5 (0.6)	5 (0.6)	2 (0.2)	6 (0.7)	9 (1.1)
	US$ 1300-2000	79 (9.5)	6 (0.7)	0 (0.0)	4 (0.5)	1 (0.1)	3 (0.4)	1 (0.1)	4 (0.5)	1 (0.1)
	> US$ 2000	24 (2.9)	4 (0.5)	2 (0.2)	4 (0.5)	0 (0.0)	2 (0.2)	0 (0.0)	4 (0.5)	1 (0.1)
Suffer from any chronic disease	**Yes**	55 (5.1)	4 (0.4)	2 (0.2)	7 (0.6)	3 (0.3)	2 (0.2)	1 (0.1)	2 (0.2)	3 (0.3)
	No	744 (69.1)	51 (4.7)	22 (2.0)	49 (4.5)	12 (1.1)	30 (2.8)	8 (0.7)	16 (1.5)	66 (6.1)
History of coronavirus infection in self or in family	**Yes**	445 (41.1)	27 (2.5)	10 (0.9)	31 (2.9)	10 (0.9)	16 (1.5)	7 (0.6)	11 (1.0)	27 (2.5)
	No	358 (33.0)	28 (2.6)	16 (1.5)	26 (2.4)	5 (0.5)	16 (1.5)	2 (0.2)	7 (0.6)	42 (3.9)

As mentioned the overall acceptance rate of the participants to take the COVID-19 vaccine was 23% (n= 250). About 39.3% (n= 335) of the participants in the study think that COVID-19 was a man-made virus to achieve political goals or economic goals, while approximately half of them (n= 580, 53.4%) think that the COVID-19 vaccine is a purpose to inject microchips into people to control and monitor them. Furthermore, 6.3% (n= 68) of respondents expect COVID-19 vaccinations can induce infertility, and 63.6% said maybe it is lead to infertility and 63.9% don't know if the vaccine will affect the pregnancy or not. Less than one-quarter of the respondents believed that the available in America and Europe are safer and more effective than those available in other countries (n = 258, 23.8%), more than half (50.4%) of the respondents not sure if America and Europe are safer and more effective and 72% of people think it is not acceptable for the government to force everyone to take COVID-19 vaccine (Figure 1).

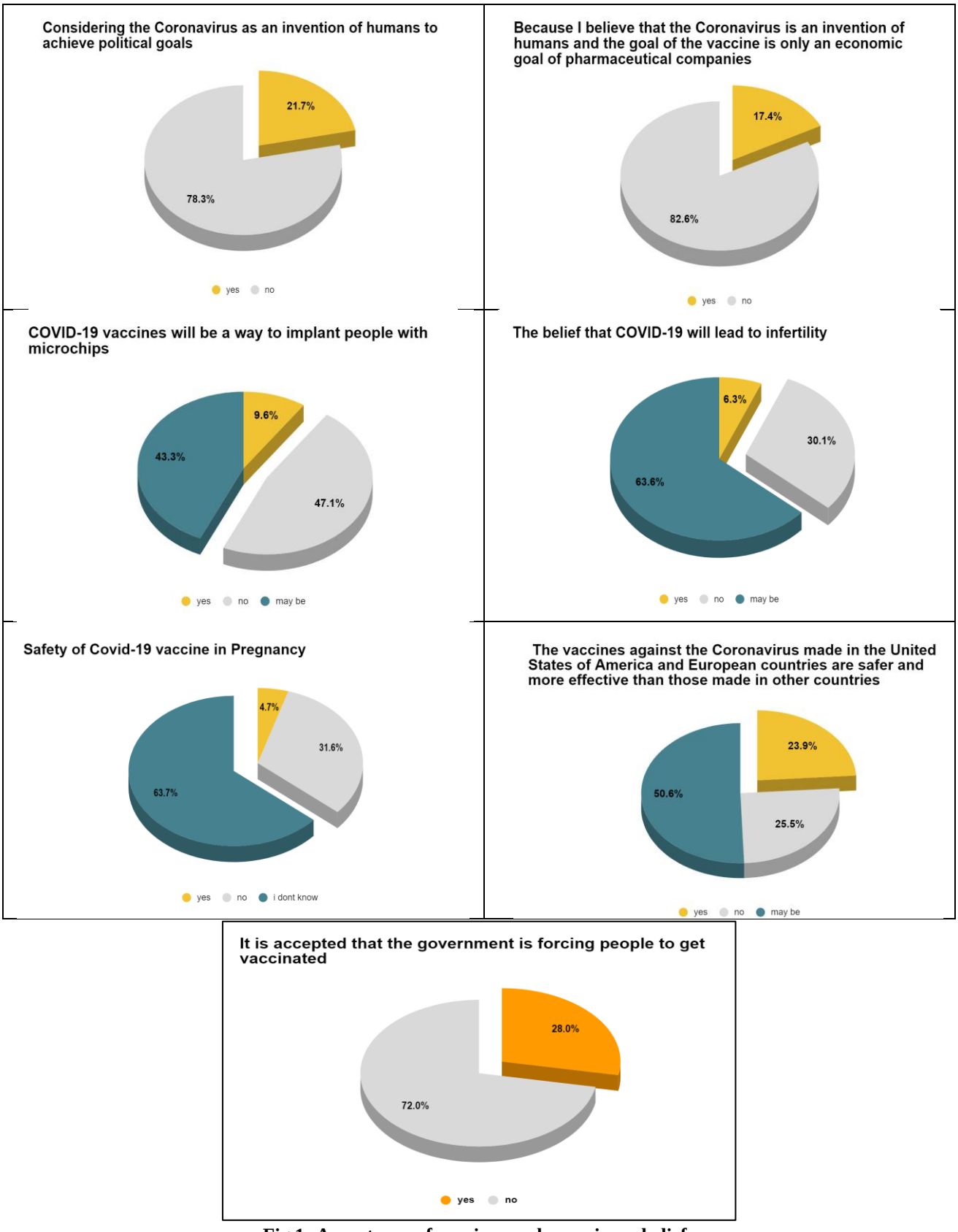

Fig 1: Acceptance of vaccines and conspiracy beliefs

Acceptance of COVID-19 vaccines in the study sample was affected by several factors such as age, gender, education level, income, health status, smoking, and the history of coronavirus infection. Among those accept to take the COVID-19 vaccine was 23%, the participants who their age from 20-35 showed higher acceptance rates to take COVID-19 vaccine, and a higher rate of vaccine acceptance was also seen among females (17.4.2% female vs. 6.5% male respondents and with who has higher educational levels (56%). The people with higher monthly income were associated with a higher acceptance rate for the COVID-19 vaccine. From the total smoker; 45 (4.2%) people will accept to take the COVID-19 vaccine and the individuals (13%) been infected with COVID-19 will accept to take it too; vs 21% not been infected and will take the vaccine. Quite a high rate (62.1%) think that the government and the Ministry of Health will not provide the vaccine for everyone. Only 19.6% mentioned that it is possible to change their minds in the future and accept to take the vaccine and 50.9% maybe they change their mind to get it. Only 14.2% of the participants think if the vaccine is available, they will feel comfortable to be one of the first to take it, 49.2% are not and 36.4% may be (Table 2).

Table 2: Rates of Covid-19 Vaccine Acceptance and Related Factors

Variable		Will You Get COVID-19 Vaccine When Available?		
		Yes	No	Maybe
		n (%)	n (%)	n (%)
Age	**< 20 years old**	58(5.3)	143(13.2)	106(9.8)
	20-35 years old	131(12.1)	198(18.2)	193(17.8)
	36-50 years old	37(3.4)	81(7.5)	72(56.6)
	> 50 years old	24(2.2)	22(2.0)	20(1.8)
Gender	**Male**	61(5.6)	66(6.1)	77(7.1)
	Female	189(17.4)	378(34.8)	314(28.9)
Educational level	**School**	36(3.3)	125(11.5)	92(8.5)
	Diploma	29(2.7)	71(6.5)	56(5.2)
	Bachelor	157(14.5)	237(21.8)	214(19.7)
	Postgraduate	28(2.6)	11(1.0)	29(2.7)
Suffer from any chronic disease	**Yes**	35(3.2)	30(2.8)	14(1.3)
	No	214(19.9)	413(38.3)	372(34.5)
Monthly income	**< US$ 650**	70(8.4)	145(17.5)	94(11.3)
	US$ 650-1300	74(8.9)	115(13.9)	133(16.0)
	US$ 1300-2000	29(3.5)	30(3.6)	40(4.8)
	> US$ 2000	9(1.1)	20(2.4)	12(1.4)
Smoking	**Yes**	45(4.2)	48(4.4)	52(4.8)
	No	205(19.0)	393(36.4)	338(31.3)
History of coronavirus infection in self or family	**Yes**	141(13.0)	234(21.6)	2.09(19.3)
	No	109(10.0)	210(19.4)	182(16.38)

The reasons that motivate people to take the Corona vaccine were summarized in Figure 2. The main reasons for the people willing to get vaccinations were to eradicate the pandemic (31%) and fear for the relatives and friends from the disease (26.1%). While the reasons for refusing to take the vaccine were due to the side effects of the vaccine (29.2%), or to get natural immunity (28.8%), and some because they distrust vaccines (18.7%). Only 9.6% hesitate to get a vaccination due to global conspiracy beliefs. About more than a quarter of the participants (26.8%) worry about the effectiveness of the vaccine and thus they are not acceptable to take it (Figure 2). Table 3 shows some factors that affect the acceptability to take corona vaccines when become available, while Table 4 shows the impact of gender on attitude towards the Covid-19 Vaccine, and Table 5 shows the correlation between the profession and the infection of the family member with Coronavirus.

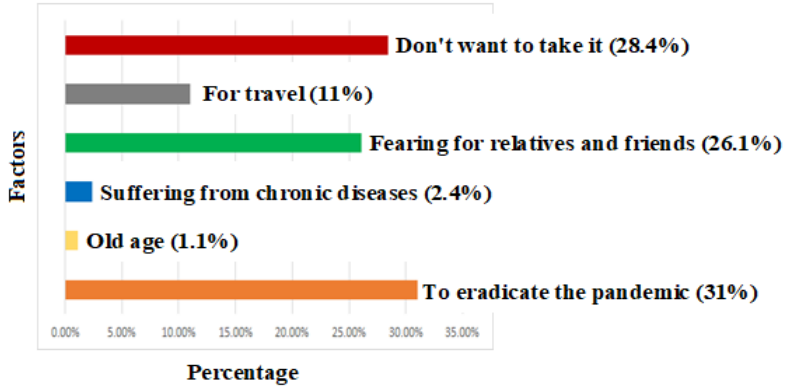

Fig 2: Factors that affect the acceptability to take corona vaccines

Table 3: Factors that affect the acceptability to take corona vaccines

Will you accept to take a vaccine against Corona when available?				
Variable		**Yes**	**No**	**Maybe**
		n (%)	**n (%)**	**n (%)**
Fearing for Relatives and Friends	Yes	143(14.1)	24(2.4)	189(18.6)
	No	105(10.3)	357(35.1)	198(19.5)
Side Effects and Vaccine Safety	Yes	138(12.8)	258(23.9)	273(25.3)
	No	110(10.2)	183(17.0)	116(10.8)
The Effectiveness of the Vaccine	Yes	89(8.3)	171(15.9)	185(17.2)
	No	159(14.7)	270(25.0)	204(18.9)

Table 4: Impact of Gender on Attitude towards the Covid-19 Vaccine

	Male (18.8%)	**Female (81.2%)**
Safety of COVID-19 vaccines in pregnancy	1.1%	3.6%
The belief that COVID-19 vaccines will lead to infertility	0.8%()	5.4%
Acceptability to take covid-19vaccine	5.6%()	17.4%

Table 5: The correlation between the profession and the infection of the family member with Coronavirus

Characteristics	**Yes**	**No**
Do not work	10.70%	13.30%
Government employee	8.00%	5.40%
Student	23.20%	18.70%
The employee in the private sector	7.50%	4.30%
Work in the medical field	1.50%	1.60%
Other than that	2.90%	2.70%

Reliance on social media and the internet (n= 956, 88.1 %) was the most popular source of knowledge about COVID-19 vaccines. TV shows, local news, and radio (n= 442, 40.7 %) were the next most common sources of information, followed by medical doctors, scientists, and government awareness campaigns (n= 437, 40.2 %) Table 6. Respondents who relied on social media sites (17.31%) were more likely to believe in a COVID-19 conspiracy than those who relied on medical physicians, health staff, and government awareness campaigns (6.3%). The rejection rate for getting a COVID-19 vaccine was highest among those who relied on the internet (42.4%) and social media (43.6%), and lower among those who relied on medical doctors and scientists (14.6%). The majority of respondents do not believe in the idea of an implantable microchip, and the vaccine which causes infertility, and the Internet and social media were the primary sources of knowledge (58.7% and 58.6%) Table 7. Figure 3 shows the concerns about the Corona vaccine, while Figure 4 shows the reasons for unwillingness to get the vaccine.

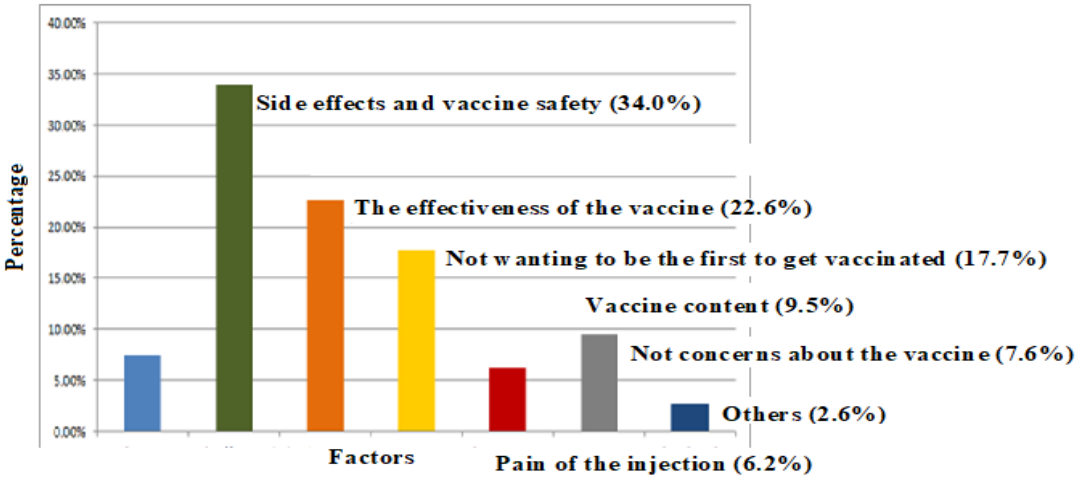

Fig 3: Concern about the Corona vaccine

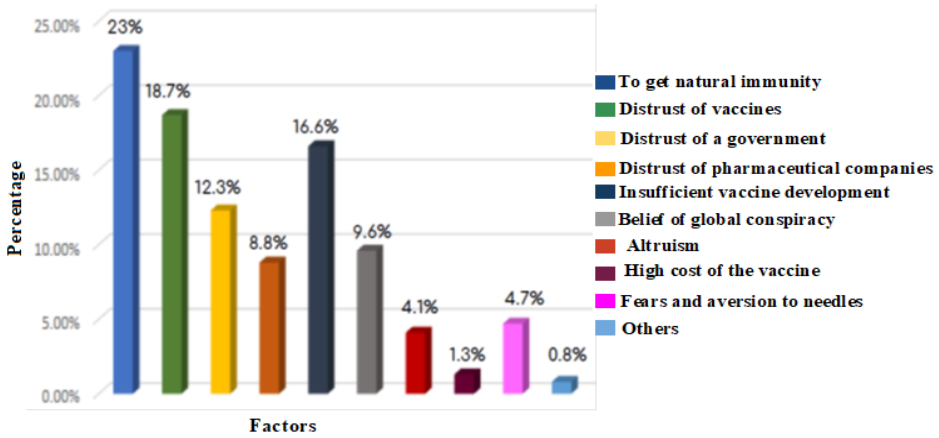

Fig 4: Reasons for unwillingness to get the vaccine

Table 6: The main sources of information regarding COVID-19 vaccines stratified by respondent demographics

Characteristic	Main Source of Information about COVID-19 Vaccines	Television	Radio	Newspapers	Internet	Social Media	Friends	Family Members	Health Staff	Government
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Age	< 20 years old	101(3.10)	33(1.00)	12(0.4)	219(6.8)	210 (6.5)	91 (2.8)	121(3.7)	89(2.8)	62(1.9)
	20-35 years old	172(5.30)	57(1.8)	24(0.7)	357(11.1)	357(11.1)	131(4.1)	151(4.7)	187(5.8)	94(2.9)
	36-50 years	79(2.40)	25(0.8)	7(0.2)	124(3.8)	113(3.5)	52(1.6)	46(1.4)	61(1.9)	58(1.8)
	Over 50 years old	40(1.20)	10(0.3)	3(0.1)	39(1.2)	40(1.2)	13(0.4)	15(0.5)	18(0.6)	16(0.5)
Gender	Male	77(2.4)	36(1.1)	19(0.6)	137(4.2)	111(3.4)	61(32.90	55(32.90	68(2.1)	42(1.3)
	Female	315(9.8)	89(2.8)	27(0.8)	602(18.7)	609(18.9)	226(5.89)	278(5.89)	287(8.9)	188(5.8)
Educational Level	School	80(2.5)	29(0.9)	7(0.2)	154(4.8)	151(4.7)	58(1.8)	71(2.2)	43(1.3)	38(1.2)
	Diploma	70(2.2)	23(0.7)	6(0.2)	87(2.7)	114(3.5)	42(1.3)	46(1.4)	43(1.3)	32(1.0)
	Bachelor	217(6.7)	66(2.0)	28(0.9)	446(13.8)	411(12.7)	168(5.2)	201(6.2)	238(7.4)	140(4.3)
	Postgraduate	25(0.8)	7(0.2)	5(0.2)	52(1.6)	44(1.4)	19(0.6)	15(0.5)	31(1.0)	20(0.6)

Table 7: The link between information sources and people's opinions about corona vaccines

Characteristic	Main Source of Information about COVID-19 Vaccines	Television	Radio	Newspapers	Internet	Social Media	Friends	Family Members	Health Staff	Government
		n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Acceptability to take COVID-19 vaccines when available	YES	88(12.7)	27(3.9)	15(2.2)	164(23.7)	n (%)	46(6.6)	73(10.5)	113(16.3)	54(7.8)
	NO	162(23.4)	55(7.9)	19(2.7)	294(42.4)	146(21.1)	126(18.2)	138(19.9)	101(14.6	81(11.7)
The belief that the Coronavirus vaccine will be a way to implant microchips to control humans	YES	31(5.1)	11(1.8)	4(0.7)	65(10.6)	302(43.6)	23(3.8)	30(4.9)	24(3.9)	16(2.6)
	NO	187(30.50)	63(10.3	26(4.2)	360(58.7)	66(10.8)	124(20.2)	143(23.3)	217(35.4)	133(21.7)
The belief that Coronavirus vaccines will lead to infertility	YES	23(5.8)	6(1.5)	2(0.5)	34(8.6)	332(54.2)	11(2.8)	15(3.)	12(3.0)	10(2.5)
	NO	108(27.4)	33(8.4)	15(3.8)	231(58.6)	41(10.4)	76(19.3)	80(20.3)	136(34.5)	86(21.8)
The belief that there is a global conspiracy	YES	81(9.5)	21(2.5)	8(0.9)	134(15.7)	205(52.0)	70(8.2)	70(8.2)	53(6.2)	41(4.8)
	NO	235(27.6)	77(9)	27(3.2)	440(51.6)	147(17.3)	165(19.4)	190(22.3)	188(22.1)	132(15.5)

DISCUSSION

The COVID-19's unexpected arrival and widespread distribution aided in the dissemination of a great deal of knowledge and misleading information about it, and many individuals still adopt this information about the COVID-19, and until now some believe that the COVID-19 is a lie or even a joke, and the most believed that it was made as a biological weapon. Many also say that the drug companies have made this virus to make profits when they manufacture a vaccine for it. Covid-19 disinformation is confusing its vaccine and making people hesitant to get vaccinated. Vaccine fear is now one of the negative consequences of COVID-19 myths and conspiracy. To the best of our knowledge, this is the first study on the knowledge, acceptability, and perception of the COVID-19 vaccine in Palestine.

This study identified the factors that influence the acceptance or refusal of the COVID-19 vaccine. In this large representative sample, most of the participants indicated hesitancy to be vaccinated against COVID-19 when it becomes available. People decline immunizations due to the claims that vaccines cause infertility or purpose to implant microchips to control and monitor humans, or they believe there is a global conspiracy, or due to the side effects and vaccine safety, and because they think that coronavirus is made by human to achieve political or economic goals. Social media sites have become a major and common source of health information. However, this study aimed to determine the overall rate of possible acceptance of COVID-19 vaccines in Palestine cities. Hebron received the most responses. Only 23% of those who responded to the survey said they would get vaccinated, while 40% said they would refuse the vaccine, this is an alarming rate. The lower acceptance rate for COVID-19 vaccines in Palestine can be explained by a high rate of conspiracy belief (implant microchips, the vaccine was created for political purposes), as well as dependence on social media sites to learn about the vaccine and the fear of becoming the first to take the vaccine. The overall acceptance rate for influenza vaccines has been low. Access barriers, fear of negative reactions, safety concerns, and a lack of motivation are all possible causes. Acceptance of the COVID-19 vaccine was also low in this study, which is understandable. The COVID-19 vaccine, on the other hand, has a slightly higher acceptance rate than influenza vaccines. This is due to people's positive desire to end the epidemic and return to normal life, as well as their fear of relatives and friends, and also their fear of the virus itself due to the high death rate. Also, age plays a significant role in whether or not people accept the vaccine, as the percentage of elderly people who want to take the vaccine is higher than the percentage of those who do not want to take it.

The rate of COVID-19 vaccine acceptance was higher among female respondents compared to males (81.2% vs. 18.8%). This might be because the number of female respondents to the questionnaire was more than males. In addition, females are less likely to believe that COVID-19 vaccines will lead to infertility and males were also less likely to think that the COVID-19 vaccines are safe in pregnancy. Several variables influence whether or not people support the Corona vaccine, one of which is fear for relatives and

friends from the disease, as some people decided to take it for this purpose, indicating the Palestinian community's closeness, altruism, and connections.

There is also concern about side effects, the safety of the vaccine, and its effectiveness, so the percentage of those who do not want to take it and may take it but are afraid is higher than the percentage of those who do want to take it. One of the reasons for this fear is social media, as there are many rumors, misinformation, and platforms that spread misleading info about the virus, and this is where government campaigns come in, as the percentage of people who receive information from reliable sources is very small when compared to the Internet. A high percentage of People who receive their information from social media and the Internet refuse to take the vaccine because it contains misleading information about covid-19 and the vaccine (e.g. lead to infertility, way to implant microchips, conspiracy beliefs), misinformation on social media has been found to propagate quicker than factually accurate knowledge and that misinformation may cause long-term attitudinal and behavioral changes even after a brief exposure. Thus, the high percentage of adoption of such beliefs shown in this study may be attributed to such mistrust. Another possible explanation for the adoption of such beliefs could be related to concerns about the perceived safety of the vaccine and the uncertainty regarding the benefits of COVID-19 vaccines. Others would argue that COVID-19 vaccines did not undergo extensive clinical trials and that the long-term side effects are still unknown, and for these reasons, they will abstain from getting the vaccine. In all cases, we need to raise awareness in the Palestinian community about the importance of taking vaccines to help reduce disease transmission and return to life as it was before the COVID-19 as most of the people think it is not acceptable for the government to force everyone to take the COVID-19 vaccine.

One of the goals of this study was to find a correlation between vaccine hesitancy and related conspiracy theories. Despite the lack of any evidence to support some claims (e.g., conspiracy plots to use vaccines to implant microchips into humans or believes that COVID-19 was the invention of humans), around one-quarter of the study sample believed in such misinformation. While such ideas may seem to be harmless, However, our findings show that they may have a significant negative public health effect due to their relation to vaccine hesitancy. A lack of trust in governments, vaccine manufacturers (pharmaceutical companies), and healthcare professionals can lead to the endorsement of conspiracy beliefs. The majority responded to the survey have a bachelor's degree. The high rate of acceptance of the vaccine among them was high; therefore there is a correlation between education and awareness regarding the vaccine. However, the vast percentage of those who answered no, and who were also students, could not be ignored, and this could be due to a lack of information and, a strong dependence on social media sites and the Internet especially among young people. Also, because the majority of the respondents to the survey are under the age of 35, and chronic illnesses are uncommon among them, the explanation for their refusal to take the vaccine may be that they would not show symptoms if they are infected and that the virus does not represent a danger to them as it does to the elderly, as it is generally believed that the virus does not affect young people very significantly. In general respondents with higher educational levels had a higher rate of vaccine acceptance, which might be related to their lower tendency to believe in conspiracies. Respondents with histories of chronic diseases were more likely to accept COVID-19 vaccination, which could be related to the higher rates of morbidity and mortality encountered by people with chronic disease. Additionally, a lower monthly income in Palestine was associated with higher rates of vaccine hesitancy. An important factor to consider when exploring vaccine acceptability is vaccine convenience in terms of its availability and affordability. In the background of the Covid-19 pandemic, it's important to reduce the effect of disinformation on the decision not to get vaccinated. Individuals receive misinformation from a variety of sources, including the media, social media, and people who are around them. Public health authorities and policymakers must continue developing proactive messaging and strategies before residents are vaccinated. On the other hand, excess information can lead to media fatigue, misinformation, and the spread of fake news.

The success of any vaccination program to achieve herd immunity depends on the vaccine acceptance and uptake rate. To achieve herd immunity, the vaccine hesitancy issue should be addressed. Conspiracy theories may lead to mistrust contributing to vaccine hesitancy. The factors that influence the acceptance of the COVID-19 vaccine were identified. Targeted and multipronged efforts will be needed to increase acceptance of a COVID-19 vaccine. While waiting for vaccines to arrive, continuous education should be conducted to increase understanding and to clear up any misunderstandings or misinformation about the vaccine. To date, there is no published article about the level of knowledge of the COVID-19 vaccine among the Palestinian population. By 7 October 2021, 46.4% of the world population has received at least one dose of a COVID-19 vaccine, 6.46 billion doses have been administered globally, and 23.06 million are now administered each day. Only 2.5% of people in low-income countries have received at least one dose. In Palestine 2.28 million doses were given, 1.16 million were fully vaccinated, and 24.2% of the population was fully vaccinated.[32] Another study about the knowledge,

attitudes, and acceptance toward the COVID-19 vaccine should be carried out especially after the vaccination of about a quarter of the population; this might affect the outcome of the survey. Therefore, we are going to do another research study taking into consideration the limitations of this study and the number and rate of vaccinated people in Palestine.

CONCLUSIONS

Vaccines are a key strategy to stop the escalation of the COVID19 pandemic. Different factors have been identified as precipitators for vaccine hesitancy which include conspiracy theories. Consistency of vaccine uptake was associated with gender and education, as for females or with increase education level for individuals increases the chance of accepting the uptake of the vaccine. A reliance on social media as the primary source of information about COVID-19 vaccines might be associated with vaccine hesitancy. Systematic interventions are required by public health authorities to reduce the levels of vaccines hesitancy and improve their acceptance. The low rate of acceptability vaccination is alarming to public health authorities and should stir further studies on the root causes and the need for awareness campaigns. Moreover, public health agencies should monitor and track the most frequently shared COVID-19 vaccine misinformation on social media. The main reasons for the people willing to get vaccinations were to eradicate the pandemic and fear for the relatives and friends from the disease. While the reasons for refusing to take the vaccine were due to the side effects of the vaccine, or to get natural immunity, and some because they distrust vaccines.

LIMITATIONS

One of the most obvious limitations in this study was the unequal distribution of respondents in different Palestine City, different age and gender groups. We began and finished the questionnaire before the vaccine's arrival and before the second wave of COVID-19, which is the most severe and quickest spread, and this may have affected the outcome.

Ethical Considerations

The study was approved by the Palestinian Ministry of Health (MOH). The identities of participants remained unknown and confidential; the data was only used for research purposes.

Conflicts of Interest and Financial Disclosure

The authors declare no competing financial interest and no conflicts of interest concerning the authorship and/or publication of this article.

Acknowledgment: The authors acknowledge the Palestinian MOH

REFERENCES

1. Kim, E., Okada, K., Kenniston, T., Raj, V. S., AlHajri, M. M., Farag, E. A., ... & Gambotto, A. (2014). Immunogenicity of an adenoviral-based Middle East Respiratory Syndrome coronavirus vaccine in BALB/c mice. *Vaccine*, *32*(45), 5975-5982.
2. Yu, P., Hu, B., Shi, Z. L., & Cui, J. (2019). Geographical structure of bat SARS-related coronaviruses. *Infection, Genetics and Evolution*, *69*, 224-229.
3. Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., ... & Tan, W. (2020). A novel coronavirus from patients with pneumonia in China, 2019. *New England journal of medicine*, 382(8), 727-733.
4. van Boheemen, S., de Graaf, M., Lauber, C., Bestebroer, T. M., Raj, V. S., Zaki, A. M., ... & Fouchier, R. A. (2012). Genomic characterization of a newly discovered coronavirus associated with acute respiratory distress syndrome in humans. *MBio*, *3*(6), e00473-12.
5. Madewell, Z. J., Yang, Y., Jr, I. M. L., Halloran, M. E., & Dean, N. E. (2020). Estimated transmissibility and severity of novel SARS-CoV-2 Variant of Concern 202012/01 in England. *medRxiv*, 1-13.
6. Worldometers. Covid-19 Coronavirus Pandemic; Coronavirus Cases. Available from: https://www.worldometers.info/coronavirus/. Accessed 9 March 2021.
7. Sturman, L. S., & Holmes, K. V. (1983). The molecular biology of coronaviruses. *Advances in virus research*, *28*, 35-112.
8. Wege, H., Siddell, S., & ter Meulen, V. (1982). The Biology and Pathogenesis of Coronaviruses. In: Cooper, M. (eds) Current Topics in Microbiology and Immunology. Current Topics in Microbiology and Immunology, 99. Springer, Berlin, Heidelberg. https://doi.org/10.1007/978-3-642-68528-6_5
9. Zhou, P., Li, Z., Xie, L., An, D., Fan, Y., Wang, X., ... & Li, Q. (2021). Research progress and challenges to coronavirus vaccine development. *Journal of medical virology*, *93*(2), 741-754.
10. Lai, M. M. (1990). Coronavirus: organization, replication and expression of genome. *Annual review of microbiology*, *44*(1), 303-303.
11. Pires, M. A., Crokidakis, N., Cajueiro, D. O., MAd, M., & Queirós, S. D. (2020). What is the potential for a second peak in the evolution of SARS-CoV-2 in Brazil? Insights from a SIRASD model considering the informal economy. *arXiv preprint arXiv:2005.09019*.
12. Spaan, W., Cavanagh, D., & Horzinek, M. C. (1988). Coronaviruses: structure and genome

expression. *Journal of General Virology*, *69*(12), 2939-2952.
13. Paul, E., Steptoe, A., & Fancourt, D. (2021). Attitudes towards vaccines and intention to vaccinate against COVID-19: Implications for public health communications. *The Lancet Regional Health-Europe*, *1*, 100012.
14. World Health Organization. Coronavirus disease (COVID-19). Available from: https://www.who.int/health-topics/coronavirus#tab=tab_1. Accessed 9 March 2021.
15. Li, Y. D., Chi, W. Y., Su, J. H., Ferrall, L., Hung, C. F., & Wu, T. C. (2020). Coronavirus vaccine development: from SARS and MERS to COVID-19. *Journal of biomedical science*, *27*(1), 1-23.
16. Badgujar, K. C., Badgujar, V. C., & Badgujar, S. B. (2020). Vaccine development against coronavirus (2003 to present): An overview, recent advances, current scenario, opportunities and challenges. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, *14*(5), 1361-1376.
17. Dubé, E., Laberge, C., Guay, M., Bramadat, P., Roy, R., & Bettinger, J. A. (2013). Vaccine hesitancy: an overview. *Human vaccines & immunotherapeutics*, *9*(8), 1763-1773.
18. WHO. The different types of COVID-19 vaccines. Available from: https://www.who.int/news-room/feature-stories/detail/the-race-for-a-covid-19-vaccine-explained. Accessed 9 March, 2021.
19. Thomas, K. (2020). New Pfizer Results: Coronavirus Vaccine Is Safe and 95% Effective. The New York Times. Available from: https://www.nytimes.com/2020/11/18/health/pfizer-covid-vaccine.html. Accessed 15 March, 2021.
20. Kim, J. H., Marks, F., & Clemens, J. D. (2021). Looking beyond COVID-19 vaccine phase 3 trials. *Nature medicine*, *27*(2), 205-211.
21. Shin, M. D., Shukla, S., Chung, Y. H., Beiss, V., Chan, S. K., Ortega-Rivera, O. A., ... & Steinmetz, N. F. (2020). COVID-19 vaccine development and a potential nanomaterial path forward. *Nature nanotechnology*, *15*(8), 646-655.
22. Centers for Disease Control and Prevention. COVID-19. Different COVID-19 Vaccines. Available from: https://www.cdc.gov/coronavirus/2019-ncov/vaccines/different-vaccines.html. Accessed 9 March 2021.
23. Cohen, J. (2020). Vaccine designers take first shots at COVID-19. *Science*, 3, 368(6486), 14-16. doi: 10.1126/science.368.6486.14.
24. Dhama, K., Sharun, K., Tiwari, R., Dadar, M., Malik, Y. S., Singh, K. P., & Chaicumpa, W. (2020). COVID-19, an emerging coronavirus infection: advances and prospects in designing and developing vaccines, immunotherapeutics, and therapeutics. *Human vaccines & immunotherapeutics*, *16*(6), 1232-1238.
25. Calina, D., Docea, A. O., Petrakis, D., Egorov, A. M., Ishmukhametov, A. A., Gabibov, A. G., ... & Tsatsakis, A. (2020). Towards effective COVID-19 vaccines: Updates, perspectives and challenges. *International journal of molecular medicine*, *46*(1), 3-16.
26. World Health Organization. (2019). Ten threats to global health in 2019. Available from: https://www.who.int/news-room/spotlight/ten-threats-to-global-health-in-2019. Accessed 15 May, 2021
27. Soares, P., Rocha, J. V., Moniz, M., Gama, A., Laires, P. A., Pedro, A. R., ... & Nunes, C. (2021). Factors associated with COVID-19 vaccine hesitancy. *Vaccines*, *9*(3), 300. https://doi.org/10.3390/vaccines9030300
28. Eskola, J., Duclos, P., Schuster, M., & MacDonald, N. E. (2015). How to deal with vaccine hesitancy?. *Vaccine*, *33*(34), 4215-4217.
29. Dubé, E., Bettinger, J. A., Fisher, W. A., Naus, M., Mahmud, S. M., & Hilderman, T. (2016). Improving Vaccination Rates: Vaccine acceptance, hesitancy and refusal in Canada: Challenges and potential approaches. *Canada communicable disease report*, *42*(12), 246-251. doi: 10.14745/ccdr.v42i12a02.
30. Montagni, I., Ouazzani-Touhami, K., Mebarki, A., Texier, N., Schück, S., & Tzourio, C. (2021). Acceptance of a Covid-19 vaccine is associated with ability to detect fake news and health literacy. *Journal of public health (Oxford, England)*.
31. Malik, A. A., McFadden, S. M., Elharake, J., & Omer, S. B. (2020). Determinants of COVID-19 vaccine acceptance in the US. *EClinicalMedicine*, *26*, 100495.
32. Global Change Data Lab; Our World in Data. Statistics and Research: Coronavirus (COVID-19) Vaccinations. Available from: https://ourworldindata.org/covid vaccinations?country=OWID_WRL. Accessed 7 October 2021