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A Review – On Post Covid Vaccination

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Abstract: *COVID-19 Vaccine Acceptance in India: A Systematic Review-This systematic review and meta-analysis aimed to determine the level of acceptability of COVID-19 vaccines across various Indian states. The researchers included published studies from major databases (Pub Med, Scopus, Cochrane, DOAJ, Web of Science) that used surveys or questionnaires to measure vaccine acceptance and hesitancy. Out of 524 initial records, 23 papers met the eligibility criteria and were included in the final review, covering a total of 39,567 participants. The review found that two specific surveys (one nationwide and one in Delhi) reported high acceptance rates (92.8% and 79.5%, respectively).For all included studies, the pooled estimated acceptance rate for the COVID-19 vaccine in India was 62.6% (with a 95% Confidence Interval of 55.6% to 69.4%).The results showed significant heterogeneity across the studies (I^2 = 99.40\%).The findings offer a quick summary of acceptance and hesitancy rates among the Indian population, which can be used to inform future research and vaccine education programs.*
COVID-19 Vaccines and Post-COVID Conditions (Long COVID)-Despite extensive research confirming that COVID-19 vaccines reduce severe disease outcomes, less is known about their effectiveness in preventing conditions that develop after the initial infection, commonly referred to as Long COVID or post-COVID-19 conditions. A separate comprehensive review and meta-analysis was conducted specifically to assess the efficacy of vaccination in preventing these long-term symptoms.
Importance of Understanding Post-Vaccination Experience-While the protective power of COVID-19 vaccines is widely discussed, there is a lack of understanding regarding the actual experiences of individuals receiving the vaccination outside of controlled clinical trials. Knowing what to expect after vaccination is crucial for public education, helps to debunk myths, and is necessary for reducing vaccine hesitancy.

Keywords: *COVID-19 Vaccine*

I. INTRODUCTION

The World Health Organization (WHO) officially declared COVID-19, caused by the Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2), a global pandemic on March 11, 2020.[1]The high contagiousness of the disease, along with an estimated mortality rate significantly exceeding that of the seasonal flu, severely disrupted daily life and put populations at risk. This led countries worldwide to implement drastic measures, including national or regional lockdowns and recommended behavioural changes, in an attempt to curb the spread. The pandemic caused significant global impacts, including widespread deaths and severe economic slowdowns in communities and nations. In response, countries focused on two main efforts: adapting existing medical treatments forCOVID-19 and rapidly accelerating the development and testing of new drugs and vaccines to combat the highly in contagious disease.[2]

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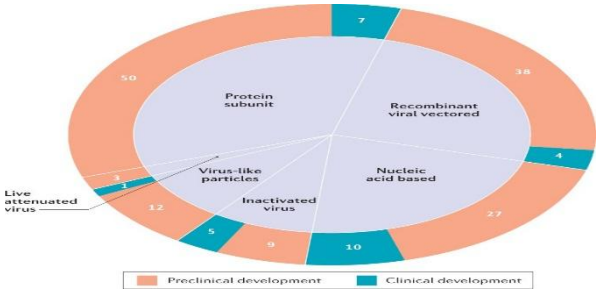

Fig.1: Immunological considerations for COVID-19 vaccine strategies

Vaccine Goals and Study Rationale-

The primary objectives of vaccination are to decrease the risk of infection, reduce disease severity, and limit transmission. While COVID-19 vaccines have proven effective, breakthrough infections (getting infected after vaccination) can still occur. In India, the COVID-19 vaccination campaign began in January 2021, prioritizing healthcare workers (HCWs). HCWs may face a greater risk of breakthrough infection due to frequent workplace exposure to the virus. [3]The two main vaccines administered in India were Covishield and Covaxin, both recognized as safe and effective. However, there is limited data concerning the frequency and severity of COVID-19 infections following vaccination in this population.This study was specifically conducted to address this gap by investigating the rate and severity of post-vaccination COVID-9 among Indian doctors. Doctors were chosen for this research because they were among the first to be vaccinated, ensuringa pool of reliable data for the study.[4]

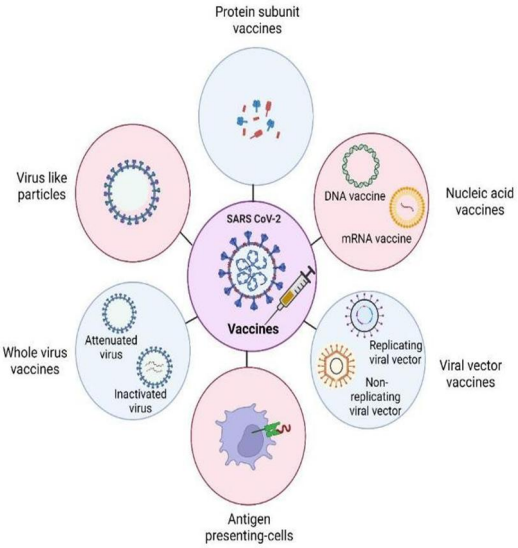

Fig.2: India plans to vaccinate 300million people(1)

DISCUSSION

People who had COVID-19 before getting vaccinated were much less likely to get infected again after the vaccine. This suggests that getting COVID-19 once may provide some natural immunity. A previous study by Letizia and colleague salso found that people who already had antibodies were five times less likely to get reinfected. Combining natural immunity and vaccination—called “hybrid immunity”—may further reduce infection rates. Other research shows that one vaccine dose in people who already had COVID-19 can boost their protection against different variants.[5]

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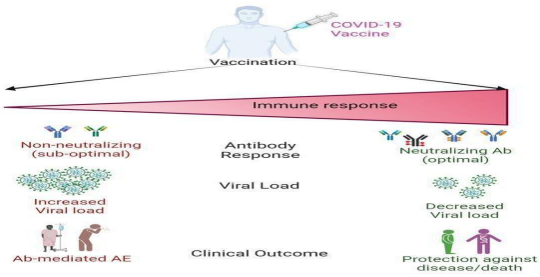

Fig.4: The Ambivalence Of Post COVID-19 Vaccination Responses in Humans.

Factors Linked to Severe Breakthrough COVID-19

Our study identified several factors associated with more severe COVID-19 infections among vaccinated individuals: older age, being male, having pre-existing health problems (comorbidities), and daily exposure to COVID-19 patients. However, receiving a complete two-dose vaccination significantly helped to reduce the severity of the illness.[6]

Infection Risk Among Vaccinated Doctors-

The study's findings indicate that daily, occupational exposure to COVID-19 patients did not increase the risk of contracting COVID-19 among vaccinated doctors. Although male doctors were more involved in treating COVID-19 patients than female doctors, their post-vaccination infection rate was not higher than that of their female colleagues. However, vaccinated doctors who had pre-existing health conditions (comorbidities) were found to be more susceptible to breakthrough infections.[6,7]

Immediate Post-Vaccination Side Effects:

Halthcare professionals surveyed shared their immediate experiences after vaccination: Two-thirds of participants reported mild, anticipated symptoms, while the remaining one-third experienced no symptoms at all. The most common side effects were fatigue (45%) and muscle aches (44%), followed by fever (34%), headache (28%), and injection site pain (27%).Crucially, no symptoms were serious enough to require hospitalization.[8]Symptoms typically started rapidly, averaging 11 hours after the shot (range: 2 to 24 hours), and lasted for approximately 30hours.[9]

Factors Influencing Side Effects:

Interestingly, similar symptoms were observed inplacebo groups. In the Pfizer-BioNTech phase 3 trial, 42% of vaccine recipients and 34% of placebo recipients reported headaches. This phenomenon, known as the "nocebo effect,"islinkedtonegativeexpectationsratherthanthevaccineitself.Asthestudydidn'tassessantibodylevels,itcouldn'tdetermi newhetherthereducedsymptomsinolderindividualswereduetoaweakerimmuneresponse(immunesenescence)[11]Since the survey was conducted in English, participants with limited language proficiency might have faced difficulties in understanding or responding. Thesurveywasalsocarriedoutshortlyafter the vaccination rollout, meaning it couldn't capture any long-term or delayed side effects, Furthermore,because participationwasbasedon trust andtherewasnoverificationofidentity or information, data accuracy could be a concern.

Focusing on the Limitation:

The limited number of participants who were given the Covaxin, Pfizer, and Sinopharm vaccines makes it difficult to compare the results and outcomes among these different vaccinations.

Focusing on the Cause (Small Sample Size):

Because only a small number of participants received the Covaxin, Pfizer, and Sinopharm vaccines, we cannot effectively compare the results obtained from the different vaccine types.

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Focusing on Bias and Overestimation:

The reported 65% rate of post-vaccination symptoms is likely an overestimate because of inherent survey bias. People with a personal interest—such as those who experienced negative side effects from a medication or symptoms after a vaccine—are more motivated to participate in related surveys. This motivation, combined with the fact that healthcare workers (who are highly aware of potential adverse reactions) might report effects more often, artificially inflates the reported rate.

Focusing on the Mechanism of Overreporting:

The calculation showing a 65% rate of post-vaccination symptoms may be too high due to self-selection bias in survey participation. Individuals are generally more likely to complete a survey if they have a strong personal connection to the topic, such as experiencing negative side effects from a medication or symptoms after vaccination. Furthermore, because healthcare workers are usually more vigilant about adverse reactions, their frequent reporting also contributes to this exaggerated symptom rate.

Concise Summary of the Conclusion:

It is probable that the 65% post-vaccination symptom rate is inflated because people who actually had symptoms (or other strong personal interest in the topic) are more inclined to respond to the survey. This effect is amplified by healthcare workers' heightened awareness and reporting of potential adverse effect.[12]

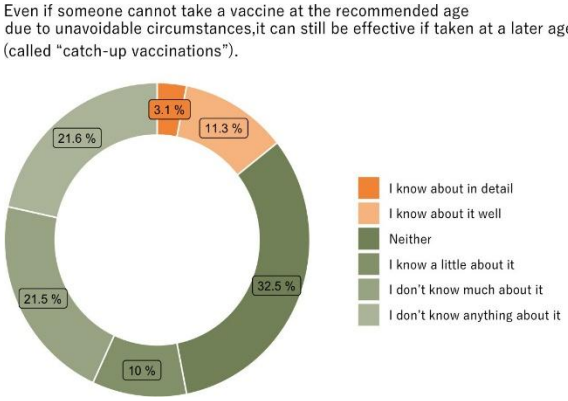

Fig.5:Public Opinion Survey on COVID-19 Vaccines and Immunization and Vaccination Policy(June17,2022)

Focusing on Methodology and Data Integrity:

The study's results are limited by several factors. Firstly, conducting the survey only in English likely presented difficulties for participants with limited proficiency, potentially impacting the quality of their responses. Secondly, the survey's timing, shortly after the vaccine rollout, meant it failed to capture any long-term or delayed side effects. Finally, the reliance on unverified, self-reported information introduced concerns about data accuracy. Additionally, the small number of people who received the Covaxin, Pfizer, and Sinopharm vaccines made it difficult to compare the outcomes of those specific vaccines.

Focusing on Scope and Potential Bias:

The scope of the survey is constrained because it was administered in English, potentially excluding or confusing non-native speakers. Its execution early in the vaccination process means the study could not track long-term health effects. Furthermore, the lack of verification for participants' identity or information suggests that the accuracy of the data collected is uncertain. Another restriction is the small sample size for individuals who received the Covaxin, Pfizer, and Sinopharm vaccines, limiting cross-vaccine comparisons.

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Concise Summary:

Key limitations of the survey include a language barrier (English-only) that may have affected participant understanding, a short time frame that missed long-term side effects, and potential data inaccuracy due to the absence of verification checks. Additionally, the small groups for the Covaxin, Pfizer, and Sinopharm vaccines restrict theability to compare them effectively.[12,13]

Methods:

We shared our research plan with the Institutional Ethics Committee and got approval to skip the full review by the Institutional Review Board (IRB). We then did an online survey 100days afterthe firstCOVID-19 vaccines weregiven in India.Thesurvey, with 12 questions,wasonsurveyplanet.com.WeusedWhatsApptocontactparticipantsbecause postal mailwas notpossible during thepandemic. People joinedandsharedpersonal information voluntarily. The survey was open from April 26 to May 18, 2021. The results were saved securely online and later downloaded to Excel.[14]

Ethical Approval: Stating the process (e.g., "Received approval from the Institutional Ethics Committee, waiver of full IRB review").

Survey Format and Platform: Naming the tool (e.g., "Online survey conducted via SurveyPlanet.com") and the number of questions.

Timing: Thekey dates (e.g.,"Conducted100daysafter the start of the Indian vaccination rollout, open from April 26 to May18 ,2021").

Recruitment Method: The means of contact (e.g., "Participants recruited viaWhatsApp due to pandemic restrictions").

Data Handling: The security and storage of results (e.g., "Data securely stored online and analyzed using Microsoft Excel").A total of 700 doctors answered the survey. Out of these,568 were working in Maharashtra.Weremoved132doctorswhohadn'tbeenvaccinatedand58whohad vaccines other than the two studied (ChAdOx1 nCoV-19 or BBV152). This left us with 568 participants for analysis.[15,16]We looked at how age, gender, health problems, daily contact with COVID-19 patients, past COVID-19 infection, and the number of vaccine doses related to getting COVID-19 aftervaccination.Wealsostudiedhowthesefactorsrelatedtohowseveretheinfection was, using hospital stays, treatments like Remdesivirand steroids, and the needfor breathing support as indicators.[17,18,19]

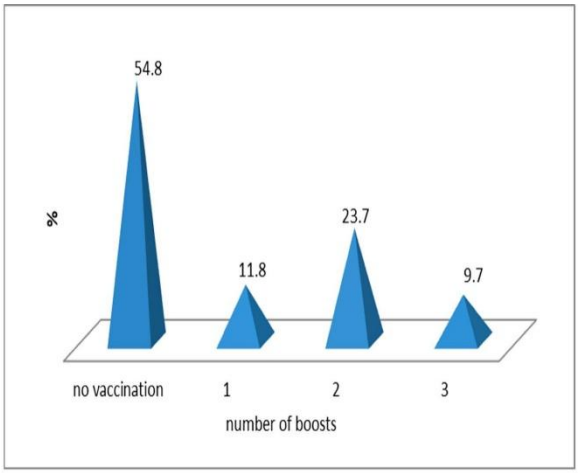

Fig.6: The Impact of COVID-19 Vaccination on Oxidative Stress and Cardiac Fibrosis Biomarkers inPatients.

II. CONCLUSION

According to the survey, two-thirds of medical professionals reported mild and short-experienced symptoms following vaccination. Fever, myalgia, and exhaustion were most frequently stated. These signs were in line with an immunological reaction that is frequently linked with vaccinations, and matched the results of phase 2/3 trials that had already been published. In 90% of cases, the symptoms were either less severe than anticipated or matched the person who received the vaccination. There were no reported serious incidents. The symptoms were more prevalent 21, 22 among younger

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people. Those with a history of COVID-19 did not exhibit any different symptoms. Taking two doses of either the ChAdOx1 nCoV-19 or BBV152 vaccine lowers the chances of getting COVID-19 and makes the illness less severe, compared to just one dose. These vaccines also offer some protection against serious COVID-19 illness. Doctors who are vaccinated and work with COVID-19 patients every day are not more likely to get infected after vaccination. However, people with existing health problems are more likely to get infected and have more severe illness even after getting vaccinated. More studies are needed to confirm how well these vaccines work, especially in both the general public and people at higher risk.[23,24,25,26]

Background:

Emphasizing the Real-World Setting:

India began vaccinating against COVID-19 on January 16, 2021, utilizing Covishield and Covaxin. We conducted this research in Mumbai, India, to understand the real-world efficacy the COVID-19 vaccines. The specific objectives were to measure their ability to prevent breakthrough infections and severe symptomatic illness among healthcare workers and to identify related effectiveness factors.[27,28]

Vaccine Effectiveness:

Covishield Effectiveness in India (Study-Based)

Against Laboratory-Confirmed COVID-19:

One dose: 49% effectiveness.

Two doses: 54% effectiveness.

Against Severe Disease:

Moderately severe disease: ~95% effectiveness.

Severe infection requiring hospitalization: Nearly 100% effectiveness.

Vaccines used in India: (The major vaccines used (or approved) in India include)

Covishield (Oxford/AstraZeneca vaccine produced by Serum Institute of India; adenovirus vector)

Covaxin (BBV152, an inactivated whole-virus vaccine by Bharat Biotech)

Sputnik V (used to some extent)

Plus, boosters or heterologous combinations in some studies.

ADVERSE EFFECT / SIDE EFFECT:

COVID-19 vaccination side effects in India can vary depending on the vaccine type and individual response. Here's a breakdown of reported side effects:

Common Side Effects:

Pain, swelling, or redness at the injection site

Fever, headaches

Irritability

Fatigue

Body rashes

Serious Side Effects (Adverse Events of Special Interest):

Stroke and Guillain-Barre Syndrome: reported in nearly 1% of individuals who received Covaxin

Myocarditis and Pericarditis: inflammation of the heart tissue, with symptoms like difficulty breathing, chest pain, and palpitations

Blood Clots: rare cases of thrombocytopenia and venous thromboembolism reported with Covishield

Severe Allergic Reactions: anaphylaxis, which can be life-threatening if not treated promptly..[29]

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Focusing on Categorized Side Effects: Covaxin-Specific Side Effects: Reported adverse events for Covaxin in adolescents and adults include new skin and subcutaneous disorders. Female participants also noted menstrual abnormalities (changes in their cycles). Furthermore, a small fraction of participants reported ocular (eye) abnormalities and hypothyroidism. Covishield-Specific Side Effects: Adverse reactions associated with Covishield include the rare condition Thrombosis with Thrombocytopenia Syndrome (TTS), which involves blood clotting combined with a low platelet count. There have also been reports of Myocarditis and Pericarditis (inflammation of the heart muscle and surrounding tissue), particularly in younger individuals.

Important Note: It is crucial to remember that these side effects are possible, but for the majority of people, the benefits of COVID-19 vaccination—namely, preventing severe illness and hospitalisation—are greater than the potential risks. If you experience any unusual symptoms after receiving the vaccine, you should seek advice from your healthcare provider.[30]

Concise Summary of Adverse Events

Specific Adverse Events for Covaxin:

Skin: New-onset skin and tissue disorders (in adolescents and adults).

Women's Health: Menstrual cycle changes/abnormalities.

Other: Ocular (eye) abnormalities and hypothyroidism (reported in a small percentage).

Specific Adverse Events for Covishield:

Blood/Clotting: Thrombosis with Thrombocytopenia Syndrome (TTS)—a rare condition involving blood clots and low platelets.

Cardiac: Myocarditis and Pericarditis (inflammation of the heart), mainly reported in younger people.

Overall Context: While these adverse effects can occur, the protection offered by the COVID-19 vaccine against severe illness and hospitalisation generally outweighs the associated risks. Always consult a doctor if you experience unusual symptoms after your vaccination.[31,32]

Side effects:-

Menstrual issues noted in women, some female participants reported changes in their menstrual cycle.

Smaller number also experienced eye problems and thyroid issues.

More serious side effects—like strokes and Guillain-Barre Syndrome—were seen in a few individuals.

The study found that teenagers, women, and people with allergies or who had typhoid after vaccination were more likely to face these serious side effects.

Those with other health conditions were also at higher risk of long-lasting issues.

The findings show that people who get vaccinated should be monitored for side effects over time, especially those who had COVID-19 before or have other medical problems.

Researchers also noted that the side effects from Covaxin were different from those seen with Covishield and varied by age group.[33]

Focusing on the Categories of Effects The most commonly observed Adverse Events of Special Interest (AESIs) reported after receiving Covaxin differed slightly by age group. In adolescents, frequent side effects included new skin and subcutaneous disorders, as well as issues classified under general disorders and nervous system disorders. Adults most often reported issues categorized as general disorders, musculoskeletal disorders, and nervous system disorders.

Concise Summary by Age Group

After Covaxin vaccination, adolescents frequently experienced new-onset skin problems, general health issues, and nervous system symptoms. Among adults, the most common reports were related to general disorders, problems with muscles and bones (musculoskeletal), and nervous system issues.

Emphasizing the Most Common Reports

The most frequent adverse events following Covaxin vaccination for adolescents were: new skin conditions, general systemic problems, and nervous system issues. For adults, the most commonly reported side effects involved general health issues, musculoskeletal problems, and nervous system disorders.[34,35]

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