Review Article

Acceptance of COVID-19 vaccine among the general population; A systematic review

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Abstract

Background:

Vaccination is the best strategy to prevent the transmission and spread of some diseases, including the COVID-19. Various COVID-19 vaccines are now available with high efficacy and safety, and they proved their efficacy to reduce the mortality rate due to COVID-19. However, the uptake of the general population to the vaccine is still low.

Aim:

To assess the level of COVID-19 vaccine acceptance among the general population by reviewing the previous studies conducted on this subject.

Methods:

PubMed and Google scholar databases were explored starting from 2021 till 2022. The search terms included "Acceptance, COVID-19 vaccine, Attitude, General population, Acceptance rate, COVID-19 vaccination," which were used in a variety of combinations to obtain all possible articles. The inclusion criteria were original articles in English Language where the research was conducted among the general population and reported the acceptance of the general population regarding the COVID-19 vaccine.

Results:

A total of 1641 articles were obtained; eight articles met the inclusion criteria and were included in our analysis. The eight studies included a total number of 22938 participants and were conducted in eight different countries. The range of acceptance rate was 37.4% to 79.8%.

Conclusion:

There was a moderate acceptance rate of the general population regarding the COVID-19 vaccine. The factors associated with vaccine acceptance were either related to the individuals or the vaccine. Increasing the knowledge of the general population about the COVID-19 vaccine is the key factor to increasing the acceptance rate.
**Keywords:** Acceptance, Attitude, COVID-19 vaccine, General population.

**Introduction:**

The Coronavirus disease of 2019 (COVID-19) has resulted in major effects on the global health and economies of the countries since its emergence [1]. COVID-19 was declared a global pandemic in early 2020 by the WHO [2]. Although different treatment strategies have been employed to manage the disease, the number of cases and deaths continue to increase [1].

The vaccine is a successful measure to reduce and prevent numerous infections [3]. Therefore, an effective and safe vaccine for COVID-19 is critical and necessary for controlling the pandemic [4]. Multiple vaccines have been developed and tested in various clinical trials across diverse populations. There have been almost 85 vaccine candidates in the clinical phase and 184 in the preclinical phase in the first quarter of 2021 [5].

The US Food and Drug Administration issued the first emergency use authorization (EUA) on 11 December 2020 for a vaccine for the prevention of COVID-19 in individuals 16 years old and older [6].

Twenty-three vaccines had advanced to stage three in the clinical trials by 25 June 2021 [7]. The EUA permits the distribution of the Pfizer-BioNTech COVID-19 vaccine in the US as the first COVID-19 vaccine in the world [8]. Other countries followed and issued approval, while other vaccine candidates were arriving at the horizon. Four of the vaccines reaching the fourth phase of clinical testing were licensed in many countries; these vaccines included two mRNA vaccine platform, which was developed by Moderna, BioNTech RNA Pharmaceuticals and Pfizer, and the National Institute of Allergy and Infectious Disease. The third vaccine used the novel Chimpanzee adenovirus-vectored platform that was developed by AstraZeneca and the University of Oxford, whereas the fourth vaccine used inactivated virus, which was developed by Sinovac and Butantan institute [9,10].

Although the vaccine is the most effective method for infection prevention and protection against diseases, the success of the vaccination process is mainly dependent
on the uptake of the vaccine, and vaccination uptake must be high [11]. A high rate of vaccination is also necessary for achieving herd immunity to reduce the transmission of COVID-19 and create a reduced risk of infection among the general population [12-14]. The vaccination rate among the general population should be as high as 82.5% to reach herd immunity [15]. Therefore, this systematic review was performed to explore the prevalence of acceptance of the COVID-19 vaccine and determinant factors among the general population by reviewing previous literature conducted on the current subject and met our criteria.

Method and search strategy:

Following the PRISMA checklist guidance for systematic review and meta-analysis [16] was adopted to write this systematic review. Both Google Scholar and PubMed databases were explored and used for the searching process for scientific articles related to our current subject. The searching process included searching for articles published between the years 2021 and 2022. Several keywords were involved in the searching process, including "Acceptance, COVID-19 vaccine, Attitude, General population, Acceptance rate, COVID-19 vaccination." The previous keywords were used in various combinations to obtain all possible articles related to our subject.

Eligibility criteria:

All the titles produced from our primary exploration were revised; articles which conducted before the COVID-19 pandemic and investigated the acceptance regarding other vaccines were excluded, and articles assessed COVID-19 vaccine acceptance and didn't focus on the general population, as well as articles reported other items additional to acceptance of vaccine were also excluded. Therefore, the remaining articles were articles that reported the acceptance of the general population regarding the COVID-19 vaccine. These articles were further screened, and articles written in non-English language as well as non-original articles such as review articles, systematic review, meta-analysis, and letters to the editor were all excluded. The remaining articles were original articles conducted on our current subject; these articles were further involved in the second step, which was deciding on the inclusion
criteria to select the eligible studies. Abstracts were assessed manually to select the relevant studies for revision. The inclusion criteria were full-text articles that stated the study design containing full data. On the other hand, non-available full-text articles, duplicate articles, articles that didn't state the study design, and studies that were overlapped or incomplete data were all excluded. The full description of the search strategy is shown in figure 1.

Fig1: Planning of Eligible criteria

Data review and analysis:

Stage one in the data review included a preliminary review for the abstracts of included articles and then reviewing the full text to extract the data and information of concern. A specially designed excel sheet was used for data extraction. Chosen data from eligible research articles were then revised via the excel sheet and then
transferred to a pre-designed table to summarize the collected data under specific titles.

Results:

This systematic review included eight articles that met the eligible criteria [17-24] (table1). One study was published recently in 2022 [17], whereas the remaining seven articles were published in the previous year in 2021 [18-24]. All studies were cross-sectional, and all studies were conducted on the general population. The total number of participants in the included studies was 22938, the least sample size was 605 [19], and the largest sample size included 7357 participants[18]. All studies were conducted on the adult population with an age range of 18-100 years [19]. Males were more dominant compared to females in three studies[17, 18, 19], with rates ranging between 56.4%[17], and 65.59 %[18], with a total rate of 49.2%, whereas females were more dominant in the remaining five studies [20-24], with a rate ranging between 65%[23], and 79.4%[24] and a total rate of 50.8%. One of the eight studies was multi-countries and included four countries of South Asia; Bangladesh, India, Pakistan, and Nepal [17], whereas the remaining seven studies were conducted in six countries, where two studies were from Bangladesh [18, 19], and one study from each of Russia [20], Jordan[21], Kuwait[22], Pakistan[23], and Iraq [24].

Regarding the main findings of the included studies, all studies reported two main findings; the willingness to take the vaccine or the acceptance rate and the factors associated with vaccine acceptance. The acceptance rate varied between the studies and ranged between 79.8% [18] to 37.4% [21]. There were six studies that reported an acceptance rate equal to or higher than 50%[17, 18, 19, 22, 23, 24], whereas two studies reported an acceptance rate lower than 50%[20, 21].

One study further reported that among 61.16% who accepted the vaccine; there was 35.14% showed the willingness to take the COVID-19 vaccine immediately, whereas 64.86% would delay the vaccination until they are confirmed about the efficacy and safety of the vaccine[19]. Another study reported that among 77.6% who accepted the vaccine administration, 64.3% reported that they would wait for some time before taking the vaccine[24]. Another study showed that acceptance increased for a vaccine with verified safety and effectiveness and increased from 41.7% to 63.2% [20]. Moreover, one study showed that the intentions of respondents were modified by
some factors, including the perceived destructive impact of COVID-19, concern about possible side effects, and positive perception of vaccines[17].

The factors that affected the acceptance of participants were various and included age[17, 18, 19, 21, 24], sex[17, 19, 20, 21, 22, 23], marital status[17, 18], education[17, 18, 23, 24], co-morbidities[17], worry about getting infected[17, 19], perceived COVID-19 impact [17], monthly income[18, 20], having family members diagnosed with COVID-19[18, 24], presence of chronic disease[18], previous vaccination [18, 19, 21, 22, 24], residence place [18, 19], the severity of infection[19], having higher knowledge about COVID-19 [19], positive trust in the healthcare system [20], occupation [21, 24], self-perceived chances of contracting the infection [22], recommendation by physicians, family members and friends [23].

Older age was associated with acceptance of the vaccine [18, 21], students were more likely to accept the vaccine [18], and postgraduates[23], residence in rural areas[18], male gender [20, 21, 22, 23], taking seasonal influenza [21, 22, 24], and being employed [21].

The previous factors were related to the individuals; there are factors relating to the vaccine affecting vaccine acceptance, including belief regarding vaccine efficacy[17, 20], and safety[21], positive attitude towards mandatory measures, vaccine availability [17], having higher knowledge about vaccination[19], having willing to pay for vaccine[21], studies proving safety and efficacy of the vaccine if declared mandatory by affiliated institute or company, way of administrating other than injection[23],

Factors associated with less willingness to take the vaccine also can be considered as barriers for vaccine acceptance, and they were fewer compared to factors associated with willingness to take the vaccine, so they weren't classified into categories. Therefore the barriers of COVDI-19 vaccine acceptance, including thinking of a conspiracy behind COVID-19, not trusting any source of information on the COVID-19 vaccine[21], being unconcerned about side effects[20], the effectiveness and safety of the vaccination [20, 23], side-effects of the vaccine[23], and having health-related risks [22].

Discussion:
Vaccination is a highly effective strategy to reduce severe illness and mortality of some diseases, including COVID-19 disease [25]. The COVID-19 vaccine is considered to be safe and has low risks of severe adverse events [26-28]. However, low uptake of the vaccine is a major threat to the influence of vaccination for preventing COVID-19 severe symptoms and mortality [25]. The uptake of the COVID-19 vaccine is low; only 0.9% of the general population in low-income countries have received at least one dose of the COVID-19 vaccine[29]. Populations across the world have concerns regarding the safety and side effects of COVID-19 vaccines [30-32]. So, we conducted this systematic analysis. In our analysis, we included studies conducted on the general populations, and as the most recent studies conducted on this subject were published in the current year (2022) and the previous year (2021) only as general populations represent the large majority in the world, and there was a previous systematic analysis conducted on the general population and published in 2021[33], so we wanted to investigate the acceptance rate of the general population and identify if it was changed.

In our analysis, the acceptance rate among the general population in the included studies was varied between different countries and regions, and it was ranged between 37.4% [21]to 79.8%[21], where six studies reported an acceptance rate higher than 50%. This reflects good acceptance and promising findings that the acceptance rate among the general population exceeded fifty percent. A previous systematic analysis conducted on the general population showed that the acceptance rate was varied between different countries, which was also found in our analysis, and it was found that the highest hesitancy was found in Arabian countries [33]. In our analysis, three studies were from Arabian countries, including Jordan [21], Kuwait[22], and Iraq[24]. The acceptance rates in the previous studies were 37.4%, 53.1%, and 72%, respectively. This variation in the acceptance rate between Arabian countries can be suggested to be related to different factors that can be further investigated.

In a global survey of potential acceptance of COVID-19 vaccine that surveyed 13426 individuals in 19 countries, it was reported that there were variations in the acceptance rates between the different countries, and it ranged from 55% to 90%. It was found that the total acceptance rate was 71.5% among all participants[34]. Another report investigated the acceptance of the COVID-19 vaccine in ten low and middle-income countries and included 44260 individuals. It was found that there was higher
acceptance to administrate the vaccine in low and middle-income countries compared with the United States and Russia[4]. In our analysis, the acceptance rate in Russia was only 41.7% [20], which was lower than the acceptance rate reported from Kuwait [22] and Iraq [24].

It is necessary to identify the factors associated with acceptance of the COVID-19 vaccine and the barriers to receiving the vaccine. The factors associated with COVID-19 vaccine acceptance included gender (male), age (older age), worrying about getting infected, having a family member diagnosed with COVID-19, occupation status, and previous vaccination (influenza vaccine). The previous factors were the major factors associated with the acceptance of the COVID-19 vaccine, and they were associated with the individuals themselves. The factors associated with the COVID-19 vaccine were less reported, and they included belief regarding the safety and efficacy of the vaccine, positive attitude toward the vaccine, and higher knowledge about vaccination. These factors reflect that the acceptance rate of individuals can be increased by increasing their information about the vaccine and correcting their information about the safety and efficacy of the vaccine. One study showed that the intentions of individuals were changed by their concerns about possible side effects and positive perception of the vaccine [17].

The factors associated with the low acceptance rate and the barriers for administrating the vaccine were also less reported. Concerning the effectiveness and safety of the vaccine, having health-related risks, side effects of the vaccine, and not trusting any source of information on COVID-19 vaccine. However, these factors also confirm our previous suggestion for the need to increase the knowledge about the individuals about the COVID-19 vaccine and correct their misconception.

In a previous systematic analysis, various factors were reported to increase the hesitancy rate and reduce the willingness to COVID-19 vaccine, including the negative perception of vaccine safety, efficacy and convenience, female gender, younger age, and less education [33], which were in agreement with our findings. A series of online surveys that included a total of 25 separate national samples showed that the female gender and worrying about the COVID-19 virus were associated with the state of vaccine acceptance [35]. There was an agreement with our findings regarding worrying about COVID-19, whereas the female gender in our analysis was
associated with lower acceptance of the vaccine. The lack of trust in authorities was associated with a lack of acceptance, as reported in one study reported acceptance in eight Western democracies countries [36]. This finding highlights the need for increasing the trust of individuals about the authorities and the vaccine in order to accept vaccination.

**Conclusion:**

There were varied rates of COVID-19 vaccine acceptance between different countries; however, the total level was acceptable, and there was a moderate acceptance rate of the general population regarding the COVID-19 vaccine. However, further analysis on the Arabian countries is needed to compare the acceptance rate between the Arabian countries and other countries. The identification of the factors associated with vaccine acceptance and barriers to administrating the vaccine is important to modify and correct the factors that can be changed to increase the acceptance of the general population. The factors associated with higher acceptance included older age, male gender, occupation, previous administration of seasonal influenza, having a family member diagnosed with COVID-19, and worrying about getting the infection, whereas concerns about the effectiveness, side effects, and safety of the vaccine were the major barriers and factors associated with lower acceptance. However, having knowledge and attitude as well as the belief toward the safety of vaccines were associated with higher acceptance. Therefore, increasing the knowledge of the general population about the COVID-19 vaccine is the key factor to increase the acceptance rate.

**Conflict of interests:**

The authors declare that there is no conflict of interest regarding the publication of this article.

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