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The conundrum of new coronavirus variants and poor uptake of booster dose: building a narrative against vaccine hesitancy in Pakistan

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INTRODUCTION

Background: As of 5 August 2022, the ongoing battle against COVID-19 pandemic has resulted 579 million confirmed cases and more than 6.4 million deaths worldwide [1]. With emergence of new variants, the pandemic continues to haunt individuals as well as societies. We expect many new anti-viral treatments in the year three of the pandemic, however, the vaccines remain one of the most effective public health intervention to prevent hospitalization and deaths. Nevertheless, to achieve long-term protection in the form of herd or population immunity, 75-90% of the population should receive a complete course of vaccination [2]. However, not all people accept vaccines and there exists a substantial population that remains against the whole concept of vaccination leading to the social phenomenon of vaccine hesitancy. Although the supply of vaccines was optimal in the last quarter of 2021, low & middle income countries will remain under-vaccinated for much of 2022, due to the major hindrance posed by the rampant vaccine hesitancy. This situation may lead to higher mortality and morbidity rates and weaker economic recoveries [3].

Keywords: Vaccine hesitancy, Booster dose hesitancy, Conspiracy theories, Misinformation, COVID-19 pandemic, Social media, Pakistan, Asia.

Vaccine Hesitancy:

Vaccine hesitancy specifically refers to refusal to receive a vaccine shot despite its availability. In the post pandemic era, vaccine hesitancy has emerged as a formidable cause for global concern. World Health Organization (WHO) [1] now grades vaccine hesitancy as one of the ten significant threats to the health care systems, which has adversely impacted health, economy and social life around the globe [4]. This vaccine hesitancy is no more a problem in low-income countries, rather equally prevalent in high-income countries, however, in a different context [3]. The anti-vaccination social moments are gaining momentum during and after the COVID -19 first waves. Vaccine hesitancy is compromising the progress made against COVID-19 pandemic and the resultant low vaccination uptake indicates a profound social weakness in a country. Furthermore, a recent body of evidence suggested that even healthcare workers were also sceptic and hesitant to receive a jab during COVID-19 pandemic [5].

Schneider kamp [6] classified vaccine hesitancy in four main types:

1. Resisting hesitancy in which the main reason is mistrust on the local or international agencies for health advocating for vaccine.
2. Paralyzed hesitancy, which is based on personal fears.
3. Informed hesitancy originates from an informed choice (i.e., when someone knows details, risks, benefits, and expected outcome).
4. Empowered hesitancy has roots in empowered choices (i.e., the choices that are in alignment with the free will for personal betterment).

Situation in Pakistan:

The case of Pakistan is of profound concern due to its not-so-progressive response to vaccination campaigns, as observed for the Polio vaccine and now for the COVID-19 vaccine [7]. Pervasive vaccine hesitancy has significantly reduced the uptake of vaccines in the Pakistani society and emerged as a key challenge for public health interventions to contain different infectious diseases in Pakistan. Generally, mistrust (resisting hesitancy) and personal fears (paralyzed hesitancy) are the main drivers of vaccine hesitancy in Pakistan. Rural areas looked more challenging than urban areas due to the fact of lower literacy rates, poor vaccination campaigns and perceptions created by the conspiracy theories pervasive on social media [8].

Persuading the vaccine hesitant population to accept vaccines has always been a daunting challenge in Pakistan. We observed this hesitancy for initial doses of COVID-19 vaccine, however, after the advent of new corona virus variants and decreasing efficacy of initial vaccine doses over time enkindled the real dilemma and highlighted the need of booster doses [8,9]. Consequently, countries hankered to inoculate people with booster doses, but faced significant hesitancy for the booster doses [10]. As now, the Pakistani government is recommending a second booster; we are interested in talking to those who have yet to get even one extra shot. Hence, this article aims to build a counter narrative against vaccine hesitancy and highlight the dire need of intervention to improve booster dose uptake. In order to make an effective policy and convincing narrative to improve the uptake of vaccination programs, it is pertinent to understand the underlying factors specifically responsible for vaccine hesitancy in this part of the world.

Underlying Factors:

Various complex yet highly context specific factors precipitate the phenomenon of vaccine hesitancy in a given society/ country depending upon time, setting and vaccines. For instance, a longitudinal study in the UK found that low level of education; economically deprived areas, black and South Asian ethnicity and women demonstrate high levels of vaccine hesitancy [11].

In Pakistan, individuals and groups have diverse and often multiple reasons for delaying or refusing vaccination. A few prominent reasons include flood of conspiracy theories on social media, poor health literacy, nonscientific mindset, wishful beliefs, mistrust on local and international health care agencies, and personal or group beliefs mainly triggered by religious indoctrination. Besides, lack of a counter narrative based campaign by the concerned authorities to falsify the factual inaccuracies and false beliefs constitutes the real reasons for wide spread vaccine hesitancy in Pakistani society [9,12]. In Pakistan, generally society is more inclined to religious sermons and political rhetoric than scientific inquiry and facts. Many conspiracy theories emerged in the orthodox society, spread like wild fire through social media during the pandemic, and badly affected the vaccine uptake. These conspiracy theories and their fast spread through social media were the large part of the reason why many people in Pakistan refused to get themselves vaccinated against COVID-19 [9,12]. People tend to share those thoughts on vaccines that tend to resonate with their own beliefs and motives and therefore, misleading the whole society. Furthermore, over reliance on homeopathic and Unani medicines without any clinical evidence also prevents an early detection and treatment of a patient [9,12]. As people have lesser free will opinions and largely acts in a conformist way. As a result, refusing vaccine become top trend on social media.

There are numerous reasons why people fall victim to these conspiracy theories. This skepticism on vaccine emerges from a feeble non-scientific mind that is not ready to accept a scientific intervention [13]. Moreover, mistrust towards government policies and anything coming from political influence results in lack of support and personal motivation to consider vaccination as a social responsibility in Pakistan. For instance, lack of trust on the international COVID-19 vaccine manufacturers, and core beliefs of not relying and accepting any vaccine coming from those areas of the world as a huge hindrance [3,13].

Another population worth consideration is the young children who do not have empowered choices to get vaccinated rely on the opinions of their parents. The parents show resistance towards vaccines based on myths, safety concerns and lack of authentic information from the health care workers. Parents prefer no vaccination at all than to suffer from the adverse effects of the COVID-19 vaccine. Parent refusal of the vaccine remains a fundamental reason of vaccine hesitancy in many parts of the world [14]. They hold preconceived beliefs that children cure more from immunity derived from natural infection than from vaccination. They consider these vaccinations as poisons for their children. This kind of parents refusal for vaccine was evident for polio vaccine making Pakistan one of the two countries that have failed to eradicate Polio [14].

Booster dose hesitancy :

The COVID-19 booster doses faced hesitancy based on more or less similar reasons as mentioned earlier with addition of some new factors. Most studies report that majority population shows hesitancy to boosters due to the side effects experienced from initial doses and their previous vaccination experiences. For example, people might not want to re-live the same adverse effects they faced previously. This may include mild fever and shoulder pain after 12-48 hours of immunization [15]. A recent study conducted in India on the assessment of vaccine hesitancy after taking the first dose of COVID-19 provides evidence for vaccine reluctance to second dose due to post-immunization adverse events [16]. Recent data collected in Saudi Arabia proved that 24.1% of people were hesitant based on the long waiting hours experienced at vaccination centers [17]. Similarly, a meta-analysis reported patients <55 years faced greater ADRs, but the responses may differ depending on the type of vaccines they were administered. For example, vectored/ recombinant vaccines have greater potential for ADRs [15]. Another factor responsible for booster hesitancy was the lack of trust in these booster doses, which could be linked with their prior mistrust against initial doses. Similarly, misleading information that people who were previously infected with COVID-19 need no booster shots as the natural infection has already raised antibody levels. Furthermore, many people were of the view that they should not risk another dose of vaccine after recently being infected with the virus as they already have a weak immune system. Besides, false claims were made that not every vaccine is effective against every variant; hence, the idea of getting re-immunized would be a wild goose chase. For instance, the belief that initial doses are sufficient was widely spread in populations. Again people fall victim to social media's conspiracy theories regarding boosters. In Pakistan, people are more prone to believe in unrealistic optimism. For example, the belief that they have managed to escape the first two waves with the lowest response rate towards vaccination, hence, it will escape the omicron wave as well. Some people may also believe that their high immunity may contain the virus. These logical fallacies provided barriers to the success of COVID-19 boosters in Pakistan [9]. This sort of misinformation spread more rapidly than the campaign for people to receive booster shots [18].

Another controversy that exacerbated the booster dose resistance was the proposition that countries should not start booster doses unless the whole population receive the initial doses. This was based on the assumption that vaccinating the unvaccinated could save many more lives than would boosting the people who already had a high level of protection. Moreover, when the global shortage of COVID-19 vaccines will be overcome or if the immunity from previous doses declines substantially, only then the booster vaccinations may be implemented. Furthermore, from an economic point of view, this situation could lead to global inequity in the distribution of initial doses. Because most high-income countries would decrease the supply of initial doses of the vaccines to low-income countries [19]. One can counter these arguments on the basis that the fair level of protection given by initial doses is not sufficient for long-term protection against a pandemic especially after the emergence of new variants, which substantially escaped the previous immunity. Therefore, there appears a need to have re-immunization. The shortage of supply in low-income countries and the resultant decrease in vaccination of initial doses can be a possibility but not true. High-income countries despite having enough vaccination supply reported less vaccination compliance due to various conspiracy theories regarding vaccines. Therefore, to halt boosters until completion of the initial dose vaccination of the unvaccinated population seems unconvincing. It might lead to a greater mortality rate as vaccinated and unvaccinated will be at the same level due to short-term immunity from previous doses.

In many parts of the world including Pakistan, significant vaccine hesitancy was also observed among the health care workers. Many of them were not aware of changing COVID-19 variants and hence could not communicate authentic information to the masses. The health care workers fall short of knowledge and expertise about COVID-19 virus and how it requires better treatment and precautions than other similar viral infections [20]. Most of them had little knowledge of virology and could not relate the importance of boosters' shots with novel COVID-19 variants. The reluctance to accept booster shots and vaccine in general by these medical professionals shows their bounded rationality and inconsistency in beliefs [21].

Booster dose hesitancy has accelerated the rapid spread of new corona virus variants in Pakistan, and pinpointed the dire need to enhance the uptake of booster shots. Nevertheless, it is now pertinent to uptake booster vaccines after the emergence of new variants.

DISCUSSION

Reducing vaccine hesitancy to booster doses is paramount to contain the pandemic. A large body of evidence has established safety, efficacy, and sustainability of these booster shots against both the Delta and Omicron variants. The efficacy of the mRNA vaccine (against the Delta variant) to prevent the emergency department visit was 86% within 6 months after two doses, and 94% after three doses. The efficacy of the same vaccine to prevent emergency department visit against Omicron was 52% and 82% with two and three doses respectively [22]. Booster shots of the Pfizer/Biotech and Moderna COVID-19 vaccine provided 87% effectiveness in prevention of an emergency room visit and 91% effectiveness against hospitalizations two months after the booster [23].

Centers for Disease Control and Prevention recommendations for booster doses are mentioned in the (Table-I).

Table-I: Centers for Disease Control and Prevention recommendations for booster doses.

Primary vaccine	Possible booster	Time of 1st booster dose	Time of 2nd booster dose
Pfizer-BioNTech	Either Pfizer-BioNTech or Moderna	• 5 months after the final dose • 3 months after the final dose for moderately or severely immunocompromised	At least after 4 months after the 1st booster for 50 years or old or for immunocompromised
Moderna	Either Pfizer-BioNTech or Moderna	• 5 months after the final dose • 3 months after the final dose for moderately or severely immunocompromised	At least after 4 months after the 1st booster for 50 years or old or for immunocompromised
Johnson & Johnson' s Janssen	Either Pfizer-BioNTech or Moderna	• At least after 2 months after the primary dose of J&J/Janssen	At least after 4 months after the 1st booster for 50 years or old or for immunocompromised

SOLUTION; WAY FORWARD:

There is a crucial need to address the pervasive issue of vaccine hesitancy in Pakistan. Equally important is the need to understand how to take part in conversations on vaccine hesitancy with patients. In Pakistan, there has been negligence on part of the health authorities in respective provinces, for not campaigning effectively and making the public fully cognizant of the merits of the COVID-19 boosters.

In many settings, mandating vaccination, particularly for those working in health or high risk/ transmission industries, has been implemented or debated by governments, decision-makers, and health authorities. However, published evidence suggests that multicomponent and dialogue-based (i.e., communication) interventions lead to significant improvements if tailored carefully according to the target population, their reasons for hesitancy, and the specific context. For instance, targeting specific groups such as unvaccinated/under-vaccinated groups or healthcare workers, addressing mistrust and improving trust in healthcare providers and institutions via genuine engagement and dialogue [24]. Thus, across all provinces, most strategies should be multi-component and focus on raising knowledge and awareness. This includes campaigns reinforcing vaccine safety, social and electronic media to build a counter narrative against conspiracy theories, dissemination of scientific data underpinning vaccine development, and clear, consistent, and comprehensive information and engagement, supporting the common sense of people are all potentially useful strategies.

In context of Pakistan, a multipronged strategy was previously recommended to curtail vaccine hesitancy [9]. This included social media handle to publish authentic information at each provincial level, spreading awareness, and educating people to use social media handles wisely. A collaborative effort for the health care team can be made by making their presence online so that the community could have a reliable source to look up to. A more rational approach suggested to change the young minds in educational institutions more inquisitive and urging the religious community to communicate authentic information through their handles. The fact-check at the provincial level must be established. However, there are also limitations to this strategy. There should be a discussion on the evaluation and monitoring of these strategies as to what extent the framework of these policies helps to tone down the social media impact. Also, there should be a population-specific strategy to target those who don't use social media specifically in underprivileged areas. For them raising knowledge and awareness would be a more appropriate approach. Seminars should be conducted on behavioral changes to make the community vaccine compliant.

However, apart from social media, there are numerous other plausible reasons for vaccine resistance. Hence, to decrease booster hesitancy, the following measures can be presented:

1. The federal and provincial governments must target the mindset regarding booster hesitancy and also urge to follow door-to-door vaccination campaigns in rural areas. Rural areas are more prone to fall a victim of conspiracy theories as there exists predetermined claims against vaccines.
2. The health care experts must first be trained to develop a scientific mind to gather knowledge on virology and novel COVID-19 strains. They often are the influencers in propagating the information, and a recent global survey suggested a greater proportion of health care workers showing their reservations towards vaccination [25]. Seminars must be held to upgrade their knowledge on emerging Delta and Omicron variants and importance of booster doses in relation to these novel strains. They must have profound knowledge on the different viral infections and their vaccination programs to communicate to the public about the difference in COVID -19 virus.
3. The staff must be trained and better counseling must be given at vaccination centers. Proper guidance on the protocol for the administration of booster shots must be communicated to build trust among the public on vaccine administration and reduce the fear of needles.
4. Another suitable approach would be to develop public health education campaign for boosters in both urban and rural areas. Many people are not even aware of the names of the booster shots available, and neither public in Pakistan has developed the habit of independently searching for guidelines on them. However, the campaign must be carried out

keeping in view the literary background of urban and rural population to tailor the influence of message accordingly.

5. A social media campaign must be run every week where top health care professionals in the country offer favorable commentary for booster shots. They should also offer counter narratives against the common myths, conspiracy theories and concocted stories against vaccines. This will help to remind the public who use social media about the need for getting boosters and will mask the negative trends against boosters.
6. Vaccination certificates should be made an important and binding requirement for visiting indoor and outdoor vicinities to create a drive for prioritizing vaccination. This is similar to how Malaysia and Singapore have urged the public to get their booster shots, otherwise, they will be demoted from "fully vaccinated status". Moreover, vaccinated employees regardless of the profession can be encouraged through subsidiaries and incentives on salary packages by submitting their vaccination certificates [3,26].
7. A website approved by government bodies and regulated by a pool of healthcare professionals should be developed to allow people to report the ADRs experienced after vaccine. This will help to counter the vaccine hesitancy for boosters based on data primarily due to safety concerns.
8. Vaccine accessibility and the inability to avail the vaccine of choice have also been significantly reported due to earlier out-of-stock vaccination supplies. The government must ensure that vaccination stock must be sustainable enough and that more vaccination centers are made available to maximize and ensure equitable vaccination coverage for boosters.
9. Medical, pharmacy and nursing students should be trained during undergraduate level on how to counter anti vaccine rhetoric of the patients based on conspiracy theories or false believes. This can be accomplished through seminars on logical and critical thinking in graduate schools where students are inculcated the art to distinguish science from pseudoscience, adoption of a non-conformist and logical mindset.
10. Parents must be educated and should be provided proper information and guidance with reference to authentic sources to look for the adverse effects and need of vaccination programs worldwide to adopt better and safe choices for their children. The health care providers must ensure the proper communication to parents on different types of vaccines and on the need of vaccination for changing COVID-19 strains.

CONCLUSION

This manuscript provides a starting point for a tailored campaign based on a counter narrative to mitigate vaccine hesitancy in Pakistan. Booster dose hesitancy is a phenomenon embedded in deep mistrust on local and international health institutions, based largely on conspiracy theories and false believes. Despite massive resistance against the COVID-19 vaccine, it will always be an achievement for how we managed to curtail the massive outbreak and emerging waves of COVID due to changing variants. However, one of our biggest worries is that people are no more taking this virus seriously while it is still present and can cause serious damage. Therefore, one should disregard conspiracy theories and get vaccinated and boosted to protect oneself and others. We need to address the root cause of the vaccine hesitancy beyond mere social media and public service messages. If we aim to attenuate the virus, there is a need to fight the doubts first.

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