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ORIGINAL ARTICLE **OPEN ACCESS**

Comparative Study of Different Phases of Covid 19 Pandemic With Reference to Symptoms

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ABSTRACT
The rapid global pandemic of SARS-CoV-2 has already posed a great threat to human health, social health system, global economy, and even the global governance, and these influences may likely continue for a longer time. The present study reveals that the implementation of lockdown due to COVID-19 pandemic consequence in drastic changes in the Satana City of Nashik District (Maharashtra) from 1st January to 30th June 2020.According to the survey, 212 (68%) patients were getting infected with coronavirus because of contact with infected people. From results showed that (173) people with infection of Covid 19 had been hospitalized. In the present work, a total of females 120 (38%) were distributed age group-wise. Vaccination is very important for the prevention of disease. In the present study, a total of 204 people were vaccinated by Covishield followed by 97 people by Covaxin, 2 by Sputnik, and 9 were not vaccinated. Total 79% of people were getting infected before vaccination while 21% of people were infected by corona who had already taken vaccination. The present study describes the COVID-19 situation in Balgan (Satana) tahsil of District Nashik, Maharashtra.
Key words: *COVID-19, Covaxin, Covishield, coronavirus, pandemic, SARS-CoV-2*

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INTRODUCTION

Coronaviruses are a family of viruses that can cause respiratory illness in humans. They are called "corona" because of crown-like spikes on the surface of the virus. Severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), and the common cold are examples of coronaviruses that cause illness in humans. The name was coined by June by Almeida et al., in 1968 who first observed and studied human coronaviruses. The name refers to the characteristic appearance of virions (the infective form of the virus) by electron microscopy, which has a fringe of large, bulbous surface projections creating an image reminiscent of the solar corona or halo [2, 25]. This morphology is created by the viral spike peplomers, which are proteins on the surface of the virus [22]. The scientific name *Coronavirus* was accepted as a genus name by the International Committee for the Nomenclature of Viruses (later renamed International Committee on Taxonomy of Viruses) in 1971[11].

World health organization declared an outbreak of pandemic due to the SARS-COV-2 virus on 11th March 2020 and named the contagious disease COVID-19 due to thirteen-fold increases in the number of cases in China, with 114 countries affected and 4291 deaths [27]. COVID-19 is not a new virus that caused the pandemic situation, earlier the same group of Coronaviruses (CoV) known as Severe Acute Respiratory Syndrome (SARS) in 2003, and the Middle East Respiratory Syndrome coronavirus (MERS-CoV) in 2012 already a same chaotic situation [17, 30]. Since the first spread of COVID-19 at Wuhan, China, in December 2019, consequences in the report of total cases above one million within the first four months [18]. On 30th January 2020, India reported its first active case of COVID-19 patient with a travel history from Wuhan [10]; since then, the number of cases was continued to spike in the country.

The pandemic of coronavirus disease 2019 (COVID-19) has resulted in an unexpectedly high number of hospitalizations for pneumonia with multiorgan illness. SARS-CoV-2 infection can be asymptomatic or induce a wide range of symptoms, including upper respiratory infection symptoms and life-threatening sepsis. In December 2019, the World Health Organization (WHO) was informed about an outbreak of pneumonia in Wuhan, Hubei Province, China, and the etiology was not identified. On January 30, 2020, WHO declared that the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) epidemic is a public health emergency of international concern (PHEIC). On February 11, 2020, the WHO officially named the current outbreak of coronavirus disease as Coronavirus Disease-2019 (COVID-19) [24] and

the International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-CoV-2 [7]. Data as received by WHO from national authorities by October 11, 2020, there were more than 37 million confirmed cases of COVID-19 and 1 million deaths. The total cumulative number of confirmed cases have far exceeded the number during SARS period [26]. After the emergence of SARS-CoV and MERS-CoV, SARS-CoV-2 is the third zoonotic human coronavirus of the century [6].

Coronaviruses are often found in bats, cats, and camels. Bats appear to be the natural reservoir of SARS-CoV-2[29, 31]. In one study, betacoronavirus isolated from pangolins has a sequence similarity of up to 99% with the currently infected human strain[13]. Another study indicates that SARS-CoV-2 and the coronavirus from a pangolin in Malaysia has high genetic similarity. The gene similarity between these two viruses in terms of E, M, N, and S genes is 100, 98.6, 97.8, and 90.7%, respectively, suggesting the potential for pangolins to be the intermediate host [28]. Among the animals in close contact with humans, dogs, chickens, ducks, and pigs are not permissive to infection. SARS-CoV-2 replicates efficiently in cats and ferrets [19]. SARS-CoV-2 can also transmit in golden hamster (Sia et al., 2020). The viruses live in but don't infect the animals. Sometimes these viruses then spread to different animal species. The viruses may change (mutate) as they transfer to other species. Eventually, the virus can jump from animal species and begin to infect humans. In the case of SARS-CoV-19, the first people infected are thought to have contracted the virus at a food market that sold meat, fish and live animals.

SARS-CoV-2, the virus that causes COVID-19, enters your body through your mouth, nose or eyes (directly from the airborne droplets or from the transfer of the virus from your hands to your face). It then travels to the back of your nasal passages and mucous membrane in the back of your throat. It attaches to cells there, begins to multiply and moves into lung tissue. From there, the virus can spread to other body tissues [5].SARS-CoV-2 is transmitted via fomites and droplets during close unprotected contact between the infected and uninfected. Symptomatic and asymptomatic patients are the main source of infection. The virus can also spread through indirect contact transmission. Some studies have demonstrated the aerosol transmission of SARS-CoV-2. During the COVID-19 outbreak, one study investigated the aerodynamic nature of SARS-CoV-2 by measuring viral RNA in aerosols in two Wuhan hospitals, indicating that SARS-CoV-2 has the potential to spread through aerosols [3, 14].

Coronaviruses primarily infect human lung cells through a receptor for an enzyme called Angiotensin Converting Enzyme 2 (ACE2). ACE2 is a member of the family of angiotensin converting enzymes that includes ACE, for which many Americans take blood pressure medicines composed of chemicals that act by inhibiting ACE. As the first step leading to viral infection, the virus spike protein recognizes and binds to the ACE2 receptor. The virus is then incorporated into the lung cells and the viral RNA is released into the cytoplasm. The viral RNA molecules recruit the cellular apparatus to make thousands of copies of the viral RNA and also instruct the cells to synthesize hundreds of thousands of nucleocapsid, membrane, envelope, and spike proteins. These assemble into new virus particles which bud out of the cell surface membrane. The cells release the newly formed viral particles propagating the infection and eventually die.In some pediatric SARS-CoV-2 infection cases, although children's nasopharyngeal swabs are negative, rectal swabs are consistently positive, indicating the possibility of fecal-oral transmission. Recent studies demonstrate that SARS-CoV-2 could replicate effectively in human intestinal organoids and intestinal epithelium. As a result, SARS-CoV-2 has the potential to spread through intestinal tract. SARS-CoV-2 can also infect the intestinal cells of bats [12, 31]. A COVID-19 patient's urine also contains infectious SARS-CoV-2 [23]. After studying COVID-19 infection in nine pregnant women, the result suggests that there is no evidence that pregnant women who were infected SARS-CoV-2 in late pregnancy can transmit the virus to infant through intrauterine vertical transmission [4]. However, recently, some studies demonstrated the possibility of vertical transmission of SARS-CoV-2 [4, 9, 16].

There have been four lockdown periods in India, with the fourth unlock phase currently underway. All previous research has focused on the impact of lockdown on the healthcare and banking sectors in various cities during pre- and post-lockdown conditions. Because there hasn't been a nationwide shutdown of diverse industries/activities, these lockdown periods can be used to identify hotspots in India. Present study focuses on impacts of various lockdown phases in Satana City of Nashik District with sign and symptom in the patient in the various phase of COVID-19 and effect of vaccination.

MATERIAL AND METHODS

In the present study, comparative study of different phases of covid 19 pandemic with reference to symptoms among Satana Taluka was carried out. For survey study questionary google form was prepared.

Sample Collection

The target population for the present study was villages of Satana tahsil.The sample size for the present study was 300. In the present study, purposive sampling was based on the question-and-answer form, the people above 18 years of age were considered for study.

Method of Data Collection

The data were collected from the people of Satanatahsil using google form as below https://docs.google.com/forms/d/e/1FAIpQLSeuGUpRjEiqbHDbdbx1pIwCLUDLZR9NjKEpBge_E9L1sZxpiQ/viewform?usp=sf_link

The following questionnaires was prepared and used in the study

1. Name
2. Gender
3. age
4. Address
5. Education
6. Blood group
7. Have you ever been infected with corona virus?
8. If your answer is YES then in which wave/phase you infected?
9. If you infected in 1st phase which type of symptoms occurred?
10. If you infected in 2nd phase which type of symptoms occurred?
11. If you infected in 3rd phase which type of symptoms occurred?
12. Do you have infected with mucormycosis?
13. Which symptom is 1st observed in your body after affected with covid 19?
14. Do you have any respiratory symptoms?
15. Do any of your family members also suffer from same symptoms
16. Did you have any contact with patients confirm with corona virus disease?
17. During infection of covid 19 you had been hospitalized?
18. If yes then what was your condition?
19. During infection of covid 19 you had only home quarantine?
20. If you home quarantine which precautions you follow?
21. Which test had carried out for confirmation that you are infected?
22. If you had done HRCT-SCAN test then what is your score?
23. After how many days the symptoms occurred in your body?
24. Which symptom was serious during covid 19 infection?
25. Are you vaccinated?
26. Which vaccine you get?
27. Do you infected after or before vaccination?
28. If you infected after vaccination then which symptom mild or serious?

Other Data Collection

Epidemiological data for study area were obtained from https://howindialives. com/gram/corona districts/ and https://www.covid19india.org/ and Public Health Department, Government of Maharashtra. Population demographics data were obtained from the Census of India website (https://censusindia.gov.in/2011-common/censusdata2011.html) and the Government of Maharashtra (https://mahades.maharashtra.gov.in/files/publication/unicef_rpt/chap1.pdf).

Data Analysis

The major aim of this article is to collect, process, analyze and visualize the result in to its geographical form for the easy understating and for further usages. The primary data of COVID19 is collected from Ministry of Health and Family Welfare (https://mohfw.gov.in), COVID19INDIA (https://covid 19india.org), and local administrative. The collected data is processed into spreadsheets and arranged in the required manner.

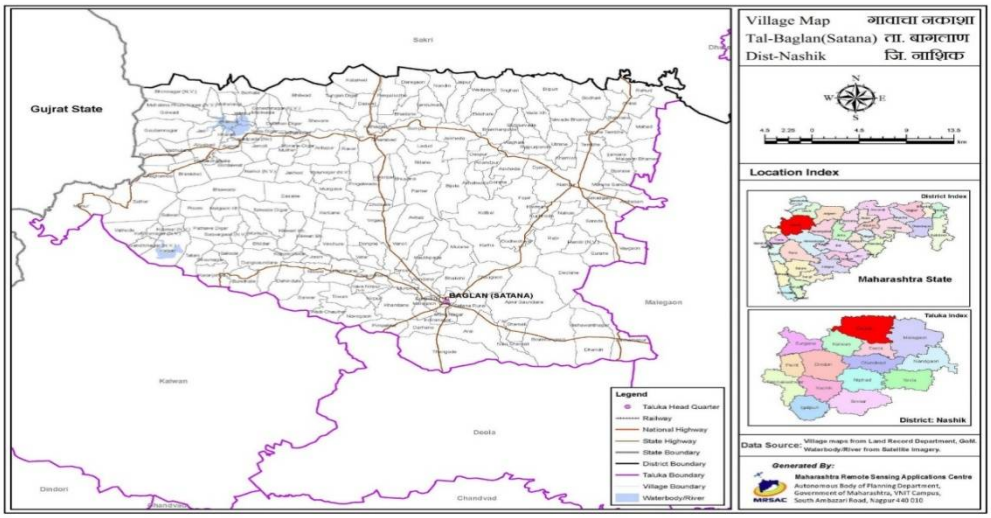

Fig. 1 : Study area: Baglan (Satana), Distict: Nashik (Maharashtra)

RESULTS AND DISCUSSION

In the present work, a total of 312 sample populations were selected for a survey study that is a comparative study of different phases of the Covid 19 pandemic with reference to symptoms. Out of 312 people, females were 120 (38%) and males were 192 (62%) analyzed by using different questionary (fig. 4.1).

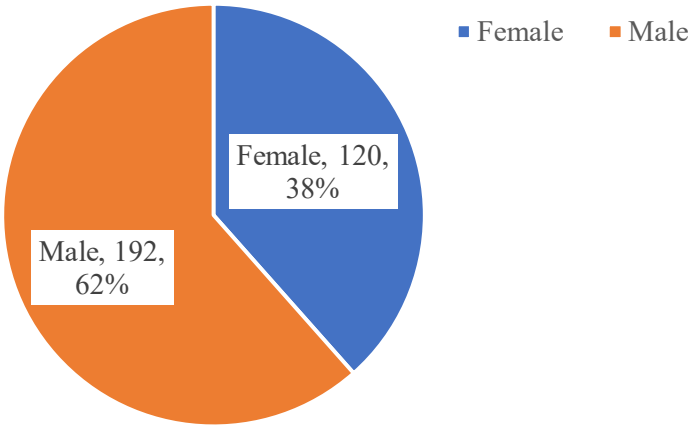

Fig. 4.1: Number and Percentage of Male and Female Sample Population for Analysis of Covid 19

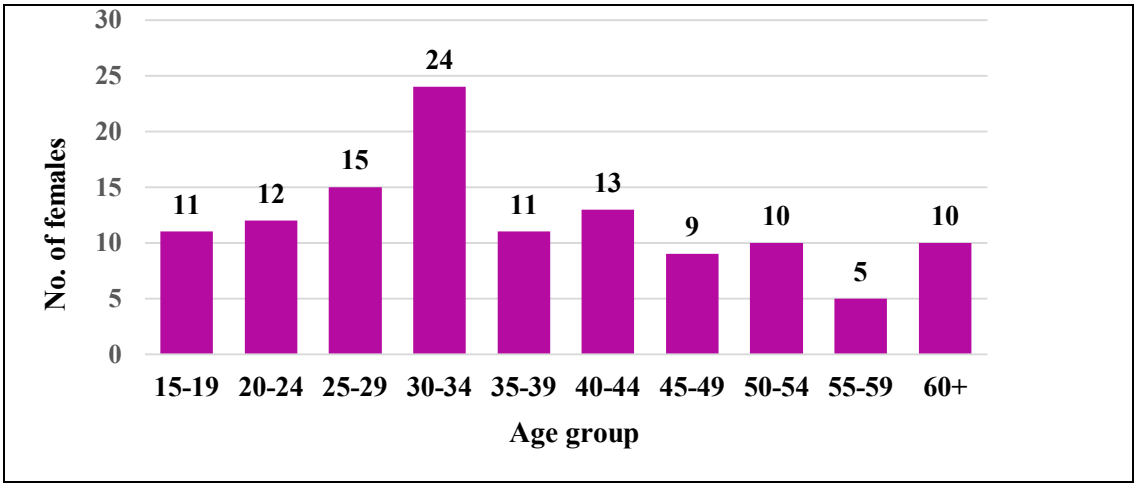

Fig. 4.2: Age Group-Wise Distribution of Females for Covid 19 Survey

In the present work, a total of females 120 (38%) were distributed age group-wise. Fig. 4.2 showed that the highest number of females (24) belonged to the age group 30-34 followed by 25-29 (15), 40-44 (13), and so on.
A majority of the coronavirus (COVID-19) cases in India affected people between ages 31 and 40 years as of October 18, 2021. Of these, the highest share of deaths during the measured time period was observed in people under the age of 50 years.

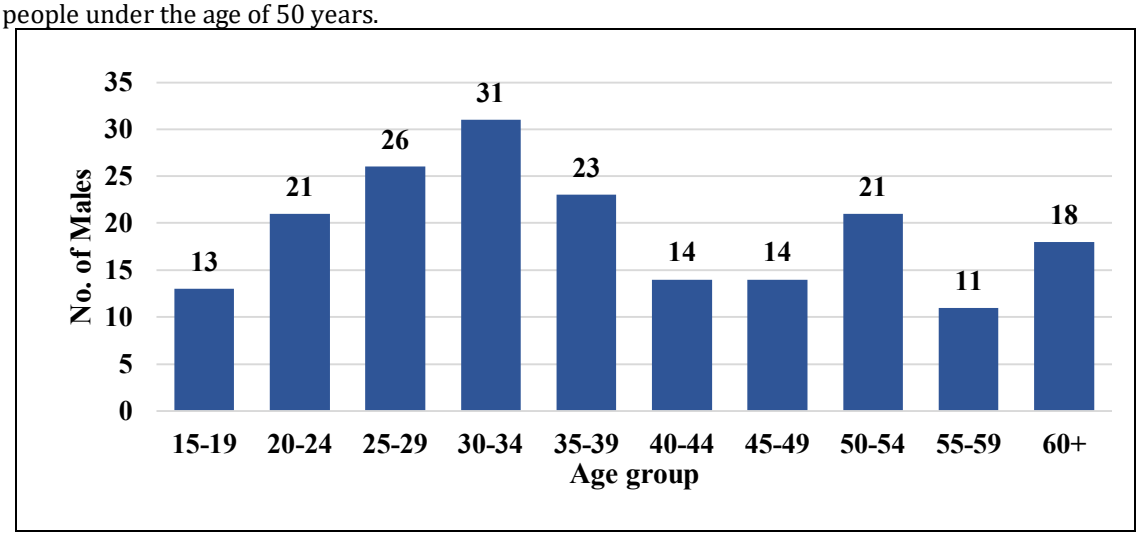

Fig. 4.3: Age Group-Wise Distribution of Males For Covid 19 Survey

A total of males 192 (62%) were distributed age group-wise. Fig. 4.3 showed that the highest number of males (31) belonged to the age group 30-34, 25-29 (26), similar to females followed by 35-39 (23), and so on.

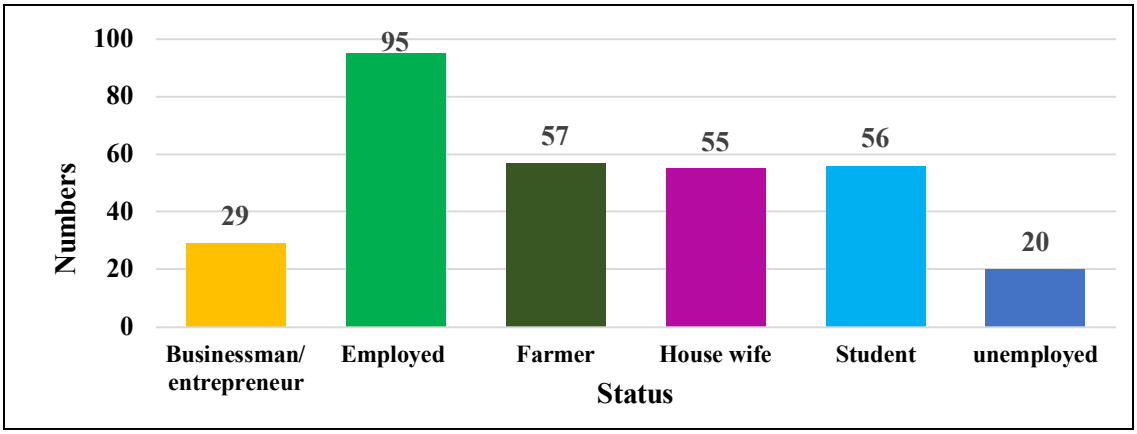

Fig. 4.4: Status Wise Distribution of People for Covid 19 Survey

From fig. 4.4, the sample population analyzed and distribution showed the highest number of employed people (95) followed by farmers (57), students (56), housewives (55), businessmen/entrepreneurs (29), and unemployed (20).

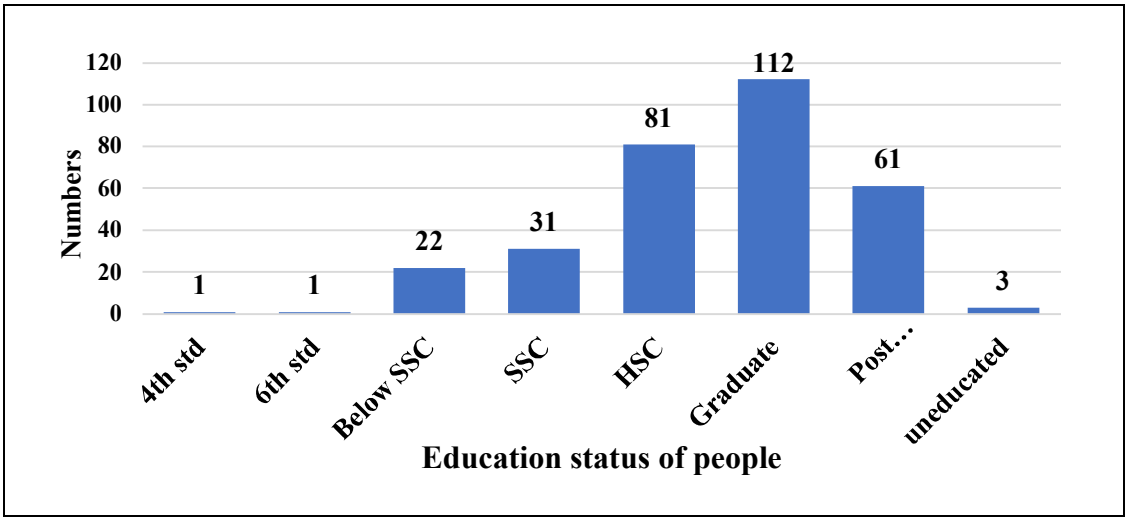

Fig. 4.5: Distribution of Population Education-Wise

Fig. 4.5 showed the distribution of the population education-wise, with the highest number of graduated people followed by HSC (81), Postgraduate (61), SSC (31), below SSC (22), uneducated (3) and 4th and 6thstd (1).

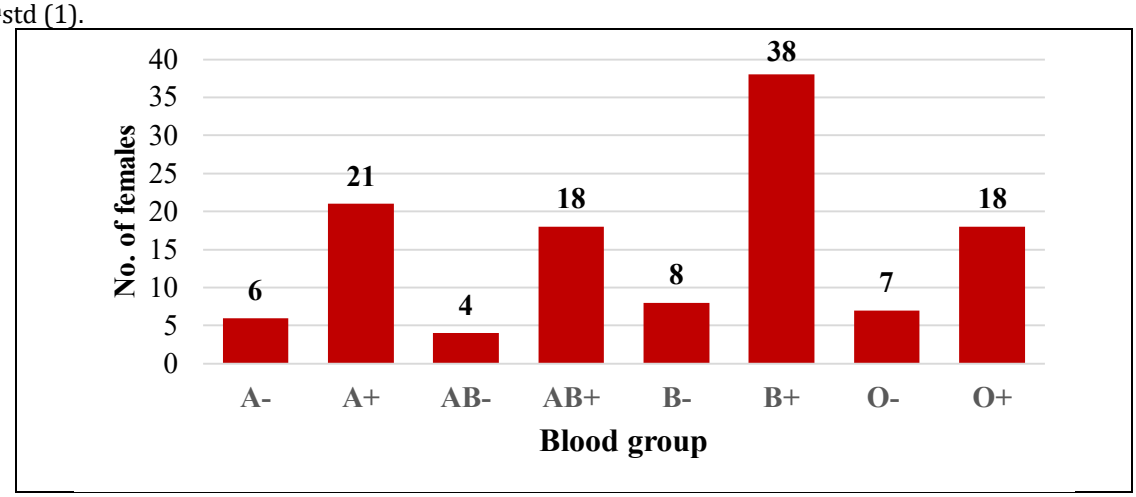

Fig. 4.6: No. of Females with Different Blood Group

Females (38) with B+ ve blood group were more in number than A+ve (21), AB+ve and O+ ve (18), B- ve (8), O-ve (7), A-ve (6) and very less AB-ve (4) were observed in sample population (Fig. 4.6).

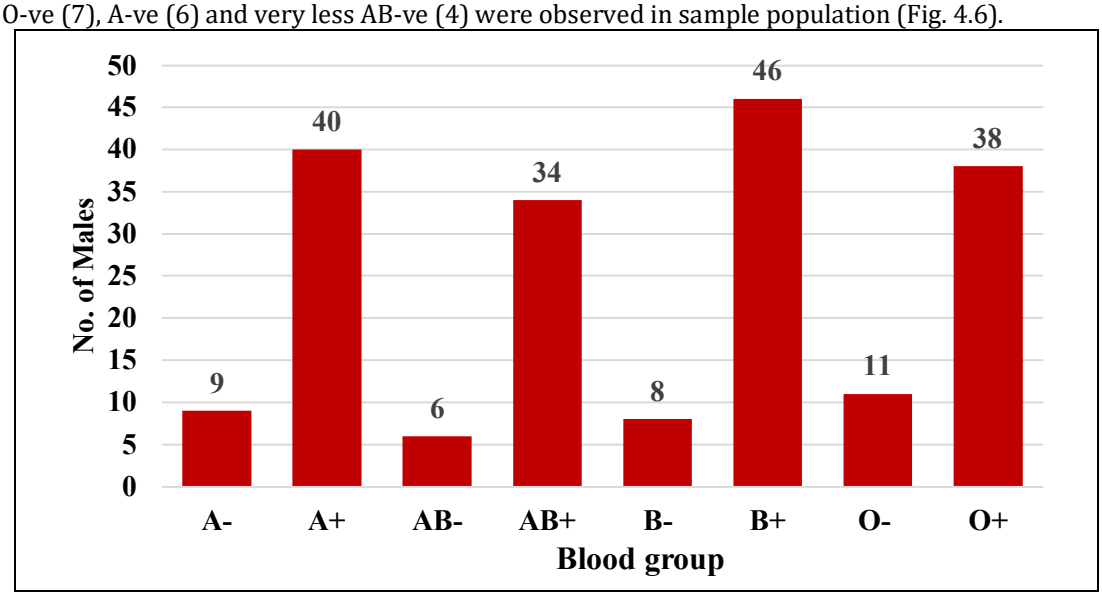

Fig. 4.7: No. of Males with Different Blood Group

Males (46) with B+ ve blood group were more in number than A+ve (40), O+ ve (38), AB+ve (34), O-ve (11), A-ve (9) and B- ve (8), and very less AB-ve (6) were observed in sample population (fig. 4.7).
Patients were enrolled from April 8, 2020 to October 4, 2020. A total of 2,586 real-time PCR (RT-PCR)-confirmed coronavirus disease 2019 (COVID-19) patients were recruited.

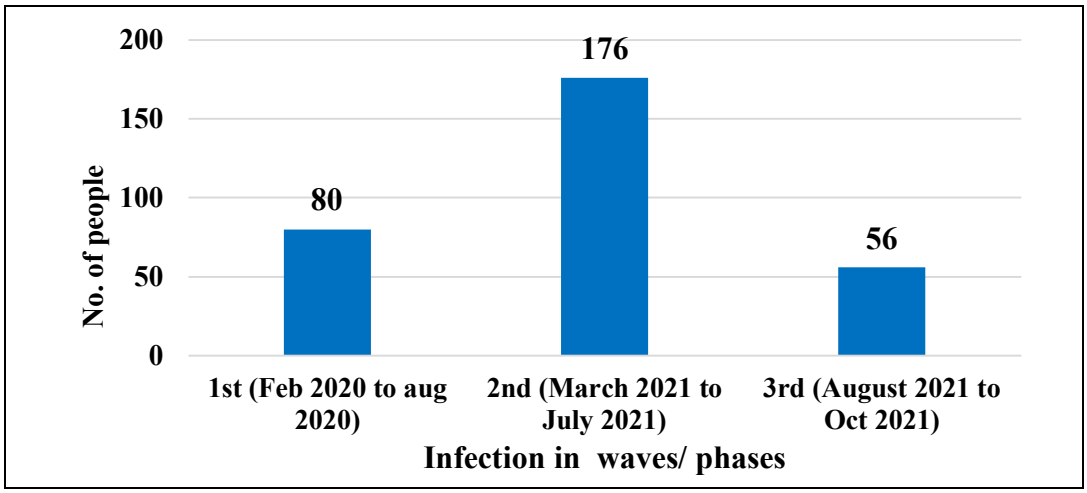

Fig. 4.8: No. of People Infected By Corona Infection in Different Waves/Phases

Among 312 sample populations, the highest number of 176 people get infected in 2nd wave/phase whereas 80 people were infected in 1st wave and 56 people were infected in 3rd wave (fig. 4.8). In the first wave, India registered quite a low number of COVID-19-positive cases/million people, but the scenario unexpectedly changed in the second wave, when even over 400,000 confirmed cases/day were reported. Lineage analysis in India showed the emergence of new SARS-CoV-2 variants, i.e., B.1.617.1 and B.1.617.2, during April-May 2021, which might be one of the key reasons for the sudden upsurge of confirmed cases/day.

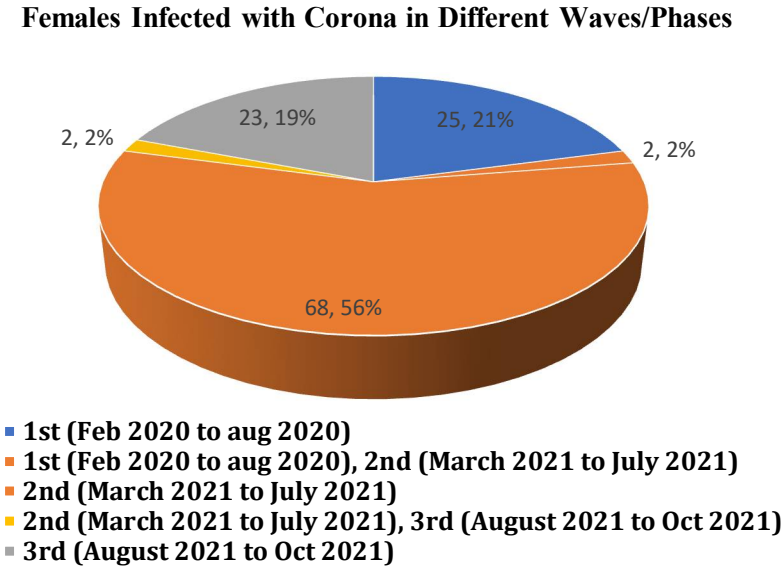

Fig. 4.9: Percentage of Corona Infection in Females in Different Waves/Phases

The highest percentage of females infected in 2nd phase (56%), whereas in 1st phase (21%) and in 3rd phase (19%).
According to a survey it was observed that females (8) with the O+ve blood group were infected more in number in 1st wave whereas females (32) who belonged to B+ve were infected in more number in 2nd phase while females (5) belonged to B+ve and AB+ve were infected more in number in 3rd phase.

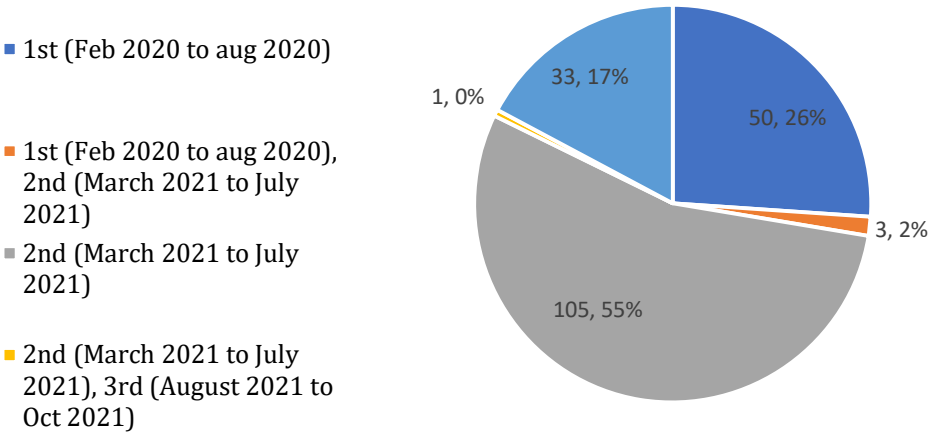

Fig. 4.10: Percentage of Corona Infection in Males in Different Waves/Phases

The highest percentage of males 55% were infected in more number in 2nd waves whereas 26% were infected in 1st waves while 17% were infected with a corona in 3rd waves (fig. 4.10). According to a survey it was observed that males (14) with the O+ve blood group were infected more in number in 1st wave followed by males (12) who belonged to blood group B+ve. Males belonged to A+ ve and B+ve were more in numbers infected in 2nd waves while A+ ve blood groups were observed in more numbers in 3rd waves. Cough, cold, fever, headache, chest pain, shortness of breathing, and redness of the eyes such kinds of symptoms were observed in all 3 waves but there were some variations observed from person to person.

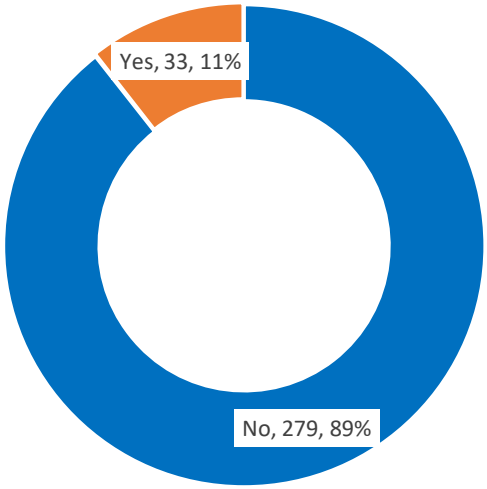

Fig. 4.11: People infected with Mucor mycosis

From fig. 4.11 people infected with mucormycosis showed that 33 people (11%) were getting infected with mucormycosis while 279 (89%) were not infected with mucormycosis.

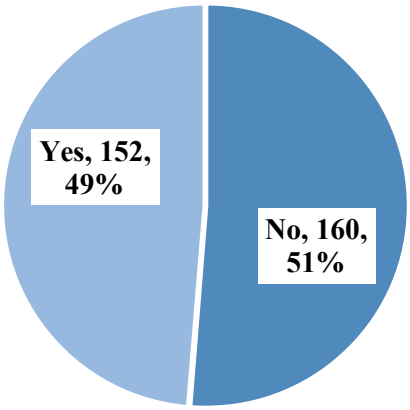

Fig. 4.12: People infected with respiratory symptoms by Covid 19

In the present study (fig. 4.12), people 152 (49%) infected with respiratory symptoms by Covid-19 were observed while there were no complaints from 160 (51%) patients regarding symptoms of the respiratory system.

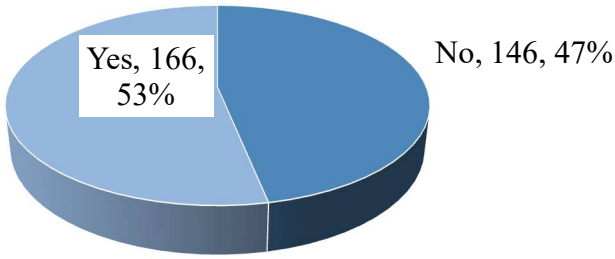

Fig. 4.13: Family members suffered from the same symptoms

When the question was asked patients whether their family members also suffered from the same symptoms, answered yes from 166 (53%) patients (fig. 4.13).

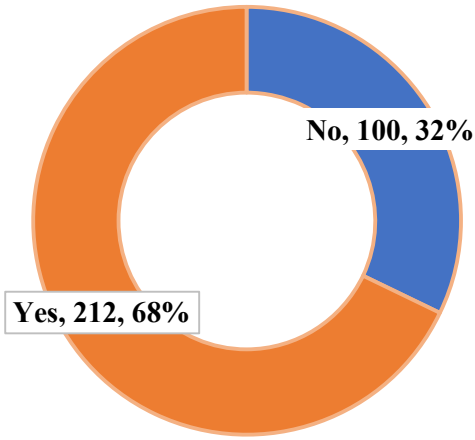

Fig. 4.14: People have any contact with patients confirmed with coronavirus disease

According to the survey, 212 (68%) patients were getting infected with coronavirus because of contact with infected people (fig. 4.14).

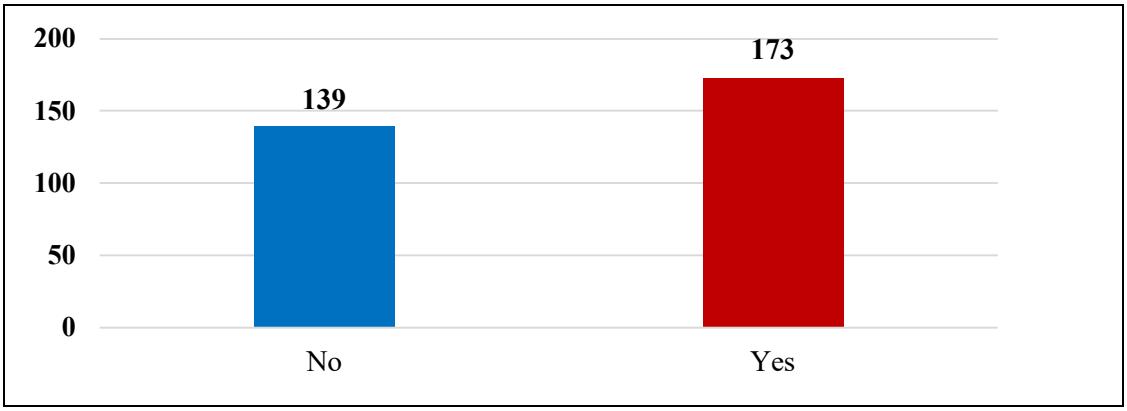

Fig. 4.15: People with Infection of Covid 19 Had Been Hospitalized

From (fig. 4.15) showed that (173) people with infection of covid 19 had been hospitalized.

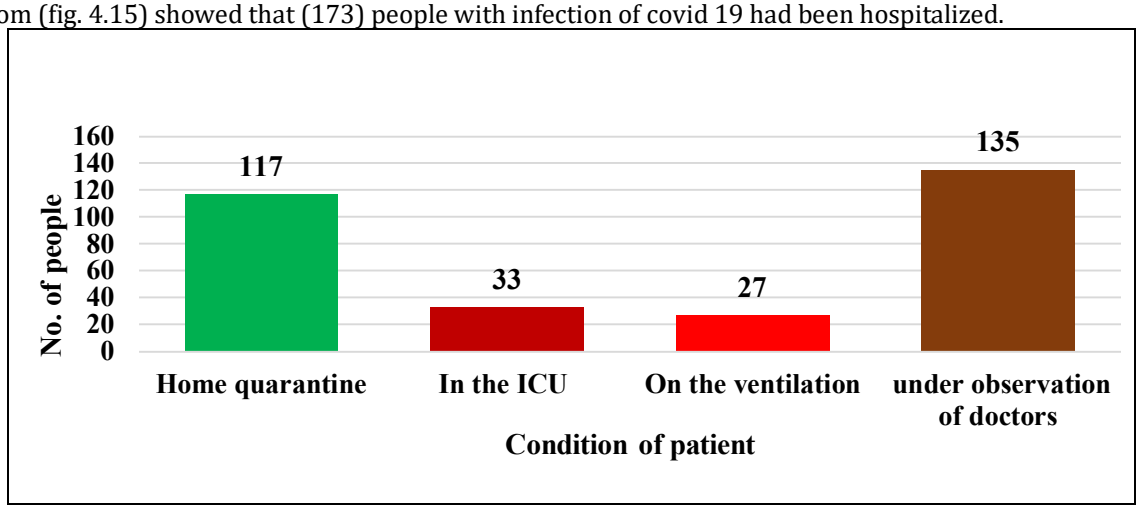

Fig. 4.16: Condition of Patients after Corona Infection

Due to the corona infection, 135 patients were kept under observation of doctors whereas 117 patients were under home quarantine while 33 patients were admitted to the ICU and due to critical conditions of patients, 27 were on the ventilation (fig. 4.16).

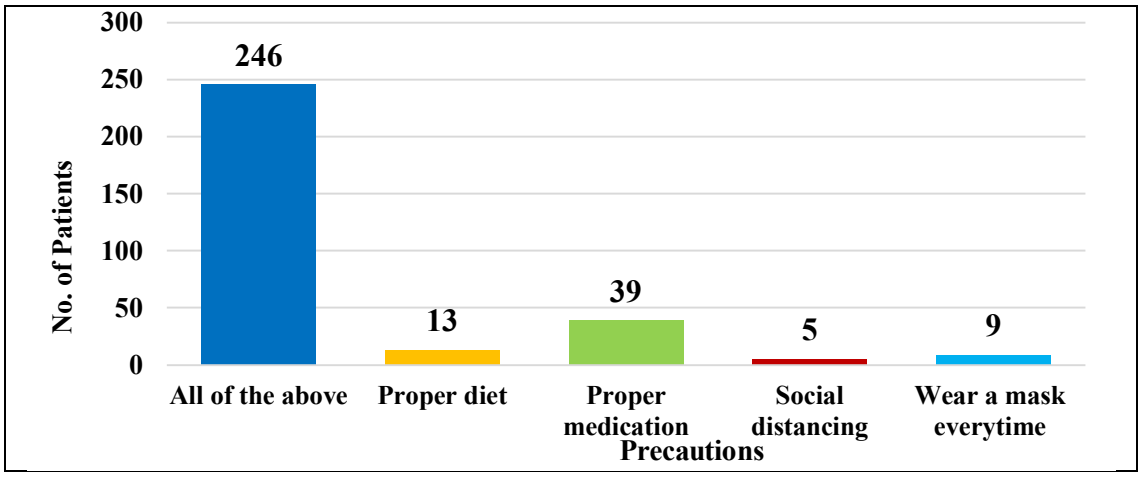

Fig. 4.17: Precautions had taken from Corona Infected Patients

To avoid the spreading of infection as well as personal health precautions were necessary to control the situation, from the study it was observed that 246 patients followed properly the diet, proper medications, social distancing, and wore a mask every time. A total of 39 patients had taken proper medication, 13 patients followed the proper diet, 9 patients were wearing masks every time and 5 patients were maintained social distancing (fig. 4.17).

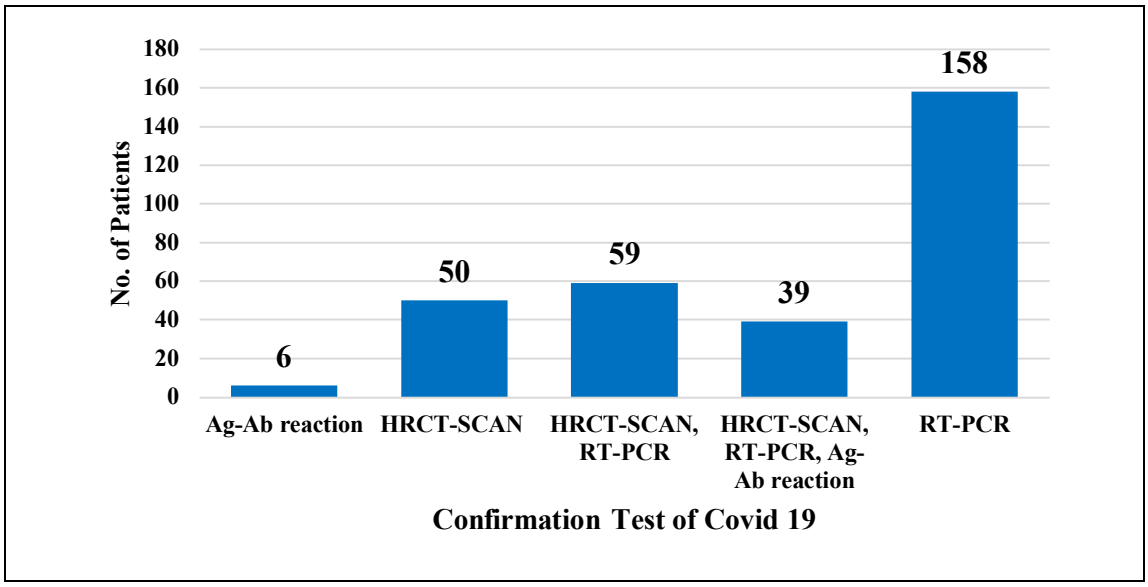

Fig. 4.18: Confirmation of Covid 19 by Ag-Ab Reaction, HRCT-SCAN, RT-PCR

Confirmation of Covid 19 was carried out by different tests such as Ag-Ab reaction, RT-PCR, and HRCT-SCAN. From (fig. 4.18) 158 patients were confirmed infected with coronavirus by RT-PCR, 59 patients were confirmed by HRCT-SCAN and RT-PCR, 50patients were confirmed by HRCT-SCAN, 39 patients were confirmed by HRCT-SCAN, RT-PCR, and Ag-Ab reaction while only 2 patients were confirmed byAg-Ab reaction (fig. 4.18).

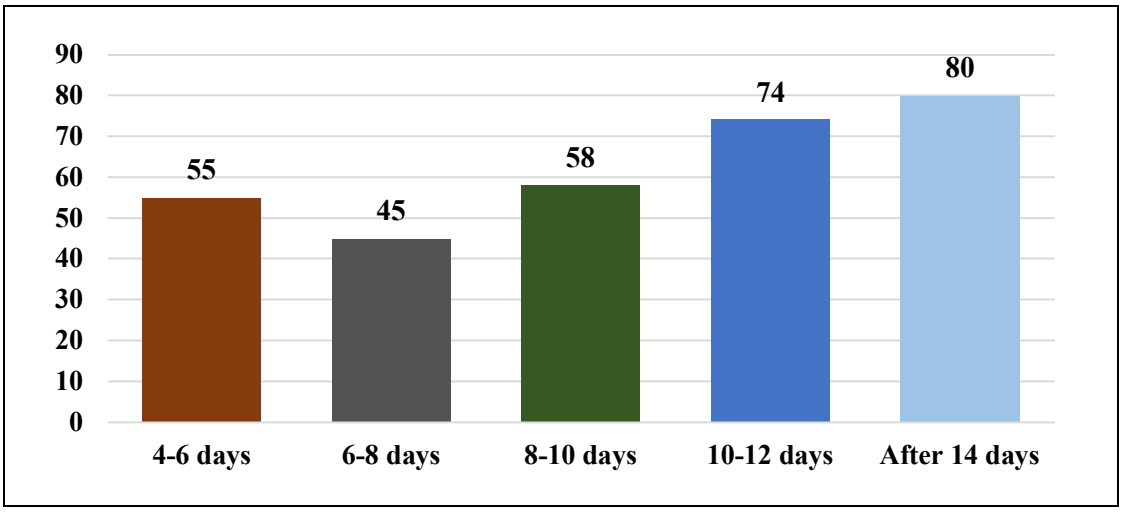

Fig. 4.19: Symptoms of Corona Observed For Days on Body

According to the survey, 80 patients said that they experienced symptoms of corona after 14 days also whereas 74 patients felt symptoms 10-12 days, while 58 patients felt symptoms 8-10 days. 55 patients felt symptoms 4-6 days and least number of 45 patients felt symptoms 6-8 days (fig. 4.19).

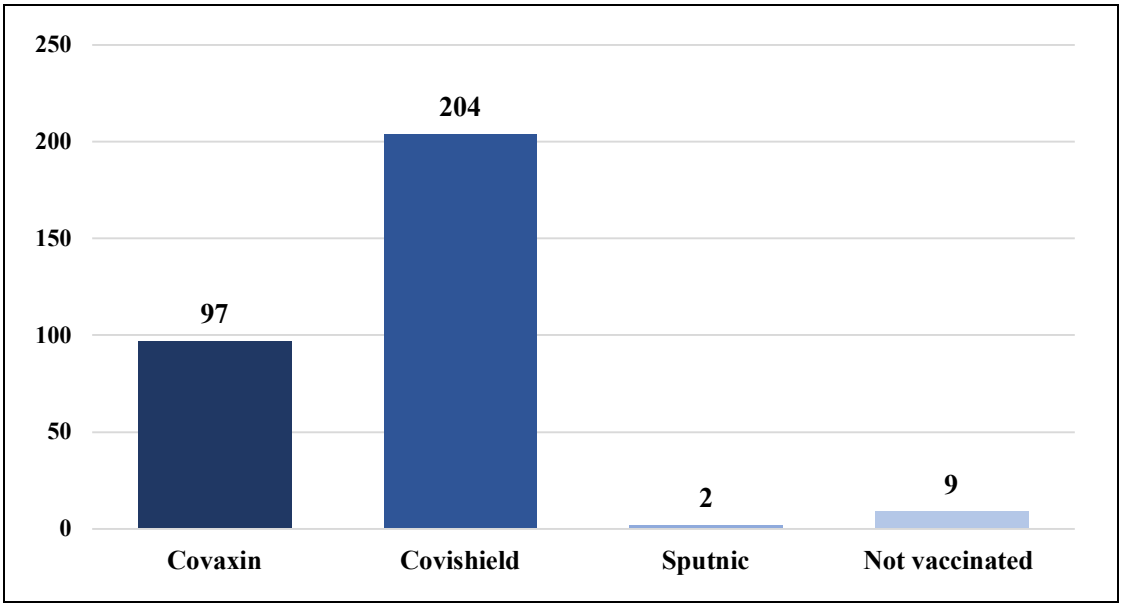

Fig. 4.20: People Vaccinated With Various Vaccine

Vaccination is very important for the prevention of disease. In the present study, a total of 204 people were vaccinated by Covishield followed by 97 people by Covaxin, 2 by Sputnik, and 9 were not vaccinated (fig. 4.20).

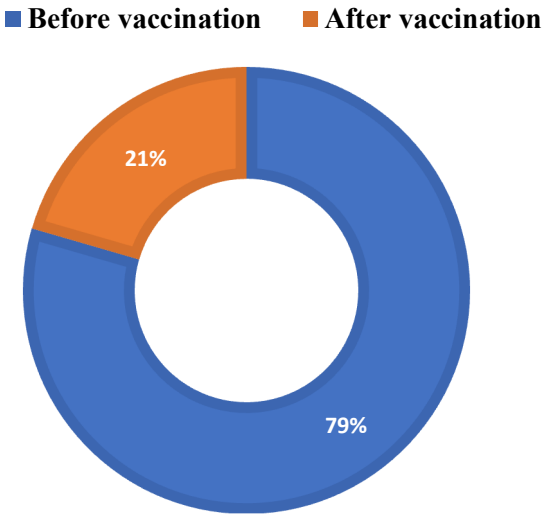

Fig. 4.21: People Infected By Corona before or After Vaccination

From (fig. 4.21) showed that 79% of people were getting infected before vaccination while 21% of people were infected by corona who had already taken vaccination.

As per the results of a large scale survey conducted across India in 2020, 31 percent stated of the respondents claimed that they prefered to take either Bharat Biotech's Covaxin or Serum Institute of India's Covishield vaccine against COVID-19. However, 23 percent of respondents did not prefer both the vaccines that were available in the country at that time.

Moreover, with evidence of increased chances of a lethal infection in comorbid patients, we find it is only natural to prioritise this group for the vaccination. However, our data has some limitations within which the results of this investigation should be interpreted. Patients self-reported the comorbidities to the attending clinicians and healthcare workers. Thus, we do not have access to their medical history or past

medications prescribed to the patients before the testing, potentially altering the study's baseline characteristics. Vaccination strategies should target the at-risk groups outlined above on priority to reduce mortality and to minimize the virus's circulation in the population, and take steps towards herd immunity.

SUMMARY AND CONCLUSION

The pandemic of coronavirus disease 2019 (COVID-19) has resulted in an unexpectedly high number of hospitalizations for pneumonia with multiorgan illness. The novel severe acute respiratory syndrome coronavirus 2 causes COVID-19 (SARS-CoV-2). SARS-CoV-2 infection can be asymptomatic or induce a wide range of symptoms, including upper respiratory infection symptoms and life-threatening sepsis. The present study reveals that the implementation of lockdown due to COVID-19 pandemic consequence in drastic changes in the Satana City of Nashik District (Maharashtra) from 1st January to 30th June 2020.

In the present work, a total of 312 sample populations were selected for a survey study that is a comparative study of different phases of the Covid 19 pandemic with reference to symptoms. Out of 312 people, females were 120 (38%) and males were 192 (62%) analyzed by using different questionaries. According to data collected by the Maharashtra Health Department, a large number of male patients are getting tested positive for COVID-19 and dying due to coronavirus as compared to females.

A majority of the coronavirus (COVID-19) cases in India affected people between ages 31 and 40 years as of October 18, 2021. Of these, the highest share of deaths during the measured time period was observed in people under the age of 50 years.

Among 312 sample populations, the highest number of 176 people get infected in 2nd wave/phase whereas 80 people were infected in 1st wave and 56 people were infected in 3rd wave. In the first wave, India registered quite a low number of COVID-19-positive cases/million people, but the scenario unexpectedly changed in the second wave, when even over 400,000 confirmed cases/day were reported. Lineage analysis in India showed the emergence of new SARS-CoV-2 variants, i.e., B.1.617.1 and B.1.617.2, during April-May 2021, which might be one of the key reasons for the sudden upsurge of confirmed cases/day.

The highest percentage of females infected in 2nd phase (56%), whereas in 1st phase (21%) and in 3rd phase (19%). According to a survey it was observed that females (8) with the O+ve blood group were infected more in number in 1st wave whereas females (32) who belonged to B+ve were infected in more number in 2nd phase while females (5) belonged to B+ve and AB+ve were infected more in number in 3rd phase.

The highest percentage of males 55% were infected in more number in 2nd waves whereas 26% were infected in 1st waves while 17% were infected with a corona in 3rd waves (fig. 4.10). According to a survey it was observed that males (14) with the O+ve blood group were infected more in number in 1st wave followed by males (12) who belonged to blood group B+ve. Males belonged to A+ ve and B+ve were more in numbers infected in 2nd waves while A+ ve blood groups were observed in more numbers in 3rd waves. From the results, people infected with mucormycosis showed that 33 people (11%) were getting infected with mucormycosis while 279 (89%) were not infected with mucormycosis.According to the survey, 212 (68%) patients were getting infected with coronavirus because of contact with infected people. From results showed that (173) people with infection of covid 19 had been hospitalized.

Furthermore, poor compliance with social distancing guidelines by young people might have facilitated contagion in young, healthy adults and children. The decrease in the age of the patients then resulted in a decrease in the case fatality rate in that those patients who died were on average 5 years older than the victims of the first wave. Moreover, fewer patients required respiratory assistance via invasive mechanical ventilation methods. This improvement in the results of admitted patients might be linked to the fact that the health system in our country, as in many others, has since become better prepared.

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