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A Comparative Study of Oxygen Saturation in Vaccinated and Unvaccinated Covid Patient

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ABSTRACT: The second wave of the coronavirus has been different from the first one in many ways. It claimed more lives, as it was more infectious and has lasting post COVID complications.
The generation of vaccines may not prevent infection entirely but they are ensuing that the disease does not progress to severity. Previous study show that the lung parenchymal involvement is more common in the unvaccinated population

AIM OF THE STUDY:
The purpose of study is to see the oxygen saturation in 50 already vaccinated and 50 unvaccinated COVID patients at the time of admission in the tertiary care COVID hospital in Guwahati, Assam.
MATERIALS AND METHOD: It was a comparative study done in 100 COVID positive patients confirmed by RT PCR tests.
RESULT:Oxygen saturation in unvaccinated COVID19 patients was found to be significantly less in comparison to vaccinated people
Key word: SPO2 vaccination corona virus

I. INTRODUCTION:

On February 11,2020, the World Health Organization(WHO) named the respiratory illness caused by SARS COV-2 as Corona virus disease 2019 (COVID-19) and later declared it a pandemic on March 11, 2020.(1) Initially, the respiratory illness started from Wuhan in the Hubei province of China then spread to other countries and became a global problem. Whole genome sequencing and systematic analysis showed that this novel corona virus is a distinct clade from beta corona virus associated with human severe acute respiratory syndrome (SARS) and Middle East Respiratory syndrome(2) which was officially named "SARS-COV-2" by WHO.The patient's clinical manifestations included fever, unproductive cough, dyspnea, myalgia, fatigue, normal or decreased white blood count and imaging evidence of pneumonia. (3) The western World became most affected by the illness specially the United States and the European countries by the 1st wave of COVID-19. WHO coronavirus (COVID-19) Dashboard (2021) showed SARS-COV-2 accounted for more than 143 million infections and more than 3 million deaths worldwide by April 2021. Virus genomic sequences are being generated and shared at an unprecedented rate, with more than one million SARS-COV2 sequences available via Global initiative on sharing all influenza Data (GISAID) permitting near real-time surveillance of the unfolding pandemic (4) Further to understanding epidemiology, sequencing enables identification of emerging SARS-COV-2 variants and sets of mutations potentially linked to changes in viral properties.(5) These mutations of SARS-COV-2 have changed the course of COVID 19 with variants alpha, beta, gamma, delta lamda etc. These new variants have made the disease more contagious with severe lung involvements which has increased the need for oxygen supply of patients with decrease oxygen saturation in infected patients.
World meter COVID-19 corona virus pandemic 2019 published online April 10 shows that since the middle of March 2021, the 2nd wave has started and on April 9, 2021, highest number of cases (144,829) has been identified in India. Several administrative barriers affecting the co-ordination among the state, center and national institutes may be a contribution to the inadequate response to COVID-19 during the second wave (6). India is a country with a high population with regional variation in health literacy, health care inequity and poor risk perception among the general people (6)

Oxygen saturation is a measure of how much hemoglobin is currently bound to oxygen compared to how much hemoglobin remains unbound. The oxygen is taken up readily at high partial (eg in the lungs) and released as readily at low O_2 pressures (eg in tissues) this providing an effective system for transport of O_2 from the atmosphere to the cells of the body. At O_2 tension of 100mmHg or more, hemoglobin(Hb) is virtually 100% saturated, approximately 1.34ml of O_2 is then

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combined with each gram of Hb. (7) The current target oxygen saturation range for patients with COVID19 recommended by the National Institute of Health is 92-96%. Diffuse systemic endotheliitis and micro thrombi plays on important pathogen in the wide range of systematic manifestations, exacerbations of hypoxic pulmonary vascular endotheliitis/ micro thrombi the phenomenon of silent hypoxia with some patients presenting to the hospital with severe hypoxemia disproportional to symptoms and overburdened health system and public health resources in many parts of the world with adverse implications on outpatient monitoring and early institution of oxygen supplementation(8)

Indian Government started its vaccination drive from 16th January 2021 against Covid19 virus with two types of vaccines 1) Covishield manufactured by Central Drugs standard Control Organisation and Covaxin (Indian indigenous Covid19 vaccine) manufactured by Bharat Biotech in collaboration with Indian Council of Medical Research (ICMR) and National Institute Of Virology (NIV). It is seen that COVID-19 infections are taking place inspite of vaccination but most of the patients recover without complications if we compare with unvaccinated COVID -19 infected cases.

II. AIMS AND OBJECTIVES:

1) To compare the oxygen saturation between vaccinated and un- vaccinated Covid19 patients
2) To see the effect of co-morbidities in vaccinated and un-vaccinated cases

STUDY DESIGN:

The study is a hospital based analytical case control study. 100 cases of Covid19 patients confirmed by RAT and RTPCR tests were taken out of which 50 cases were already vaccinated (2 doses) as control and 50 cases were un-vaccinated as cases. The data were taken at the time of admission of the patients to the tertiary care Covid19 hospital in Guwahati from thehospital records. The results were expressed as mean +/-SD and pie charts and histogram. The data analysis is carried out using 't" test. The vaccinated and un-vaccinated cases is compared and a 'P' value <0.01 is taken to be statistically significant.

INCLUSION CRITERIA:

1) COVID -19 patient confirmed by RTPCR test
2) 50 already vaccinated patientswith 2 doses of vaccines(control)
3) 50 un-vaccinated patients (case)
4) Patients > 18yrs

EXCLUSION CRITERIA:

1) Patients <18 yrs
2) Pregnant women
3) Healthy individuals without COVID 19 infections

III. MATERIAL AND METHODS:

It was an analytical case control study which was done in a tertiary covid19 care hospital in Guwahati . 100 COVID-19 positive patients were taken confirmed by RT-PCR test. The study was carried out from 1sJune to 30thJune 2021.Of the total patients, 50 cases were already vaccinated and 50 were unvaccinated. The patients' medical history and other clinical data were collected through data collection tables in electronic medical records. The recorded information include demographic data, medical history, contact history, potential comorbidities, symptoms, signs, laboratory tests and oxygen saturation records.Oxygen saturation were recorded by pulse oximeter and lung involvement was also confirmed by X ray chest.

IV. RESULTS AND OBSERVATIONS:

Total of 100 covid19 positive patients which include 50 already vaccinated and 50 unvaccinated patient. From table 1 it is seen that the mean +/-SD of age was found to be 54.73+/-15.9 with the age ranging from 17 to 95 years. The mean +/- SD of SPO2 of vaccinated Covid19 patients were found to be 94.02+/-5.65 and the mean +/- SD of unvaccinated Covid19 patients were found to be 87.7+/-13.34 as shown in table 1. It was seen that oxygen saturation was significantly less P value < .01 in unvaccinated people which is shown in table 2. It was seen that out of the vaccinated people 17% were male and 33% were female shown in figure 1(a) and out of the unvaccinated people 16% were male and 34% were female as shown in figure 1(b). It was also seen that 35% of unvaccinated people were with comorbidities and 24% of vaccinated people were with comorbidities as shown in figure 2. It was observed that vaccinated cases of COVID 19 did not have oxygen saturation <60%, 9% cases had SPO2 between 61%-89% and 40% cases had SPO2 >90% in vaccinated cases.. It was observed 2% of unvaccinated COVID 19 cases have oxygen saturation <60%, 18% have oxygen saturation between 61%-89% and 19% have oxygen saturation > 90% as shown in figure figure3. The comorbidities present in vaccinated cases were found to be less than the comorbidities present in unvaccinated cases as seen in table 3(a) and 3(b).

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Table 1:

Statistical parameter	Age	SPO_2 in Non vaccinated	SPO_2 in Vaccinated
Mean+/-SD	54.73+/-15.9	87.7+/-13.34	94.02+/-5.65
Standard error	1.59	1.89	0.99
range	17-95	42-100	68-99

Table 2: SPO2 compared between vaccinated and non-vaccinated cases

P value	<0.002
t value	1.68

Figure 1(a): Sex ratio among vaccinated cases

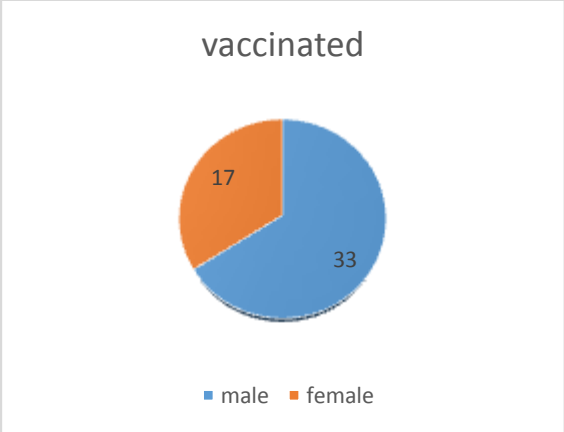

Figure 1(b): Sex ratio among unvaccinated cases

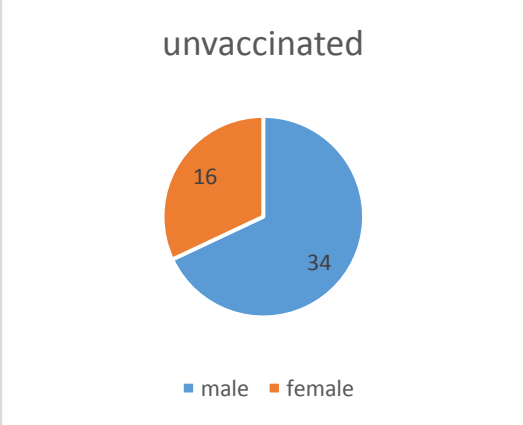

Figure 2: Covid19 +ve patients with comorbidities

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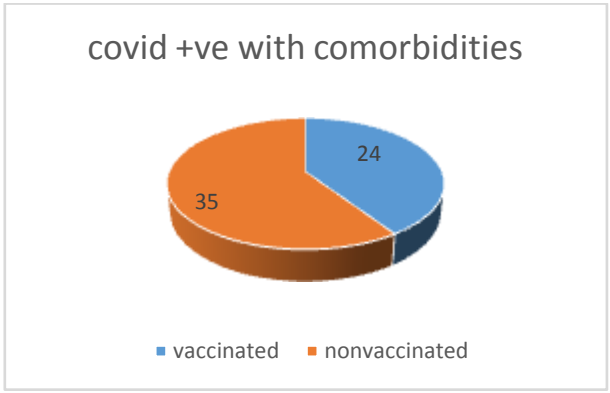

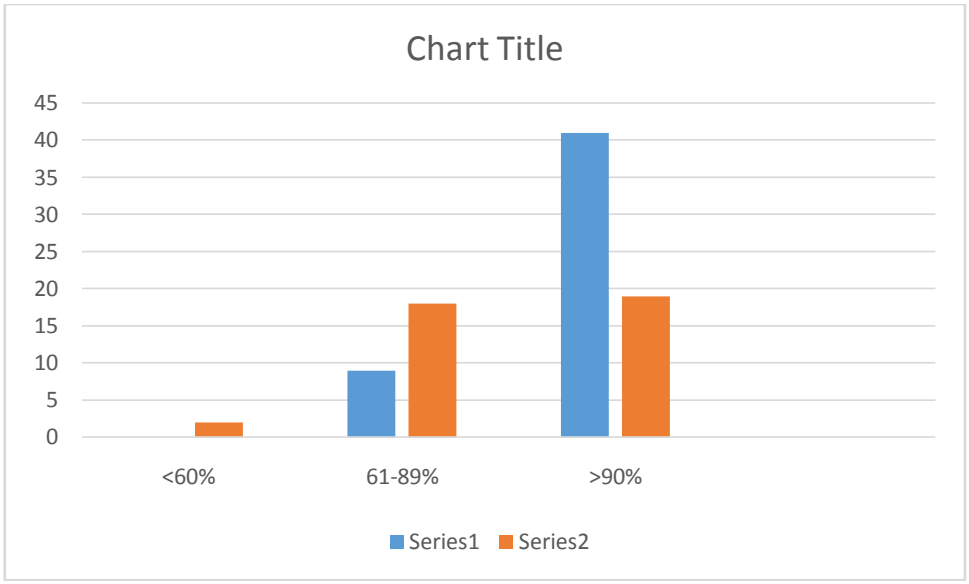

Series 1: Vaccinated Covid19 cases
Series 2: Non vaccinated Covid19 cases
Figure 3: Different levels of SPO2 in vaccinated and unvaccinated

Table 3(a): Different comorbidities with vaccinated cases

Diabetes mellitus	Hyper tension	Cardiac problem	Chronic Kidney disease	Chronic pancreatitis	Parkin-sonism	Thyroid disease
9	11	1	1	1	1	4

Table 3(b): Different comorbidities with unvaccinated cases

Diabetes mellitus	Hyper tension	Cardiac problem	Chronic Kidney disease	Ch. gastritis	jaundice	Chronic liver disease
11	17	1	8	1	1	1

Ca larynx	Ca oesophagus	Asthma	Renal stones
1	1	1	5

V. DISCUSSION

It was observed that oxygen saturation of the vaccinated covid 19 patient was much higher in comparision to the unvaccinated covid positive patient. The mean +/- SD of SPO2 of vaccinated Covid19 patients were found to be 94.02+/-5.65 and the mean +/- SD of unvaccinated Covid19 patients were found to be 87.7+/-13.34 as shown in table 1. It was seen that oxygen saturation was significantly less P value < .01 in unvaccinated patientswhen compared with vaccinated patients as shown in table 2. It was seen that out of the vaccinated people 17% were male and 33% were female shown in figure 1(a) and out of the unvaccinated people 16% were male and 34% were female as shown in figure 1(b). It was also seen that 35% of unvaccinated people were with comorbidity and 24% of vaccinated people were with comorbidity as shown in figure 2. Different comorbidies present in vaccinated and unvaccinated patients as shown in table 3.It was observed that vaccinated cases of COVID 19 did not have oxygen saturation <60%, 9% cases had SPO2 between 61%-89% and 40% cases had SPO2 >90% in vaccinated cases.. It was observed 2% of unvaccinated COVID 19 cases have oxygen saturation <60%, 18% have oxygen saturation between 61%-89% and 19% have oxygen saturation > 90% as shown in figure figure3.

In a previous study done Dr P Madhuet al after analysing CTscans reportsof 206 covid19 patients the study found that amongst who were vaccinated only 12% had lung involvement on the other hand unvaccinated covid19 positive patient had 88% lung involvement During January-March 2021,in a multistate network of U.S. hospitals, vaccination was associated with a reduced risk for COVID19-associated hospitalisation among adultsaged> 65 years (9,10). Early reports from Israel have also documented the real world effectiveness of SARS-COV-2 vaccinations including among older adults (11,12)

Another study released by Fortis health care on june17 found that
a majority of fullyvaccinated health care workers develop only mild illnessafter contracting the corona virus and largely recovered from home

As of 19April ICMR 2021,bulletin the Astra Zeneca vaccine is effective and safeat protecting people of extremely serious risk of covid19.

VI. CONCLUSION-

While wide spread vaccination remains the pandemic end game,it is unlikely to prevent all infection.Those who developed covid19 infection after vaccination will probably have a milder illness and so the risk of breakthrough infections should not deter us from using current vaccines.Further study into the causes of breakthrough SARS COV2 infections could help scientists to refine covid19 vaccines or the schedule of booster doses.

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