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Vaccine Refusal and Hesitancy among Iranians Participated in the National COVID-19 Vaccine Hesitancy Survey: A Qualitative Study

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Abstract

Background: Success in COVID-19 vaccination depends on understanding why people refuse or hesitate to take the vaccine. This study aims to explore vaccine refusal and hesitancy among Iranians who participated in the national COVID-19 vaccine hesitancy survey.

Methods: A qualitative content analysis approach was used. Twenty-six participants were selected by purposive sampling. In-depth, semi-structured telephone interviews were conducted during the year 2022. A directed content analysis approach was used for analyzing the data by extracting the codes, subcategories, and categories.

Results: Four major categories and their respective subcategories related to refusal and/ or hesitancy against COVID-19 vaccination emerged: "lack of confidence" (distrust in policymakers and pharmaceutical companies, distrust in national media, belief in conspiracy theory, and lack of confidence in the vaccine's safety and effectiveness), "complacency" (Fatalism and philosophical beliefs, low perceived risk, and belief in the adequacy of the precautionary principles), "constrains" (personal and psychological barriers), and "coercion" (coercion by relatives and unsteady imposed mandatory vaccination by the government).

Conclusion: Distrust, fatalism, low perceived risk, and overconfidence in traditional Persian medicine were important barriers to COVID-19 vaccine acceptability needing a variety of measures for improving COVID-19 vaccine uptake, including enhancing public trust in government and policymakers, clarifying vaccine safety and effectiveness, dealing with religious fatalism, and regulating anti-science messages on social media.

Keywords: Vaccine hesitancy, Vaccine Refusal, COVID-19, Qualitative Research, Iran

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Introduction

Vaccines are one of the most effective tools for protecting individuals against preventable diseases such as COVID-19 (1). While behavioral measures such as isolation, facial covering, hand-washing, and physical distancing have controlled to some extent the spread of the virus, vaccines are preferred as the best way to control the COVID-19 pandemic (2). Despite strong recommendations to receive the COVID-19 vaccine, there is still considerable variation in vaccine acceptance in countries and people with different socioeconomic and sociodemographic characteristics (3, 4).

There is a continuum of vaccine acceptance, from those

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↑What is "already known" in this topic:
Despite strong recommendations to receive the COVID-19 vaccine, there is still considerable variation in vaccine acceptance in the population.

→What this article adds:
The current study highlights distrust, fatalism, low perceived risk, and overconfidence in traditional Persian medicine as important barriers to COVID-19 vaccine acceptability.
COVID-19 vaccine hesitancy is being promoted by an anti-vaccine movement targeting social media that has spread dangerous, misleading information about the vaccine risks.

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who accept all recommended vaccines to those who strongly oppose all vaccines. The term 'vaccine-hesitant' refers to people who are not sure or unwilling to receive recommended vaccines despite the availability of vaccination services. By contrast, vaccine-refusal individuals are very unlikely to change their vaccine behavior. It is important to understand why individuals are hesitant or refuse to get vaccinated (5).

Many studies have reported numerous factors leading to refusal and/ or hesitancy toward vaccination. At the individual level, different sociodemographic factors (e.g., age, gender, socioeconomic status, geographic location) and many other factors (e.g., low perceived risk, concern about vaccine safety and effectiveness, belief in alternative preventive measures, and negative experiences with vaccination) are related to suboptimal vaccination (2, 5, 6). Vaccine refusal or acceptance is strongly context-dependent and the political, social, economic, and cultural factors may have an important impact on making decisions about vaccination (7).

Some people are ideologically opposed to the vaccine because of the governmental policy regarding COVID-19 in some countries (8, 9). Approximately one-third of those not planning to be vaccinated against COVID-19 are vaccine deniers (9) based on believing conspiracy theories (10-12). Many people understand the necessity of a COVID-19 vaccination but have safety or effectiveness concerns arising from the rapidity of vaccine production (2, 13). Some individuals intend to let others receive the vaccination, and in this way, they would protect through herd immunity (14). Unfortunately, some young and healthy individuals have low perceived risk and believe that they are not at risk for COVID-19 (12, 15) but this is a misplaced perception because long-term consequences occurring in survivors of COVID-19 remain a concern (16, 17).

Misinformation, spiritual or religious beliefs, structural barriers, previous personal experience of COVID-19, distrust in government, no trust in drug companies, and widespread social media spreading false rumors about the COVID-19 vaccine side effects are additional influential factors for vaccine refusal and hesitancy (18-24).

The Global endeavors to understand vaccine hesitancy have been focused on the WHO–SAGE (Strategic Advisory Group of Experts) working group whose main outcome was the "Three C model," claiming that vaccine hesitancy is influenced by factors including a lack of confidence, complacency, and convenience (25). Based on the above determinants and in accordance with the 3 C model (confidence, complacency, convenience), another psychological profile was proposed by Betsch et al. in 2015 called "rational calculation" (26). Behaviors of people related to vaccine refusal and vaccine hesitancy make crucial derangements in vaccination coverage. This study aimed to explore causes of vaccine refusal and/ or hesitancy against COVID-19 vaccination among those who have not received any type of COVID-19 vaccine and those who don't intend to receive the next/ booster doses of the vaccine in a widespread geographic area including 23 out of 31 Iran's provinces.

Methods

Study Design and Sample

This study was part of the national COVID-19 vaccine acceptance survey whose data collection was conducted from nine to 16 April 2022, in which participants were selected through a stratified random sampling with probability proportional to the size of each province from the general population of Iran (Iranian aged 18 years and over) who registered in the integrated health system. The Ethics Committee of the National Institute for Medical Research Development (NIMAD) approved the study protocol (Ethics code: IR.NIMAD.REC.1400.101). For the qualitative part of the study, participants were selected by purposive sampling based on their words in the national survey stating that they didn't receive any COVID-19 vaccine or didn't want to receive the next/booster dose of the COVID-19 vaccine.

When selecting the participants, the maximum variation in terms of age, gender, education, and place of residence was considered. The inclusion criteria were the person's participation in the national COVID-19 vaccine acceptance survey and willingness to be contacted again and have a more complementary interview. No exclusion criteria were predicted unless changing the participants' decision on using their words stated in the interviews for the aims of the study. Finally, data saturation was reached with Twenty-six participants, as the researcher didn't find any additional information in the last three interviews, compared with previous ones. The characteristics of the participants are presented below (Table 1).

Data Collection

The main researcher (H.N) conducted in-depth, semi-structured telephone interviews for data gathering from May 2 to September 16, 2022. from May 2 to September 16, 2022. The interview questions were as follows: "What is the most important reason you haven't received the Corona vaccine yet?" "What is the most important reason for your delay getting the next vaccination/booster dose?" "In your opinion, what factors have contributed to the control of Corona in Iran?" and "What are your thoughts on other vaccines and immunizations during childhood (except the COVID-19 vaccine)?" For deeper understanding, we used probing questions such as "Please explain more" and "Can you bring an example?"

Telephone interviews were conducted in a quiet place and at a time predetermined by the interviewees. The duration of the interviews varied from 30 to 60 minutes, and interviews continued until data saturation. The interviews were recorded using a voice recorder and, if necessary, also important points were noted by the researcher.

Data Analysis

The data were analyzed using the directed content analysis method according to the steps: condensing, coding, categorizing, abstracting, and extracting themes (27). A directed approach to content analysis was used because the 3 C model, as a comprehensively accepted one, framed the theoretical basis of the study (25). The 3C model guides

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Table 1. Participants characteristics (n=26).

Participant number	Vaccination dose/s	Gender	Age (year)	Educational level	Place of residence	Province
P1	0	Female	32	Diploma	City	Isfahan
P2	0	Male	43	Diploma	City	Ilam
P3	3	Male	51	Diploma	City	Markazi
P4	0	Male	43	Diploma	City	Kerman
P5	0	Female	34	Illiterate	City	Tehran
P6	2	Female	48	Middle school	City	Markazi
P7	0	Female	26	Middle school	Rural	Alborz
P8	0	Female	23	Diploma	Rural	Fars
P9	1	Female	29	Associate Degree	City	Gilan
P10	0	Female	35	Diploma	City	Zanjan
P11	0	Male	34	Middle school	City	West Azerbaijan
P12	0	Male	50	Diploma	City	Kurdistan
P13	0	Male	43	High school	City	Mazandaran
P14	2	Female	41	Diploma	City	North Khorasan
P15	2	Male	40	High school	City	Kermanshah
P16	0	Female	40	Diploma	City	Razavi Khorasan
P17	2	Male	48	Master's degree	City	Mazandaran
P18	0	Female	36	Illiterate	Rural	Sistan and Baluchestan
P19	0	Male	57	Associate Degree	City	Makazi
P20	2	Male	40	Bachelor's Degree	City	Isfahan
P21	0	Male	32	Bachelor's Degree	City	Qazvin
P22	1	Female	52	Primary school	City	Hamedan
P23	0	Female	35	Master's degree	City	Semnan
P24	1	Female	65	Primary school	City	East Azerbaijan
P25	2	Female	36	Diploma	City	Ardabil
P26	1	Female	28	Middle school	Rural	Bushehr

policymakers towards three main factors (confidence, complacency and convenience) hindering vaccine uptake, thereby enabling them to identify the key barriers within the particular group. The transcripts were read several times with great care and patience by two researchers in order to achieve a general understanding of the meaning. Initial codes including words, sentences, or paragraphs suggesting an important meaning or concepts corresponding to the aim of the study, were extracted. The codes were assigned to different categories based on differences and similarities and transferred in the margin of the text.

Trustworthiness

To improve the trustworthiness and quality of data and results, adequate time was allotted to data collection. Maximum variation in sampling was considered. Furthermore, at the end of the interview, general interpretations of the participants' experience were stated briefly by the researcher and confirmed. Also, the investigators were exposed long-term to the data (prolonged engagement). The researcher considered peer checks to promote credibility. Moreover, we provided a thick and rich explanation of the findings supported by participants' quotations.

Ethical considerations

In order to comply with the ethical principles of research, informed verbal consent was obtained from all participants. They were told there was no compulsion to participate in the study, and they could end the interview and withdraw from the study whenever they wanted. Unnecessary questions that would provoke emotional reactions were not asked. Participants were also assured that their names would remain confidential when the results were published.

Results

The data analysis resulted in four categories and eleven subcategories (Table 2). The categories were organized as follows: "lack of confidence, complacency, constraints, and coercion."

Lack of confidence

One of the most important reasons for not getting the vaccine was "lack of confidence." This category was formed of subcategories "distrust in policymakers and pharmaceutical companies", "distrust in national media", "belief in a conspiracy theory", and a "Concern about vaccine's safety and effectiveness."

Distrust in policymakers and pharmaceutical companies

Most participants mentioned that distrust in policymakers, the government, and their decisions and the financial gain of pharmaceutical companies were common facts that made them refuse and/ or hesitate to vaccination. Hidden economic-political motivations of the policymakers and the pharmaceutical companies, rapid vaccine development, and urgent approval of the COVID-19 vaccines compared to childhood vaccines were key reasons for this mistrust. One participant stated:

"The government, the Ministry of Health, and the pharmaceutical companies created a market for themselves through these vaccines … … … Iranian vaccines are also not known at all. Some say that these are fake, no tests have been done, no vaccine has been produced … … …" (p2).

Distrust in national media

Many participants had doubts about the statistics of morbidity and mortality declared by the national media. They said that the national media was at the service of the government and propagated their policy. As one participant

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Table 2. Categories and subcategories

Categories	Subcategories
Lack of confidence	Distrust in policymakers and pharmaceutical companies
	Distrust in national media
	Belief in conspiracy theory
	Concerns about vaccine's safety and effectiveness
Complacency	Fatalism and philosophical beliefs
	Low perceived risk
	Belief in the adequacy of the precautionary principles
Constraints	Personal barriers
	Psychological barriers
Coercion	Coercion by relatives
	Unsteady imposed mandatory vaccination by the government

stated:

"I don't trust the government and the statistics of infected and dead people they announce. Because of political issues, they increase and decrease the statistics whenever they like … … …" (p4)

Belief in conspiracy theory

Some participants believed in conspiracy theories such as Nano/microchips entering, gene change, genocide, world population reduction, human control through vaccines, man-making virus, and the bioterrorism goals behind it. Participant No. 20 stated:

"Money and power are in the hands of secret organizations that greatly influence political decisions … … … It's a game and, usually, the politicians don't tell us about the true motives for their decisions."

Another participant added:

"Corona was man-made and was created to force people to get the vaccination and to carry out mass sterilization. This disease and virus were a plot to bioterrorism goals, control humans, and harvest or change in DNA." (p19)

Concerns about vaccine's safety and effectiveness

Another key reason to refuse and/ or hesitate regarding vaccination was concern about vaccine safety. They expressed concern that vaccines have not been adequately tested, and potential short and long-term side effects and possible vaccine-related adverse effects cannot be denied. One participant said:

"Look, they don't make a vaccine that is compatible with everyone's body. One gets it, shows complications, and one gets nothing … … … Someone says that if you take a vaccine, your hair will fall out, someone says that you will become infertile, and many other things. Seeing these, I prefer not to vaccinate than to vaccinate and wait to see what will happen to me." (p5)

Further, most of the participants reported they were not confident in the effectiveness of the vaccine in the prevention of disease or death. Participants explained:

"If the vaccine was effective, why wouldn't the coronavirus subside, and people still die from it? Everyone who got the vaccine got infected with the Corona again. Why, when we got the childhood vaccines, no one else got those diseases? Why after vaccination, did no children die from polio or whooping cough? This means that those vaccines were effective, but in the case of the Corona vaccine, nothing like this can be seen." (p16)

Complacency

Complacency or self-sufficiency makes people think they are enough to deal with the disease and do not feel the need to receive vaccines. Subcategories "fatalism and philosophical beliefs", "low perceived risk", and "belief in the adequacy of the precautionary principles" lead to this category.

Fatalism and philosophical beliefs

Other features of Iranian society preventing them from getting COVID-19 vaccines and noncompliance with preventive behaviors were fatalism and philosophical beliefs. Participants believed in being protected by God and stated that illness is a punishment by God for sin and the results of our wrong or sinful behaviors, and he sends sickness to send a message to us.

Participants said:

"Corona was a divine test … … … I believe that my fate is one hundred percent in the hands of God, and, when the time comes, whether I get Corona or be in a sweet sleep, I will fly to him." (p16)

One participant believed that with alternative approaches through metaphysics and energy medicine, healers can channel healing energy into a patient and get positive results:

"It is true that a Coronavirus and disease exist, but if instead of the virus, we focus on the body of the host, which is us, our progress will be much better … … … In my opinion, applying the power of thoughts and emotions and intrinsic connections of them with physiological functions and, manipulation or use of energy fields that penetrate the human body could be promoted and positively influence our physical health and healing."(p20)

Low perceived risk

Furthermore, the low perceived and severity risk of getting infected with COVID-19 was a further reason reported for the rejection of the vaccination. Participants stated that the risk of contracting the disease, suffering severe type, and the occurrence of complications after contracting COVID-19 are low in them.

Moreover, some people emphasized that they had enough strong immune systems to deal with a possible infection. According to their statements, by reinforcing the immune system through prior infection with COVID-19, strengthening their immune system via traditional Persian medicine, preventive and supportive measures like a change in lifestyle, having a balanced diet, and taking supplemental vitamins and herbs such as Thymes or Stachys lavandulifolia, there is no need to receive vaccine:

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"Since the beginning of this disease, I have promised myself to stand up to it. I said that if I can strengthen my immune system, I will succeed. So I changed my lifestyle, eating a lot of fruits, using a lot of vitamins D and C, starting exercise, and walking for three hours a day also following the protocols …" (p13)

In addition, the participant believed that factors like a decrease in pathogenic and virulence of the virus, a decline in the frequency of new cases of disease and death, and achieving herd immunity in society via acquired and natural ones had a pivotal role in refusing to get next/ booster doses of COVID-19 vaccine.

Belief in the adequacy of the precautionary principles

According to some participants' experiences, the best way to deal with COVID-19 was to follow preventive principles and health protocols like wearing multiple masks, regularly washing hands, keeping a physical distance from sick people, observing physical distancing, avoiding being in crowded centers, and so on. This was while the perceived and severity risk of disease in these individuals was very high. One participant said:

"I know how dangerous coronavirus is, but is it still necessary to get a vaccine despite wearing three masks, using alcohol, washing hands regularly, avoiding going to public and crowded places, and observing social distancing?!" (p13)

Constraints

Regarding participants' reporting, constraints included personal and psychological barriers, both affecting them to refuse and/ or hesitate to vaccination. In the 3 C model, the term convenience is used to point out practical barriers to vaccination. While few participants perceived geographical access as a barrier to not receiving the vaccine, most of them emphasized the type and manufacturing country of the vaccine as very important and influential factors in making a decision on whether or not to receive the vaccination.

Personal barriers

This category refers to some personal considerations such as time pressure, lack of time coordination, and being too far from the vaccination center. One participant stated:

"I have seven children. Because of the schools closures, I am so busy, and I don't have any time to get vaccinated. Of course, once I went to the health center near our home, they said that I should go to vaccination centers and get vaccinated because it was too far from us, and I didn't have enough time to stay in the vaccine line until my turn, so I didn't go to get vaccinated."(p18)

Psychological barriers

Unpleasant feelings about injection, being sensitive to receiving a certain brand of vaccine, and indecision on vaccination had an important role in participants' vaccination behavior. Previous experience with products of a certain country or believing that a specific brand, not available in Iran, has more effectiveness were some justifications they made for not receiving vaccination:

"I was afraid of injections from childhood. I severely fear injection and vaccine … … …" (p10)

"Except for the Iranian and Chinese vaccines, I would give any other vaccine. AstraZeneca has not been available for a long time. If AstraZeneca existed, I would take it … … … I needed the AstraZeneca vaccine to leave the country, and having a vaccination card of Sinopharm or Iranian vaccines, I was not allowed to enter the destination country." (p19)

The concept of indecision on vaccination reflects the individual's extensive mental comparison of the positive and negative aspects of various vaccines. They were constantly evaluating the risk of vaccination and therefore, couldn't make a definitive decision:

"I don't know what will happen to me. I know that every vaccine has its own advantages and disadvantages, but no matter how I calculated it, I saw that the harm of the vaccine is more than the benefit … … … I think there is still a need for more studies to be done on corona vaccines and their possible side effects so that one can make the right decision and not hesitate. Under these conditions, I prefer not to get vaccinated." (p16)

Coercion

Our results showed that direct or indirect coercion by relatives (family members and relatives), and unsteady imposed mandatory vaccination by the government were other causes of refusal and/ or hesitancy to vaccination.

Coercion by relatives

Paternalism, subjective norms, and attitudes of relatives around vaccination were other hindering causes of vaccine refusal and/ or hesitancy. Some participants reported that their relatives (family members and relatives) prohibited them from getting vaccinated, even when they were willing to receive the vaccination. One participant said:

"… The first days of vaccination, I was very interested to receive the vaccine, but my husband and his family didn't permit me to get vaccinated." (p7)

Unsteady imposed mandatory vaccination by the government

The government established strict policies with the aim of maximizing vaccine coverage, but these policies became fragile whenever the wave of the disease subsided. This would cause those who had received some doses of vaccination to no longer receive the next/ booster doses. For example, one participant explained:

"If I am being forced to get vaccinated, I don't do so … … … The first two times of vaccination were required by the workplace, and I had to get them, despite my opinion about not receiving the vaccine." (p20)

Discussion

Vaccine refusal and hesitancy are complex and context-specific concepts varying across time, place, and type of vaccine. In the present study, the focus was on the negative consequences of vaccine refusal and vaccine hesitancy because the behaviors of people related to both make crucial derangements in vaccination coverage. Also, because the 3 C model guided the study, the discussion is organized as it reflects the findings based on components of this model.

The results of the study revealed that the public's confidence plays an important role in Iranian's willingness to get

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the COVID-19 vaccine. In general, those with a lack of confidence are more likely to distrust the health care system and medical treatments, have a negative attitude and disbelief, and believe in conspiracies. More generally, many studies have also emphasized that distrust in government, policymakers, vaccine-providing companies, conspiracy beliefs, and concerns regarding vaccine safety or effectiveness can be the core predictors of delayed vaccination (2, 18, 28, 29). Furthermore, our findings are in line with those of previous studies conducted in Iran, which pointed out low social trust in pharmaceutical and vaccine companies as a key factor in non-vaccination (30, 31). Social trust guarantees mutual interaction between the public and government leading to public cooperation with and acceptance of government policies including vaccination.

Although under-reporting and underestimating statistics about Corona disease is a worldwide phenomenon (6), in Iran, the national media is strictly under the control of the government, and it seems that this phenomenon is running in more depth and can explain why people don't rely on national media news. Another important, influential factor in vaccine refusal and/ or hesitancy roots in peoples' pre-existing trust. General trust can be affected by the level of pre-existing trust, meaning that individuals' pre-existing trust determines how to judge news irrespective of being good or bad (32).

Additionally, conspiracy theories about the hidden agenda of vaccination played a role in refusing vaccination. Consistent with our findings, numerous studies have indicated that belief in the conspiracy theory is associated with reduced intention to receive COVID-19 vaccination (18, 23). Furthermore, the high speed of production of Corona vaccines to receive more financial benefits by pharmaceutical companies and policymakers was another important factor for not receiving COVID-19 vaccines mentioned by participants, which is consistent with previous studies' findings (18, 33).

Some participants in our study had encountered some individuals in their close relatives and watched some people on social media going through direct or indirect adverse repercussions such as cardiovascular, pulmonary, and liver complications; headache; back pain; dizziness; nausea; coagulopathy, and death after receiving the vaccine. This could be explained by the expansion of anti-science rhetoric and anti-vaccine movements that use targeted disinformation messages regarding vaccination. Some others had personal experience with side effects or reactions to previous doses of the vaccine. Previous studies have reported concerns about unknown adverse effects and fear of short- or long-term complications that play the main role in not receiving the vaccine (18, 29, 34).

Unlike other countries, for example, China (Hong Kong) (35), the government didn't establish a perfect follow-up process to explore probable adverse events following COVID-19 vaccination. Furthermore, participants in our study believed vaccines are responsible for serious diseases or disabilities with uncertain causes that corroborate the hypothesis of the anti-vaccination movement, which claims a wide range of negative consequences of vaccination (36).

Another important point to consider has to do with the prevention of COVID-19 infection through the COVID-19 vaccine (37-39). Participants expressed a negative view of the vaccine's effectiveness due to their personal experience of re-infection with COVID-19, re-infection, and death of relatives despite receiving the vaccine.

Complacency was another main category describing the participants' feeling of self-satisfaction leading to refusal and/ or hesitancy regarding vaccination. One of the influential factors in complacency is the fatalistic worldview. Fatalism is higher in people who say religion is important in their everyday lives, as well as in Muslims (40, 41). According to the literature, fatalism is commonplace and high among Muslims, embedded in Middle Eastern societies (42, 43). In religious societies such as Iran, fatalism is common and rooted in the immortal power of God (44). Based on this, everything depends on God's will. As a result, they think that health measures are not important priorities. Our results are consistent with the findings of other studies, which reported spirituality, religious beliefs, and fatalism, such as believing in God and illness, as a punishment for sin influencing health behavior and intention of receiving the COVID-19 vaccine (33, 45, 46). Even though a fatalistic view implies that events are inevitable and there is nothing that can be done to change them, a previous study suggested that media exposure could conflate measures of fatalism (47).

A fatalistic outlook is based on beliefs like predetermination, luck, and pessimism, and it can have serious consequences on the health realm (48). A vast body of literature has demonstrated that fatalism negatively impacts a wide range of health behaviors and their determinants (40, 49). Another domain of complacency had to do with philosophical beliefs. In agreement with our findings, Pelčić et al. (2016) reported that metaphysics is the core of religion and can be another religious excuse for avoiding vaccination (50).

In the present study, most participants were too confident in their judgments (overconfidence bias), believing that everybody is personally immune against many risks (optimistic bias). The findings of the current study support the previous research findings that individual risk perception influences willingness to receive the COVID-19 vaccines (12).

Previous studies observed a negative significant correlation between the perceived threat of disease with complacency and a positive significant relationship between good health status and invulnerability to infection (24, 51). Consistent with previous studies, complacent people don't feel vulnerable, and their perceived risks of disease are low. They feel healthy, and not taking care of themselves may lead to committing high-risk behaviors (52).

Some people believe that after receiving previous doses of the vaccine, immunity in their bodies has increased, and they are not at high risk for getting a severe disease, and if cases of infection and death increase, they will take the next dose of their vaccine. In line with previous studies, participants expressed that the history of being infected with COVID-19 strengthened their immune system and protected them from re-infection or severe disease (53, 54).

Studies have also shown that heuristics and biases have a

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very important effect on risk perception (32). Based on the anchoring bias, people tend to rely on the information they receive at first and make judgments or decisions based on that information. Another explanation for vaccine refusal and/ or hesitancy can be representative heuristic. Participants in our study constantly tend to estimate the probability of Corona disease involvement by whether this event is representative of similar events such as influenza and common cold stored in their memory. Another justification could be related to availability bias, which points to people's tendency to perceive an event as the more frequent event that can be imagined or recalled easily.

It seems that belief in traditional medicine significantly determines a person's risk perception. Although previous studies have mentioned the use of traditional medicine in the prevention and treatment of disease (55, 56), the distinguishing point in our study was that almost all participants stated that traditional Persian medicine was better than the COVID-19 vaccines, and this disease can be prevented or treated with this approach. They believed that traditional medicine or treatments and natural medicine, herbal remedies, and high vitamin supplements are preferable alternatives to vaccines that are safer and more effective than modern medicine, which is quite consistent with research findings (53, 57).

Belief in the adequacy of precautionary principles was reported by participants as another motive for not receiving the COVID-19 vaccine. The literature on COVID-19 frequently emphasizes that precautionary principles are necessary but not enough to protect people against the disease, concluding that if the intention is to control the disease and reach herd immunity, vaccination is inevitable (2, 6, 58).

Constraints, as a category of the findings, refer to personal and psychological barriers to vaccination. Personal barriers, including time pressure, lack of time coordination, and being too far from the vaccination center, may lead to refusal and/ or hesitancy to vaccination. Some studies have reported that being too busy and not having enough time for vaccination are major barriers to receiving the vaccine (59, 60). Psychological barriers were some mental concerns such as fear of injection, being sensitive to receiving a certain brand of vaccine, and indecision on vaccination. Studies have reported similar findings that fear of injections may negatively influence the decision to get vaccinated (61, 62).

The participants were especially worried about the associated risks of vaccination and searching for additional information on the pros and cons of vaccination, and this produced ambiguity in decision-making. Some individuals engaging in frequent calculations preferred to wait until the safety of the vaccine was confirmed, and their decision depended on subjective evaluations of risks (24, 63). In fact, concerns based on safety, vaccine ingredients, novelty, and unknown adverse effects are common issues regarding vaccine hesitancy in the literature (64-66).

The concept of coercion (coercion by relatives and unsteady imposed mandatory vaccination by the government) emerged as the category of leading causes of refusal and/ or hesitancy to vaccination. Our findings highlighted the importance of paternalism, subjective norms, and attitudes of relatives around vaccination as the hindering causes of vaccine refusal and/ or hesitancy. According to the Theory of Planned Behavior model (TPB model), one reason for not completing vaccination was subjective norms, such as motivation to comply (67).

According to participants' opinions, temporary force to receive the vaccine cannot guarantee compliance to receive all doses of the vaccine. Some people said that the lack of legally binding regulations to receive the next/ booster doses of vaccine was a very important consideration in people's decision not to receive the vaccine (68, 69).

Strengths and limitations

Because of the COVID-19 pandemic, we had to get in contact with participants by telephone for interviewing. The absence of visual cues during a telephone interview is thought to result in a loss of contextual and nonverbal information and understanding, compromise, probing, and interpretation of responses. Yet, telephone interviews may create a comfortable atmosphere and allow respondents to feel relaxed and able to reveal sensitive information (70).

The fact that we had an opportunity to recruit participants from the samples of the national survey helped us to take advantage of the multi-ethnic and multicultural nature of Iran. Additionally, the maximum diversity of respondents, including both COVID-19 non-vaccinated persons and those who didn't want to get the next/ booster doses of vaccine, was another key strength of this study. Further research in this field is needed to determine the role of factors influencing vaccine refusal and/ or hesitancy.

Conclusion

Lack of confidence, complacency, constraints, and coercion were presented as the main causes of vaccine refusal and/ or hesitancy behavior. With more details, the issues of distrust, misinformation and disinformation, concerns regarding vaccine safety and effectiveness, low perceived risk, people's overconfidence in traditional Persian medicine compared to modern medicine, fatalistic worldview, and coercion partly justify Iranian COVID-19 vaccine refusal and/ or hesitancy behavior. In order to address COVID-19 vaccine concerns and facilitate uptake in more hesitant populations, it is essential to implement appropriate risk communication and to understand a network of influences for good communication.

An alarming aspect of the public response in Iran has been widespread COVID-19 vaccine hesitancy, promoted by a hostile anti-vaccine movement targeting social media that has spread dangerous misleading information about the vaccine risks that emphasizes the importance of evidence-based health education and communication by the government, trusted leaders, and medical professionals regarding health maintenance and preventive care, as well as regulating social media anti-science messages.

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Ethics approval and consent to participate

The study protocol was approved by The Ethics Committee of the National Institute for Medical Research Development (Ethics code: IR.NIMAD.REC.1400.101). Each interview was preceded by verbal consent.

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Conflict of Interests

The authors declare that they have no competing interests.

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