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POST PANDEMIC COVID-19 PHYSIOLOGICAL AND PSYCHOLOGICAL CHANGES IN BAHAWALPUR POPULATION

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ABSTRACT

The pandemic of COVID-19 left profound global impacts on public health, economics, and social dynamics. Since its emergence, the virus has spread across 229 countries, infecting over 590 million individuals and causing 7.0 million deaths as of March 2024. The pandemic has necessitated the development of vaccines and public health interventions to mitigate its devastating effects. This study aimed to assess the post-pandemic impact of COVID-19 on physical, mental, and social health parameters of adults in Bahawalpur, Pakistan. A cross-sectional study design was employed, recruiting 500 participants aged 20–30 years using random sampling. Data were collected via a questionnaire assessing the long-term effects of COVID-19, including mental health disorders, immune system alterations, economic challenges, and medication preferences. After performing calculations, graphs were plotted on Microsoft Excel spread sheet to analyze the post-COVID-19 experiences.

Results indicated that 90% of vaccinated individuals continued to experience symptoms, with significant effects on mental health (46%), physical activity (56%), sleep patterns (42%), stress and depression (66%), social interaction (72%), productivity (84%), and economic stability (74%). Chronic disease conditions persisted in 90% of respondents, indicating long-term health complications. Memory alterations (26%), miscarriages (16%), and continued post-pandemic health impacts (18%) further highlight the pervasive consequences of COVID-19. Notably, social interaction and economic challenges were predominant, reflecting the broader societal disruptions induced by the pandemic.

The study also identified widespread post-pandemic disease burdens, with immune system disorders affecting 48% of individuals, respiratory diseases at 32%, cardiovascular conditions at 6%, and central nervous system impairments at 4%. These findings emphasize the need for sustained medical surveillance and intervention strategies to address persistent health complications. Furthermore, a shift in medication preferences was observed, with 50% of respondents utilizing herbal medicine, 22% relying on allopathic treatments, and 28% opting for alternative therapies. This trend suggests a growing inclination toward complementary and integrative medicine in post-pandemic health management. The psychological ramifications of the pandemic were evident, particularly among young adults, who experienced heightened stress due to social isolation, financial instability, and disruptions in daily routines. Additionally, children were found to be significantly affected by pandemic-induced psychological stressors, necessitating targeted mental health interventions for younger populations.

Keywords: Post pandemic, Covid-19, Physiological changes, Psychological changes.

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INTRODUCTION

The coronavirus, is a extremely transmissible respiratory disease caused by SARS-CoV2 [1]. The disease was first identified in December 2019 and then declared as pandemic by the World Health

Organization (WHO) in 2020 [2]. COVID-19 has had significant impacts on public health, economies worldwide, prompting extensive efforts to develop vaccines, treatments, and preventative measures [3].

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590 million cases of Covid -19 are found all over the world and 7.0 million deaths as March 2024 [4]. Covid-19 has spread to almost 229 countries and territories while some countries have been more affected than other like as United states, China, India, France, Germany and Pakistan. Patients with COVID-19 present with many symptoms, some can be very lethal while some are simple. If the patient have SpO₂ <94% on room air at sea level, PaO₂/FiO₂ <300 mm Hg, a respiratory rate >30 breaths/min, or lung infiltrates >50% then it is a confirmation of severity of disease. The corona virus can become a cause of severe acute myocardial injury and other complications [5].

The corona virus affects many systems of body along with the respiratory system. The gastrointestinal organs also get affected [6]. Children and older people are at increased risk of developing the disease and complications. It leaves psychological impact on them. They experience different conditions like fears, uncertainties and many substantial changes to their daiy life [7]. There are multiple risk factors for the people to develop this disease. These factors include Age, any underlying medical conditions and weakened immune system increase the risk of severe illness from COVID-19. The incubation period can vary from 2 to 14 days [8]. For earlier strains, the average incubation period was around 5 to 6 days. Newer variants, like Omicron, tend to have a shorter incubation period, around 3 to 4 days. Corona virus disease has resulted into many uncertainties that are caused by lockdowns, distancing, quarantine and economic breakdown. These have affected the mental health problems of people. Especially the people with pre-existing mental health disorders have suffered a lot.

The severity of COVID-19 is variable. The disease can be as mild as simple respiratory disease with few symptoms like flu headache etc, while in some cases the symptoms may be as severe like extreme body aches, high grade fever, headache and joint pain. Disease also leaves its after effects in body systems like eye problems, memory problem etc . It is estimated that the symptoms are severe in 3–4% of cases. Mild cases typically recover within two weeks, while those with severe or critical diseases may take 3-6 weeks to recover. Among those who have died, the time from symptom onset to death has ranged from two to eight weeks. the median time between the onset of symptoms and death was twelve days, with seven being hospitalized. However, people transferred to an ICU had a median time of ten days

between hospitalization and death [9].

Despite the comprehensive nature of this study, limitations such as self-report bias and the restriction of the sample to a single geographic location must be acknowledged. Future research should expand the demographic scope and incorporate longitudinal assessments to further elucidate the prolonged effects of COVID-19. Overall, the findings underscore the necessity for interdisciplinary approaches integrating healthcare, psychological support, and economic recovery initiatives to facilitate holistic post-pandemic rehabilitation. The study highlights the urgent need for policy frameworks addressing the multifaceted consequences of COVID-19 and ensuring sustainable health resilience in affected populations [10].

METHODOLOGY

It was a cross-sectional study. A sample size of 500 people recruited from the Islamia University of Bahawalpur, Pakistan. Method of random sampling was used to select participants. The research study focused on young adults between the ages of 20 and 30 years old without any discrimination of gender. We used a questionnaire-based survey to collect data on the post-pandemic effects of COVID-19 and its related complications. We explain the data collection method, which involved the distribution of questionnaires. The content of the questionnaire, focusing on questions related to the post-pandemic effects of COVID-19 and its complications. The questionnaire was designed to assess a wide range of physical, mental, social and economic impacts. After performing calculations, graphs were plotted on Microsoft Excel spread sheet to analyze the post-COVID-19 experiences. Informed consent was obtained from all participants. Data confidentiality was maintained throughout the research process. limitations of the study, such as potential biases in participant selection or the self-report nature of the questionnaire [11, 12].

Inclusion criteria

20-30 years old, Residents of Bahawalpur, Pakistan, Students and employees, Individuals who have confirmed or suspected history of COVID-19 infection, and Ability to understand and complete the survey in the chosen language (English)

Exclusion Criteria

Individuals other than the 20–30-year age range, Individuals not residing in Bahawalpur,; Individuals with cognitive limitations that might hinder their ability to understand or complete the survey accurately [13].

Table 1: Summarizing the methodology section.

Component	Description
Study design	A cross sectional study.
Sample	A cross-sectional study with a sample size of 500 people recruited from the public sectors in Bahawalpur, Pakistan. Age range 20-30 years old without any discrimination of gender
Data Collection	Survey questionnaire designed to assess the post-pandemic effects of COVID-19 and related complications, including physical, mental, social, and economic impacts.
Data Analysis	After data collection from patients, results were calculated and interpreted by using different diagnostic tools. Graphs were plotted on Microsoft Excel spread sheet to analyze the post-COVID-19 experiences.
Ethical Considerations	Informed consent was obtained from all participants. Data was confidentiality maintained throughout the research process.
Limitations	Limitations of the study, such as potential biases in participant selection or the self-report nature of the questionnaire.
Study population	Inclusion and exclusion criteria applied during participant selection.

RESULTS AND DISCUSSION

According to Bram van den Borst *et al.* 2021 three months post-COVID-19, patients showed significant pulmonary recovery, yet residual abnormalities persisted, particularly in critical cases, possibly leading to pulmonary fibrosis. Mental and cognitive issues affected a third of patients regardless of severity. Even mild cases experienced severe health problems, warranting further investigation. Longer-term studies are crucial to understand and address COVID-19 sequelae [14].

According to Daria Łaskawiec *et al.* Tedros Adhanom, WHO Director, warns of looming "mass trauma" due to the pandemic, emphasizing the need for mental health support. Post-Pandemic Stress Disorder (PPSD) is emerging as a significant concern, distinct from PTSD, impacting individuals

globally due to ongoing stressors like fear of infection, isolation, and job loss. Symptoms include anxiety, avoidance, and negative emotions. Psychotherapist Owen O’Kane advocates addressing the root cause of trauma for effective management. The pandemic's prolonged impact underscores the importance of mental health care for survivors and healthcare workers [15].

According to Daria Łaskawiec *et al.* Several global studies highlight the mental health impact of the COVID-19 pandemic. UK research among older adults found 36.5% experiencing traumatic stress symptoms, with 27.4% at risk of PTSD. Greek study shows elevated fear in 32.7% of women. Chinese and Mexican studies reveal PTSD symptoms in COVID-19 survivors, emphasizing the urgent need for psychological support [16].

Table 2: Post-pandemic health and societal impacts among vaccinated individuals

Symptoms	Effected	Not effected	Percentage
Vaccinated	450	50	90
Mental health	230	270	46
Physical activity	280	220	56
Sleep pattern	210	290	42
Stress, Depression	330	170	66
Social interaction	360	140	72
Productivity	420	80	84
Economics	370	130	74
Immune system	280	220	56
Memory changes	130	370	26
Miscarriages	80	420	16
Continuing to be impacted	90	410	18
Enthusiasm and Ambition	260	240	52
Chronic disease condition	450	50	90
Overall attendee	150	350	30
Follow up	200	300	

Table 3: Post-pandemic prevalence of disease burden across physiological systems

Diseases affected widely after pandemic	Effected	Percentage
Immune system	240	48
Respiratory diseases	160	32
CVS	30	6
CNS	20	4

Table 4: Post-pandemic trends in medication utilization among affected individuals

Category of medication	Prescription employed	Percentage
Herbal Medicine	250	50
Allopathic Medicine	110	22
Other	140	28

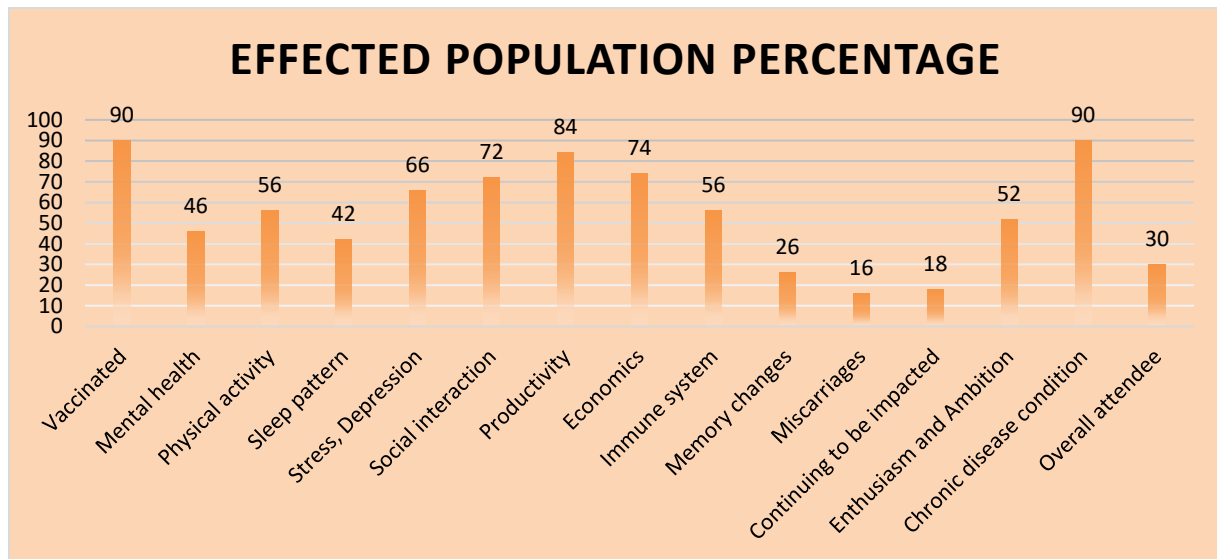


Figure 1: Effected population.

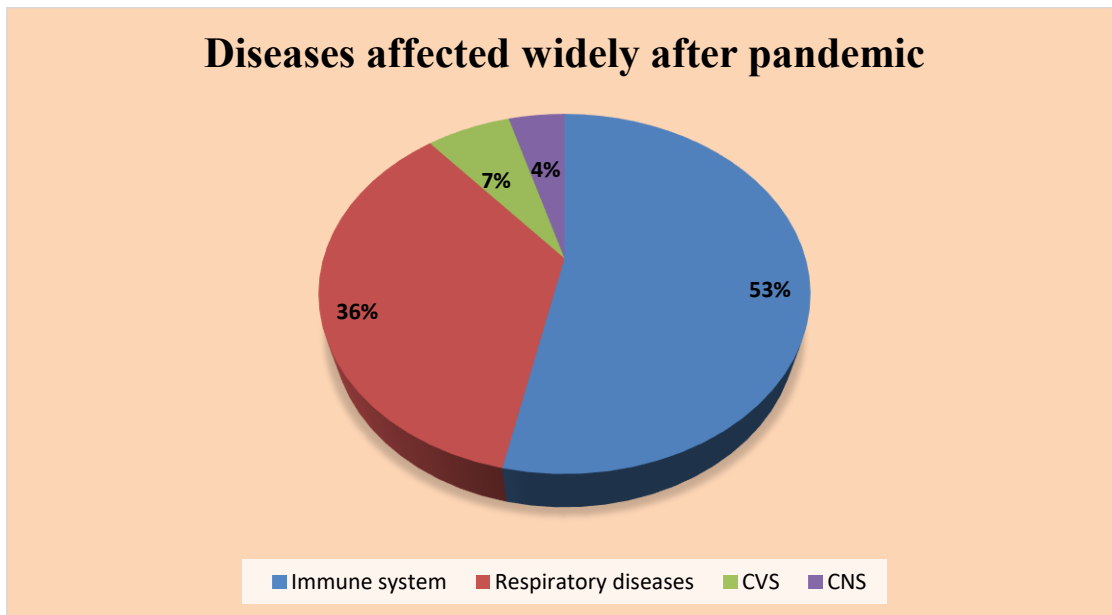


Figure 2: Diseases affected after pandemic.

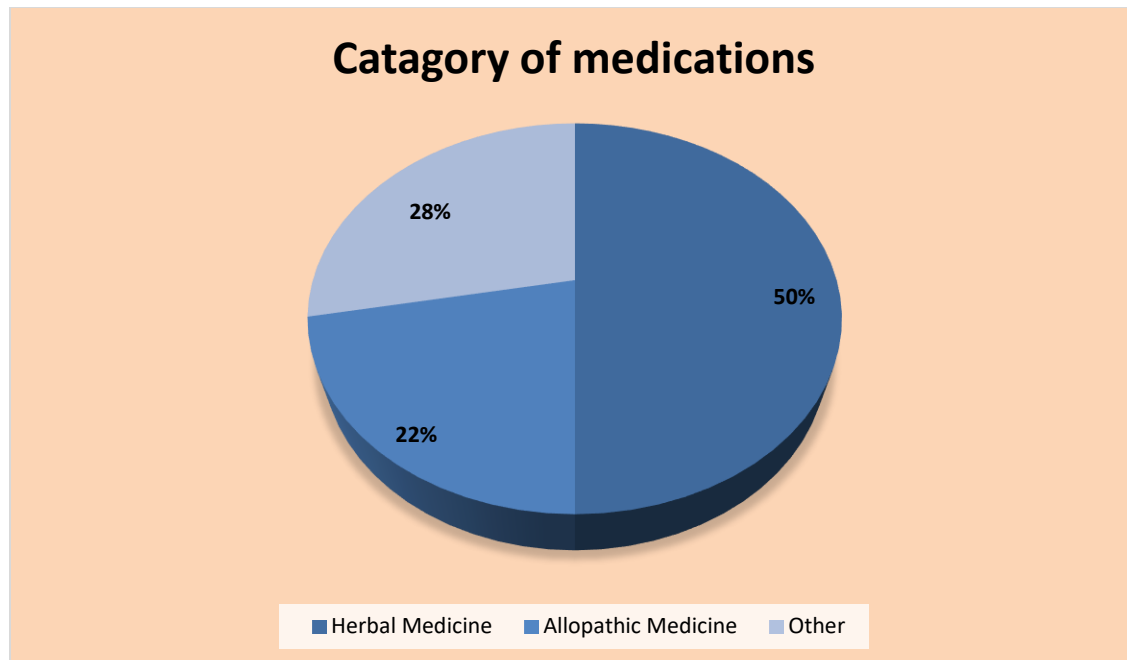


Figure 3: Categories of medications.

According to Sooyeon Min et; al. ten investigations endeavored to quantify and juxtapose the incidence of depressive manifestations within the populace both pre- and post-onset of the pandemic. These inquiries utilized various assessment tools such as the Patient Health Questionnaire (PHQ-9, PHQ-8, or PHQ-2), the Depression, Anxiety and Stress Scale (DASS-21), or the Brief Symptom Inventory (BSI), or estimated the prevalence of major depressive episodes through the Mini International Neuropsychiatric Interview (M.I.N.I.). The amalgamated odds ratio across all studies amounted to 1.97, indicative of a statistically significant escalation in depressive symptoms subsequent to the pandemic. However, considerable heterogeneity was observed among the studies ($I^2 = 97.6\%$, $Q = 319.3$, $p < 0.001$). A sensitivity analysis was conducted to assess the influence of assessment instruments, which restricted the analysis to studies employing the PHQ, yielding consistent outcomes with an overall pooled odds ratio of 2.75. Investigations focusing on the Dutch population through longitudinal studies utilizing the 5-item Mental Health Index (MHI-5) revealed either no change or a reduction in the prevalence of elevated Anxiety and Depression Symptoms (ADS) levels. Two studies lacking specific measures pertaining to depression were excluded from the meta-analysis. Moreover, an exploratory analysis employing a PHQ-9/-8 threshold of ≥ 5 (indicative of mild or greater depression) did not discern a significant alteration in prevalence subsequent to the pandemic [17].

Six studies were incorporated into the meta-analysis to scrutinize alterations in the prevalence of clinically noteworthy levels of anxiety before and during the pandemic, operationalized as GAD-7 scores ≥ 10 or GAD-2 scores ≥ 3 . The collective odds ratio, pooling data from these studies, amounted to 2.04, signifying a substantial escalation post-pandemic onset. However, a notable degree of heterogeneity was observed ($I^2 = 97.7\%$, $Q = 317.6$, $p < 0.001$).

Ten studies undertook a comparative analysis of the prevalence of clinically significant levels of psychological distress, delineated by thresholds of GHQ-12 scores ≥ 4 or K6 scores ≥ 13 . The amalgamated odds ratio yielded 1.62 (95% CI: 1.15–2.30, depicted in Figure 1C), indicating a discernible increase. Nonetheless, a considerable degree of heterogeneity was evident across these studies ($I^2 = 99.2\%$, $Q = 648.0$, $p < 0.001$) [18].

Our study provides a comprehensive analysis of various health and societal parameters among vaccinated individuals and the broader population post-pandemic. Among vaccinated individuals, 90% reported being symptomatically affected, with notable impacts on mental health (46%), physical activity (56%), sleep patterns (42%), stress and depression (66%), social interaction (72%), productivity (84%), and economic well-being (74%). These findings underscore the multifaceted toll of the pandemic on individuals despite vaccination efforts. Mental health emerged as a significant concern, affecting 46% of vaccinated individuals, highlighting pervasive psychological impacts post-pandemic.

Similarly, physical activity levels were disrupted in 56%, indicative of broader lifestyle changes. Sleep patterns also suffered, with 42% reporting disturbances, reflecting ongoing stressors and adjustment challenges. High levels of stress and depression were prevalent (66%), underscoring persistent mental health challenges despite vaccination. Social interaction and productivity were notably affected, with 72% experiencing changes in social dynamics and 84% reporting impacts on productivity. Economic repercussions were evident, affecting 74%, indicating widespread financial strain post-pandemic [19].

Health-wise, the immune system was noted to be affected in 56% of cases among vaccinated individuals, suggesting potential immune dysregulation post-vaccination. Memory changes (26%) and chronic disease conditions (90%) were also significant, reflecting long-term health implications. The study further examined diseases prevalent post-pandemic, revealing impacts on the immune system (48%), respiratory diseases (32%), CVS (6%), and CNS (4%). These findings highlight ongoing health challenges beyond COVID-19, necessitating continued monitoring and intervention strategies. Regarding medication trends, herbal medicine was widely employed (50%), followed by

allopathic medicine (22%) and other therapies (28%). This diversity in treatment approaches underscores the complex nature of post-pandemic health management and the varied preferences among affected individuals.

CONCLUSION

In conclusion, the study underscores the profound and multifaceted impacts of the pandemic on vaccinated individuals, encompassing mental health, physical well-being, social dynamics, productivity, economic stability, and immune function. The findings underscore the need for comprehensive support systems and healthcare interventions tailored to address these complex post-pandemic challenges effectively. Ongoing research and public health initiatives are crucial to mitigate long-term consequences and promote recovery across affected populations.

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