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Evaluation of Physical & Mental Status of COVID Recovered Patients Underwent Vaccination of Both Doses: A Questionnaire Survey

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ABSTRACT

Aim: Purpose of our study was to assess the physical and mental status of patients who have recovered from Covid and have also undergone vaccination process as well.

Methodology: 50 patients were included in the present study who had recovered from coronavirus infection and had undertaken vaccination atleast one month back from the commencement of the present research. The patients were given questionnaire which was in English language and in an open-ended format. The questionnaire was based on demographic characteristics, co-morbidity history, clinical categorization of previous covid infection, mental status after covid infection, post -covid residual disease.

Results : Maximum subjects had no post covid recovery syndromic illness (70%), however, predominantly fatigue as well as breathlessness were common in those who had this complication after covid recovery. After recovery from infection as well as getting vaccinated, the fear of reinfection still persisted in many participants as new variants have emerged which might evade this protective immunity

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Conclusion: Psychological impact after recovery from covid infection was more even after vaccination. Physically patients were of near normal health, however, some of them still complained of breathlessness or fatigue.

Keywords SARS-COV-2, post-covid recovery, comorbidity, quality of life

INTRODUCTION

Even the best vaccines do not work for everyone. Some vaccines, such as the measles vaccine, are highly efficacious, reducing infection rates by about 98%. Effectiveness, or how much the vaccine reduces infection rates in the "real world"—outside of the highly controlled clinical-trial setting— is often lower than the initial efficacy rate. Moreover, these reported efficacy rates are based on a relatively short follow-up period, and it is unknown how the vaccine will perform over time. Although vaccine efficacy depends heavily on vaccine-related factors, characteristics of the vaccinated also matter.Psychological, social, and behavioural factors can substantially affect the immune system's vaccine response. Glaser et al., spearheaded this line of research in the early 1990s with the initial observation that psychological factors shaped the antibody responses to vaccines, even in young and healthy people.[1] All vaccines challenge the immune system. Inflammatory markers rise within hours of vaccination—thanks to the immediate and nonspecific *innate immuneresponse*, which can produce side effects such as lethargy, malaise, and irritability. As the first prong of the immune response, the inflammatory response usually lasts a few days but can be prolonged in some individuals, such as those who are depressed. The *adaptive immune system* mounts the second prong of the immune response. It targets unique vaccine components and therefore takes longer to launch.[2]Vaccines are designed to give the adaptive immune system a lasting memory of viral or bacterial components so that it can quickly and effectively respond when confronted with the actual pathogens. The adaptive immune system responds to the vaccine through (a) T cell multiplication, which can be programmed to identify and kill cells that contain the pathogen (i.e., the cell-mediated response), and (b) B cell production of antibodies, or proteins that neutralize viruses and bacteria.[3]One critical factor that modulates this response is whether the vaccine recipient has previously encountered the antigen—the protein on the surface of pathogen—either via infection or vaccination. If so, the body mounts a faster and fiercer antibody response— the *secondary immune response*—than it did during the first encounter (i.e., primary immune response). Onelimitation of this literature is that some studies do not fully account for prior exposure, making it difficult to decipher whether the primary or secondary immune response is reported.[4] However, failure to account for prior exposure can mask the magnitude of the impact of stress. Especially among older adults, it is often safe to assume that they have already encountered certain antigens and therefore mount a secondary immune response. This is a key consideration for the SARS-CoV-2 vaccine, given that around 10% of Americans had prior exposure as of September 2020. Many more have had exposure to other coronaviruses, which may influence immune responses to SARS-CoV-2, and some of the current vaccine candidates require multiple doses.[5]Unfortunately, distress is integral to the COVID-19 pandemic; in fact, in one U.S. sample, the fear of COVID-19 itself, termed "coronaphobia," drove depression and generalized anxiety, even after adjusting for sociodemographic factors and other psychological vulnerability factors such as neuroticism. In another large representative U.S. sample, those with elevated COVID-19 fearfulness were at a particularly high risk for clinically significant depressive symptoms. Ironically, fear of COVID-19 itself may lessen a vaccine's ability to confer immunity against the virus. The prevalence of psychiatric

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symptoms and clinical diagnoses have increased during the worldwide pandemic.[6,7]Patients with previous COVID infection are nervous about being vaccinated, either because they feel they made an inadequate immune response to the natural infection so would not benefit, or because they suspect they may have made an excessive or dysregulated response to natural infection that may be exacerbated by further immune stimulation. The assumption is that, like others, people with previous COVID infection would benefit from vaccination to reduce their risk of further infection.

AIM OF THE STUDY

Purpose of our study was to assess the physical and mental status of patients who have recovered from Covid and have also undergone vaccination process as well.

METHODOLOGY

In this present research, 50 patients volunteered to be a part of the study. Inclusion criteria was previous history of SARS-Cov-2 infection and have undergone vaccination of atleast one dose of any WHO/DGCI approved vaccine; one month back from the date of the study. Informed consent was taken from all the participants. Clinical history and general physical and mental examination process was undertaken for all the test subjects. The patients were given questionnaire which was in English language and in an open-ended format. The questionnaire was based on demographic characteristics, co-morbidity history, clinical categorization of previous covid infection, mental status after covid infection, post -covid residual disease. The data was recorded in an excel spreadsheet and later analysed with the help of SPSS 25.0. descriptive statistical analysis was conducted with the help of percentage and frequency measures.

RESULTS

In our study, around 66% of participants were male and mostly were under 50 years of age with maximum co-morbidity noted were diabetes (18%) and hypertension (12%) apart from all other less common co-morbid conditions. (Table 1)Mostly participants had undergone covishield/astrazeneca vaccination (78%) as compared to covaxin (22%). Only 6% of people have had ICU admissions/ severe covid infection. Maximum subjects had no post covid recovery syndromic illness (70%), however, predominantly fatigue as well as breathlessness were common in those who had this complication after covid recovery. After recovery from infection as well as getting vaccinated, the fear of reinfection still persisted in many participants as new variants have emerged which might evade this protective immunity. (Table 2)

Table 1- Demographic characteristics of participants

Variable	Data recorded
Gender	Male – 66%, female- 34%
Age	Less than 50 years – 78%, over 50 years- 22%
Co-morbidities	Diabetes- 18%, hypertension- 12%, psychiatric disorders-1%, other co-morbidities- 5%, no comorbidities- 64%

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Table 2- Physical and mental status after post covid in participants

Variable	Data recorded
Clinical classification of covid	Mild- 83% Moderate-11% Severe-6%
Post covid disease	Fatigue-12% Breathlessness-9% Insomnia- 4% Headache-3% Chest pain-1% Joint pain-1% No residual disease- 70%
Mental status of participants	Same as before infection-34% Under stress/fear of reinfection-66%
Vaccination type	Covishield- 78% Covaxin-22%

DISCUSSION

A range of vaccines have been developed against COVID-19 and vaccine roll-out is in process throughout the EU/EEA and beyond. The vaccines for COVID-19 have been evaluated for their efficacy and effectiveness in reducing either COVID-19 infection or, more specifically, induced mortality, severe outcomes and/or mild or moderate COVID-19 disease. However, these trials have not been designed to measure transmission risk, following exposure to circulating virus, from vaccinated individuals to others. Some populations are not currently eligible for vaccination, such as children, or may be immunocompromised and may need to be given special consideration as regards transmission risk from vaccinated individuals.[8]A systematic review of 150 studies describing virus-specific serum antibody responses in individuals infected with SARS-CoV-2 showed IgM is consistently detected before IgG, peaking between weeks two and five and declining over a further three-to-five-week period post-symptom onset. IgG peaks between weeks three and seven post-symptom onset, persisting for at least eight weeks. Neutralising antibodies − with the capacity to restrict virus growth in vitro − are detectable within seven to 15 days of disease onset, and levels increase until Days 14–22, before plateauing and then decreasing. Lower antibody titres have been observed in those with asymptomatic or clinically mild disease.[9]A small, US National Institutes of Health supported study, published as a pre-print, suggests a single dose of mRNA vaccine elicits rapid immune responses in seropositive individuals with post-vaccine antibody titres that are comparable to, or exceed titres found in naïve individuals who received two vaccination doses.[9] The study included 109 individuals (67 seronegative and 41 seropositive) who received mRNA vaccines Pfizer-BioNTech or Moderna. The antibody titres of vaccinees with pre-existing immunity were 10−20 times higher than those of naïve individuals at the same points in time, and also exceeded the median antibody titres measured in naïve individuals after the second vaccine dose by more than 10-fold. The 41 people who tested positive prior to vaccination generated high levels of antibodies within few days of vaccination with first dose, while negative individuals developed low levels within 9−12 days of first dose.A nested case-control analysis of 51 participants in an ongoing longitudinal observational study of healthcare

workers in London (COVID-19 Consortium) suggests a good antibody response to the first Pfizer-BioNTech dose in previously-infected individuals.[10] Among previously-uninfected, seronegative individuals, anti-S titres after one vaccine dose were comparable to peak anti-S titres in individuals with a previous natural infection who had not yet been vaccinated. Among those with a previous SARS-CoV-2 infection, vaccination increased anti-S titres more than 140-fold from peak pre-vaccine levels.[11] This increase appears to be at least one order of magnitude greater than reported after a conventional prime-boost vaccine strategy in previously-uninfected individuals. The authors suggest the findings provide a rationale for serology-based vaccine dosing to maximise coverage and impact. Another small study also looked at antibody responses to a single dose of the Pfizer-BioNTech or Moderna vaccines in 59 healthcare workers. Those who had previously been infected with SARS-CoV-2 had a clear antibody response, which peaked at 10 and 14 days after vaccination. At all points in time, healthcare workers with previous infection showed statistically significantly higher antibody levels than those who had not been infected.[12] Whether enhanced vaccine-induced antibody responses among previously seropositive individuals will show differential longevity compared to boosted vaccines remains to be seen. The assessment of immune responses induced by vaccination has largely focussed on the development of antibodies targeting the S1 domain of the SARS-CoV-2 spike protein. S1 includes the receptor binding domain, and antibodies targeting this domain critically impair virus cell entry. A key benefit of some vaccine regimens is that anti-S IgG titres are higher than for natural infection, with serum from vaccinated individuals showing greater neutralisation capacity against homologous SARS-CoV-2 viruses in vitro.[13] As mentioned above, in the absence of definitive correlates of protective immunity, the presence of neutralising antibodies against SARS-CoV-2 provides the best current indication for protection against reinfection and breakthrough infection for previously infected and vaccinated individuals. A number of studies have shown that the neutralisation ability of polyclonal serum correlates positively with anti-S IgG or anti-RBD IgG.[8]Vaccination has also been shown to result in robust T cell responses, with memory and effector function demonstrated against multiple viral epitopes. Additionally, cross-reactive T cell responses have been demonstrated against variant viruses in vaccinated individuals.In our study, psychological impact after recovery from covid infection was more even after vaccination, due to developing various mutant strains of virus which might invade the protective antibody response. Physically patients were of near normal health, however, some of them still complained of breathlessness or fatigue.

CONCLUSION

The mental health impact of the COVID-19 pandemic can persist and be long lasting for several years after the pandemic. Much remains to be learned regarding coronavirus immunity in general and SARS-CoV-2 immunity in particular, including the protective immunity induced by vaccines and the maintenance of immunity against this virus.

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