IMPACT OF COVID-19 VACCINES ON THE HEALTH OF INDIVIDUALS ACROSS VARIOUS AGE GROUPS IN GOA

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Abstract

Amidst the covid-19 pandemic, vaccination plays a crucial role to mitigate the spread of the virus and its adverse effects on public health. With widespread rollout of SARS-CoV-2 vaccines that have received emergency use authorization by the WHO across the world, understanding dynamics of vaccines among various demographics is important for vaccine acceptance and to enhance vaccine uptake and address vaccine hesitancy effectively. The goal of this study is to explore the impact of Covid-19 vaccine on health of different age group individuals across Goa (India). Using a comprehensive survey methodology, data was collected involving participants from diverse age brackets ranging from young adults to the elderly, residing in different regions of Goa regarding vaccination status, reasons for vaccine acceptance or hesitancy, experiences with side effects, and overall perception of vaccine efficacy. Additionally, it also focuses on the emergence of mutant strains of the virus and waning of vaccine effectiveness over a period of time. By analyzing the survey responses, pimples, fever, chest pain, cardiac attack, menstrual changes, pain at injection site were the most common symptoms documented. Statistical analysis using PSPP software and Microsoft excel worksheet showed association between age and adverse effects post vaccination concluding that as age increases adverse effects of the vaccine also increases. It was also reported that there is substantial association between the Covid-19 vaccine and its adverse effects. It also highlighted that booster dose uptake is relatively lower in Goa with the Covishield vaccine being more widely accepted compared to Covaxin among individuals.

Keywords:

Sars-Cov2, Covid-19, Vaccine Effectiveness, Adverse Effects, Immunocompromised

1. INTRODUCTION

COVID-19 was declared a global health emergency in January 2020 with 775 million confirmed cases and around 7 million deaths across the world according to the World Health Organization (WHO). It is primarily transmitted through respiratory droplets and close contact with infected individuals, with symptoms ranging from mild respiratory illness to severe pneumonia and multi-organ failure [1].

Lockdowns, travel restrictions, and social distancing measures were implemented to reduce virus transmission, protect vulnerable populations, alleviate strain on healthcare systems, and mitigate the impact on public health and economies.

The development and deployment of COVID-19 vaccines have marked significant milestones in the global battle of the Covid-19 pandemic. Although the standard timeline for vaccine development is 10-15 years, COVID-19 vaccines have been developed within less than 1 year [2]. Multiple vaccines were developed using diverse technology platforms, such as mRNA, viral vector, DNA, inactivated, attenuated, virus-like particles (VLP'S), and protein subunit platforms [3]. More than 100 vaccines had been developed, among which WHO had approved 8 vaccines for emergency use. In India, two Covid-19 vaccines had been approved [4]. Mass vaccination programs aimed to achieve herd immunity and control virus transmission, leading to the gradual relaxation of pandemic-related restrictions.

Vaccine hesitancy and refusal, have been significant hurdles in the vaccination process for various pandemics, including COVID-19. Across different regions, acceptance rates for COVID-19 vaccines have varied widely due to factors such as vaccine availability, mandatory vaccination policies, insufficient time for clinical trials, perceived effectiveness and experiences of adverse events following immunization (AEFI) with COVID-19 vaccines [5].

The impact of Covid-19 vaccine doses was reported from mild to moderate on everyday life activities among vaccine recipients [6]. Therefore, clear and reliable information is crucial to boost public acceptance of COVID-19 vaccines, build trust in vaccine safety, and ensure an understanding of potential adverse effects. Understanding the dynamics of vaccines among various demographics is essential to overcome challenges including equitable distribution, vaccine hesitancy, and the emergence of new variants of the virus.

The aim of this study is to statistically estimate the effectiveness of the COVID-19 vaccine in different age groups across Goa, to investigate the association between vaccine administration and post vaccination complications and to study the adverse effects in COVID-19 vaccinated people.

2. METHODOLOGY

The study utilized a comprehensive survey method and involved a total of 331 participants from various locations across North and South Goa to evaluate COVID-19 vaccine adverse effects (AE).

Using Google forms and personal interviews, it targeted both vaccinated and unvaccinated individuals. Data collection occurred from January to April 2024, with follow-up reminders sent to enhance response rates.

The questionnaire included two main sections: (i) sociodemographic data, health related factors, and history of SARS-CoV-2 infection. (ii) Covid-19 vaccination related data including vaccine type and doses, self-reported AEs, and post vaccination infection.

The collected data was analyzed using software PSPP (free software application for analysis of sampled data) and Excel, applying chi-square tests and correlation to examine vaccine-related associations and explore AEs across age groups and individuals with prior allergic reactions. Common symptoms and vaccine types were also identified.

3. RESULTS

3.1 TYPE OF COVID-19 VACCINES

77.3 % of the participants received Covishield, 10.27% received Covaxin and 12.8% were unaware of the vaccine received (Fig.1).
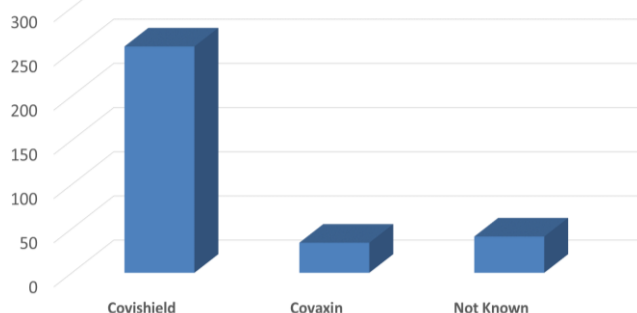

Fig.1. Types of Covid-19 vaccines received

3.2 EFFECTIVENESS OF COVID-19 VACCINES

- Null hypothesis (H_0): There is no significant differences in COVID-19 infection rates between vaccinated and unvaccinated individuals
- Alternative hypothesis (H_1): Vaccinated individuals have lower COVID-19 infection rates compared to unvaccinated individuals.

Table. 1. Chi square test for vaccinated individuals V/S diagnosed with Covid-19 vaccines

	Value	Degree of freedom	Asymptotic sig. (2 tailed)
Chi square	1.10	1	0.294

Chi square test shows Test statistics value 0.294 lower than the P value 1.10 (Table.1). Therefore, we accept the null hypothesis.

1.1 Association between the age groups and effectiveness of Covid-19 vaccines

- Null hypothesis (H_0): there is no correlation between the age group and effectiveness of COVID-19 vaccines.
- Alternative hypothesis (H_1): there is correlation between the age group and effectiveness of COVID-19 vaccines.

Table.2. Chi square test for association between the age groups and effectiveness of Covid-19 vaccines

	Value	Degree of freedom	Asymptotic sig. (2 tailed)
Chi square	1.10	1	0.14

Chi square test shows Test statistics value 0.14 lower than the P value 0.10. Therefore, we accept the null hypothesis (Table.2).

3.3 ASSOCIATION BETWEEN VACCINE ADMINISTRATION AND SERIOUS COMPLICATIONS

- Null hypothesis (H_0): There is no significant association between COVID-19 vaccination and the occurrence of serious complications.
- Alternative hypothesis (H_1): COVID-19 vaccination is associated with an increased risk of developing serious complications.

Table.3. Chi square test for association between vaccine administration and serious complications

	Value	Degree of freedom	Asymptotic value (2 tailed)
Chi square	0.13	1	0.173

Chi square test showed Test statistics value 0.173 greater than P value 0.13 therefore we reject null hypothesis (Table.3).

3.4 ASSOCIATION BETWEEN THE DIFFERENT AGE GROUPS AND POST VACCINATION EFFECTS

- Null hypothesis (H_0): there is no association between different age groups and post vaccination effects.
- Alternative hypothesis (H_1): there is association between different age groups and the post vaccination effects.

Table.4. Chi square test for association between the different age groups and post vaccination

	Value	Degree of freedom	Asymptotic value (2 tailed)
Chi square	0.16	1	0.195

Chi square test showed Test statistics value 0.195 greater than P value 0.16 therefore we reject null hypothesis (Table.4).

3.5 ADVERSE REACTIONS TO COVID-19 VACCINES

For each dose, local adverse effects were most experienced followed by general, systemic and serious adverse effects (fig. 2).
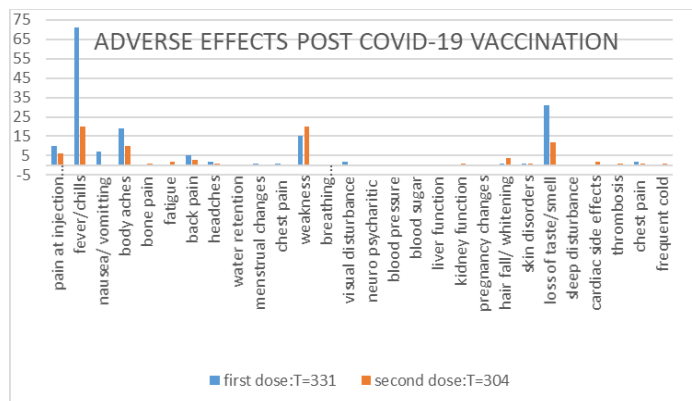

Fig.2. Adverse effects post Covid-19 vaccination

4. DISCUSSION

Since the onset of COVID-19, research has primarily concentrated on symptoms and vaccines, with ongoing concerns about safety and efficacy. Types of COVID-19 vaccines approved in India are Covishield and Covaxin, with Covishield being used most frequently among the participants. Effectiveness of Covishield vaccine shows nearly 90%, whereas Covaxin has an effectiveness of about 80%. However, evidence proved that health risks involved were more in Covishield than Covaxin.

It was reported that fully vaccinated adults against SARS-CoV-2 could carry the same viral load of the delta variant as those who are unvaccinated [7]. Our study indicates that there was not much difference in the infection rates between vaccinated and unvaccinated individuals.

The present study evaluated the side effects of COVID-19 vaccines among healthy individuals of different age groups in Goa. 166 participants experienced adverse effects after the first dose of covid-19 vaccine, whereas 165 individuals experienced adverse effects following the second dose.

Symptoms such as pain at injection site, fever, chills, loss of appetite, and gastrointestinal issues after the first dose. Following the second dose, participants reported symptoms including chest pain, menstrual changes, headaches, skin problems, hair loss, and cardiac events. In contrast, participants with previous history of allergic reaction experienced highest occurrence of adverse effects post COVID-19 vaccination.

Amer et al. [8] has highlighted headaches as a common symptom, potentially linked to inflammatory responses triggered by the vaccine's spike protein. Additionally, cerebrovascular thrombosis (CVT) has been noted as a rare adverse event related to the vaccine [8].

Out of 331 participants, 286 (86.4%) were diagnosed with adverse reactions after receiving the vaccine, compared to 30 participants (9.1%) who were not diagnosed with adverse reactions. It indicates COVID-19 vaccine is associated with an increased risk of developing adverse reactions. Additionally, the study highlighted that serious reactions such as heart attacks and strokes were among the most common severe adverse effects associated with the vaccine [6].

Age has been positively associated with effectiveness of Covid-19 vaccines, i.e. effectiveness of vaccine vary among different age groups with waning occurs faster in 80+ age group [9]. Boosters increased efficacy to over 85% and maintained lower or similar non-COVID-19 death rates compared to unvaccinated individuals, whereas in Goa booster dose uptake among different age groups is relatively low due to adverse effects of primary vaccine series.

5. CONCLUSION

These findings underscore the importance of vaccination in controlling COVID-19 and highlight the need for continued public health efforts to increase vaccine coverage.

Adverse effects of post COVID-19 vaccine among different age groups were seen. As age increased, adverse effects of the vaccines also increased. Statistical analysis confirmed association between the vaccination status and development of complications. Participants with no previous history of allergic reaction experienced lower rate of adverse effects post Covid-19 vaccination.

The survey highlighted hesitancy of a considerable number of individuals to get immunized due to insufficient clinical trials of the prescribed vaccine.

It also highlighted that booster dose uptake in Goa among different age group is very low due to the adverse effects of primary vaccine series. Covishield was the most frequent vaccine used among the population of Goa. Further extensive, thorough, and generalized research is necessary to understand the mechanisms driving vaccine efficacy and adverse effects, to draw solid conclusions.

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