



A Study on Prevalence of Post- Covid Symptoms and Impact of Vaccination among patients attending a tertiary care centre in Kerala.

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ABSTRACT: Coronavirus Disease-2019 (COVID-19) emerged as pandemic posing an unprecedented challenge to public health globally. The post covid sequelae that followed the recovery added to the longer hospitalisation and morbidity among the patients. Vaccination strategies paved path in both reducing the severity of infection and also contributed in significantly reducing the post covid symptoms.

KEYWORDS: Post covid symptoms, vaccination, IgG antibody

I. INTRODUCTION

COVID19 (Coronavirus disease) caused by a new corona virus, named severe acute respiratory syndrome coronavirus 2 (SARS CoV 2) began its spread in 2019 from Wuhan, Hubei province China. The disease has been declared a Public Health Emergency of International concern by World Health Organization (WHO) on January 30, 2020. With the large number of emerging variants and high transmissibility, SARSCoV2 has affected millions of people and was declared a global pandemic by WHO on March 11, 2020. It was highly contagious and has caused an overwhelming number of morbidity and mortality worldwide. According to WHO there are 6.7 million COVID19 cases reported worldwide. At present covid cases reported from India included a total 4.4 lakh cases. Corona viruses belongs to genus beta coronaviruses under family Coronaviridae. These are single stranded, enveloped, RNA viruses and have 4 structural proteins—spike(S), nucleocapsid(N), matrix(M) and envelope(E) proteins. Transmission is mainly by respiratory secretions especially when the person is in close contact (within 1 meter), by dissemination of infectious aerosol (airborne) and fomite transmission [1].

Covid19 results in dysregulated immune responses. Both T cell signalling and recirculation in blood are inhibited by interferons and tumour 19

necrosis factor. Elevated levels of IL-4, IL-5, IL-10 also contributes to poor T cell responses. These dysregulations contribute to the severity of the disease. [2] B cell response involves the production of IgM, IgG, IgA, neutralizing IgG antibodies and memory B cells. The neutralizing antibodies are highly immunogenic. [3] The IgG antibodies also causes activation of natural killer cells thus resulting in lysis of the infected cells and reducing the viral load. [4]

POST ACUTE SEQUELAE OF COVID: WHO estimates that about 10-20% patients suffer from post covid symptoms after the recovery from their initial infection. Fatigue, difficulty breathing, persistent cough, chest pain, myalgia, sleep/memory problems, loss of smell or taste and depression/anxiety are among the most common symptoms reported in long COVID. [5]

The predominant mechanisms include the viral toxicity, endothelial damage and microvascular injury, immune system dysregulation resulting in a hypercoagulability state with in vivo thrombosis and suppressed immunity.

This paves path for pulmonary manifestations like dyspnoea, dry cough, acute respiratory distress syndrome (ARDS), pneumonia and fibrotic lung damage during the convalescent period. A meta-analysis study conducted revealed fatigue as the most common 22 symptom followed by dyspnoea, arthralgia, depression, anxiety, memory loss, concentration difficulties and insomnia. [6]

VACCINES According to WHO database there are currently 175 vaccines in various stages of clinical development and 199 vaccines in the preclinical phase. [7]

1. ATTENUATED VIRAL VACCINES: These are in the preclinical phase including vaccines from The Serum Institute of India in collaboration with Codagenix, Indian Immunologicals and Mehmet Ali University, Turkey. [8]



2. INACTIVATED VIRAL VACCINES: • BBV152/ Covaxin (Whole Virion inactivated SARSCoV2 vaccine) from Bharat biotech are the forerunners.[9] • CoronaVac - inactivated SARS-CoV-2 vaccine (Vero cell)/Sinovac • Sinopharm (China)

3. VIRAL PROTEIN BASED VACCINES Based on Spike protein or its fragments: - • Adimmune, Taiwan; • Bektop, Russia • Clover Biopharma plus GSK adjuvant, China-Italy; • CoVaxx, US • Sanofi plus GSK adjuvant, Italy • Vaxart, US (oral formulation under clinical trial

VIRAL VECTOR VACCINES

• From nonhuman adenovirus sources: Chimpanzee adenovirus: AstraZeneca, University Oxford, Sweden-UK-Italy and Gorilla adenovirus from Rei Thera, Italy.

• From Human adenoviruses –CanSino Biologicals (Ad5-nCoV) and Recombinant COVID-19 vaccine (adenovirus type 5 vector) for Inhalation (Ad5-nCoV-IH) – CanSino Biologicals, China, Johnson & Johnson, US Gamaleya Research Institute, Russia (Sputnik V), Covishield (Serum Institute of India): A study to assess the efficacy and safety of Covishield vaccine showed a significant vaccine efficacy of 64.1% and 70.4% after completion of single dose and two doses respectively.[9]

NUCLEI ACID BASED VIRAL VACCINES • DNA based vaccines: Zycov-D from Zydus Cadila, India- contains a plasmid DNA carrying the Spike gene. The findings of the Phase I trial concluded that Zycov-D had shown satisfactory performance in vaccine efficacy and safety.[9]

Other vaccines under trial includes AnGes, Japan, Takis, Italy and Genexine, Korea

mRNA based vaccines: Moderna (mRNA1273-Spikevax) and Pfizer from USA have shown high efficacy under this group. Other vaccines include Abogn, China and CureVac, Germany which are under trial.[9]

RECENT UPDATES:

• Updated bivalent booster doses are now available for 2 groups: - • Adults (18years and older): Pfizer-BioNTech, Moderna, Novavax and Johnson and Johnson's Janssen • Children (6months- 17 years): Pfizer-BioNTech, Moderna and Novavax.

• BBV154: Intranasal vaccine developed by Bharat Biotech.[10] Also known as iNCOVACC is India's first intranasal covid vaccine, approved by Union Healthy Ministry on Dec 23, 2022. It is a recombinant replication deficient adenovirus vectored vaccine with a pre-fusion stabilised spike protein.

• COVOVAX: SARSCoV2 Recombinant spike protein nanoparticle vaccine with Matrix-M1 adjuvant developed by ICMR and Serum Institute of India is under phase 2/3 trial.

• An mRNA-based vaccine HGCO19 by Genova Biopharmaceuticals Limited is also under clinical trial.[10]

AIM

To determine the prevalence of post symptoms and to assess association of IgG antibody with vaccination status among patients attending a tertiary care centre.

II. MATERIALS AND METHODS

The study was conducted in Government Medical College, Thrissur during a period of one year from 2021 - 2022. It was a prospective cross-sectional study carried out among 180 post covid patients after obtaining informed consent. Post covid symptoms and vaccination status were assessed using questionnaires.

Blood was collected and tested for the presence of IgG antibodies in serum by ELISA using COVID KAWACH IgG MICROLISA by J. Mitra.

The data was entered into MS Excel and was analysed using Statistical Package for Social sciences (IBM SPSS) version 25.0. Chi square test was used to analyse the relationship between study variables and post covid symptoms. The p value <0.05 considered as statistically significant.

III. RESULTS

In our study, the most prevalent post covid symptom was Fatigue (35.6%), followed by Myalgia / Arthralgia (35.0%), dry cough (32.8%), palpitation (30.6%) and least common post covid sequelae was mucor mycosis and stroke/thromboembolic events (0.6%). [Table1]

Out of 180 patients, 52.2% participants were vaccinated and 47.8% were unvaccinated. Among the vaccinated 74.5% were received COVISHIELD, 23.4% received COVAXIN and 2.1% received PFIZER. Among the vaccinated individuals only 59.6% and 6.9% were reported to have taken 2nd and booster doses of vaccination. In our study vaccinated individuals had a lesser severe disease and developed significantly less post covid symptoms. They also had a high prevalence of IgG antibody than those who were unvaccinated.

Most of the patients, 57.2% had minimal symptoms at the time of admission and reported as Category A by the treating physician and 31.7% had moderate symptoms and belonged to Category B. 11.1% patients had significant symptoms (Category C). The severity of covid disease was significantly



lower in vaccinated participants compared to unvaccinated.

Post Covid sequelae was significantly higher in unvaccinated patients (97.7%) when compared to vaccinated patients (53.2%). [Figure 1]

Table 1: Distribution of Post Covid Sequelae of study participants

Post Covid Sequelae	Frequency (n=180)	Percentage
Fatigue	64	35.6
Exertional Dyspnoea	34	18.9
Palpitation	55	30.6
Dry Cough	59	32.8
Myalgia / Arthralgia	63	35.0
New Onset DM	10	5.6
Headache	16	8.9
Vertigo	5	2.8
Concentration Difficulties	7	3.9
Loss Of Taste/Smell	4	2.2
Hair Loss	12	6.7
Sleep Disturbances	24	13.3
Anxiety	12	6.7
Depression	3	1.7
Mucor mycosis	1	0.6
Stroke/Thromboembolic Events	1	0.6
Absent	46	25.6

The seroprevalence of IgG was 97.9% in vaccinated and 97.7% in unvaccinated patients. Though the prevalence was higher among vaccinated patients it was statistically not associated ($p=1.000$).

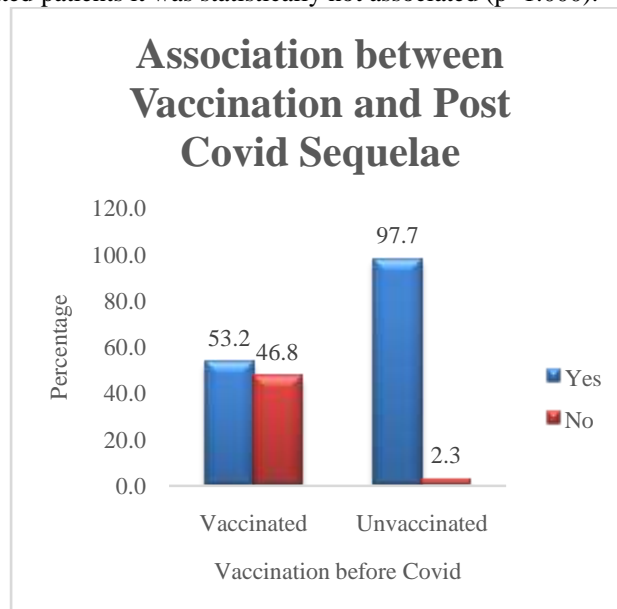


Figure-1: Multiple bar diagram of Vaccination and Post Covid Sequelae



IV. CONCLUSION

According to our study vaccination plays a significant role in reducing the risk and severity of the post covid symptoms. Among the 180 post covid patients, the most common symptom was fatigue, arthro-myalgia followed by dry cough and palpitation. The multi-organ involvement following recovery from COVID-19 infection is increasingly being reported.

In our study vaccinated individuals had a lesser severe disease and developed significantly less post covid symptoms. They also had a high prevalence of IgG antibody than those who were unvaccinated. This could be due to limited sample size.

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A significant number of patients (47.8%) were not vaccinated and among those who were vaccinated the number of those who had completed both doses of vaccination was 59.6% only. This emphasises the need to establish dedicated COVID-19 clinics to provide integrated care and strict adherence to vaccination campaigns. Follow-up care, nutritional support and vaccination thus plays pivotal role in reducing post-acute COVID-19 sequelae.

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