

Statistical Analysis on Novel Corona Virus: COVID-19

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INTRODUCTION

Coronavirus is an infectious disease caused by a group of viruses called Severe Acute Respiratory Syndrome (SARS). It was initially identified in Wuhan, Hubei, China where the outbreak first started in December 2019 during a lunar eclipse event [1]. The first case was reported on 17 November 2019. The common symptoms include fever for about 83-99 %, cough for 59-82%, fatigue for 44-70 % , loss of smell 15-30% , short of breath for 31-40 % , coughing of sputum for 29-3%, muscle ache and pain for 11-35% [2][3]. The major complications include problems like pneumonia, viral sepsis, acute respiratory distress syndrome, kidney failure, cytokine release syndrome and the usual onset ranges from 2-14 days

depending upon the victim. There are various diagnostic methods such as rRt-PCR testing and CT scan as seen in fig 1.

The virus is primarily spread to people during close contact with each other, most commonly through small droplets produced while coughing, sneezing, and talking. The vector usually falls to the bottom or onto layer instead of traveling along with air over long distances [4][5]. While, people also become infected by having contact with a contaminated surface then touching their face or nose or eyes without washing their hands. It is most important during the initial three days after the confirmation of symptoms.

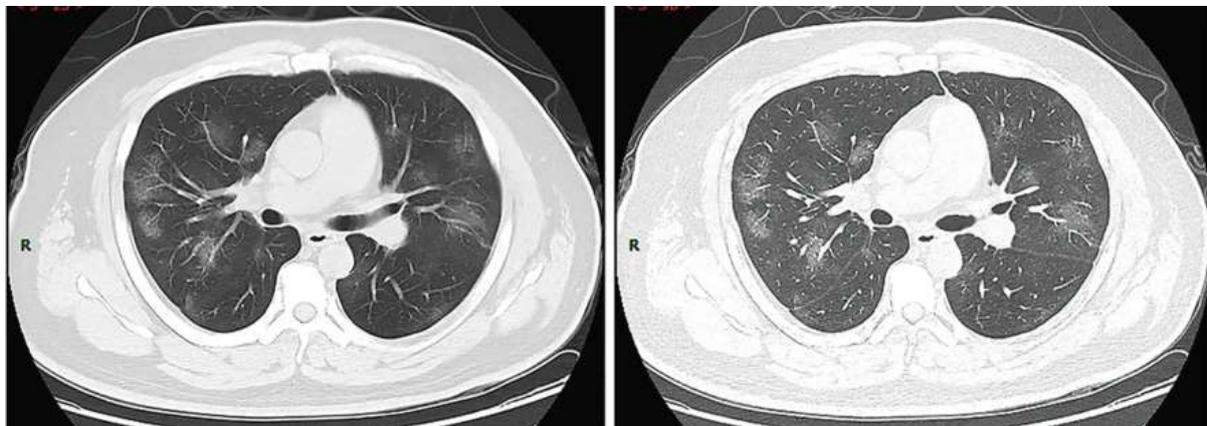


Fig 1: CT imaging of rapid progression stage

ABSTRACT

A novel coronavirus, 2019nCoV is identified as the root cause for such a deadly outbreak causing respiratory illness. Due to its widespread impact on the global community, stringent measures were implemented to reduce the effect of the outbreak; self-precautionary measures like using face-masks, hand hygiene, and self-quarantine; environmental measures were insisted to follow and also surface cleaning and community measures to prevent the widespread. The pandemic evolved in China towards the end of 2019 and COVID 19 started to spread all over the globe like a typical wildfire capturing over 190 countries. It grows in a human body with common symptoms like common cold leading to respiratory problems and at times even death. The virus grows exponentially. So, based on the symptoms and the activity of the virus various measures have been implemented. The death rate peaked in the USA and Iran at the end of March and due to comorbidities and many medications has helped in cutting down the numbers. The rate of spread did not shoot up in countries like India due to preventive and cautious care and also due to reduced human contact from the countries with incidence or spread of the vector to other countries.

Keywords: Coronavirus, COVID 19, Disease, death rate, respiratory illness, comorbidities

According to the World Health Organization (WHO), there are no vaccines or specific antiviral treatments or anti-bodies to fight COVID-19. On 1 May 2020, the United States gave emergency use of authorization to the antiviral which were used to cure malarial infections for people who were hospitalized with severe COVID 19[4][6]. Management of the disease includes the treatment for various symptoms for COVID, supportive care which is to be given by the caretaker, isolation of the person who is tested positive, and experimental measures to slow down the impact of the vector. The World Health Organization (WHO) announced that the COVID 19 outbreak as a public health emergency of international concern (PHEIC) on 30 January 2020 and as an epidemic on 11 March 2020. The widespread of the disease has occurred in most of the countries across all six regions where WHO has set up its operations.

In 2003 severe acute respiratory syndrome (SARS), caused major impact but not as the ongoing pandemic COVID, which led to the 2002–2004 SARS outbreak. More than 8,000 people from 29 different countries all around the globe and various territories were infected and at least 774 of them died during SARS and later Middle East respiratory syndrome (MERS), was identified. MERS was the root cause for the 2012 MERS outbreak, initially it started its attack in the Middle East, then later in 2015 MERS outbreak in South Korea, and the 2018 MERS outbreak in Saudi Arabia are the delegates [7][9]. The virus had behavior similar to SARS causes coronavirus disease 2019 (COVID-19), which in December 2019 led to a massive outbreak in Wuhan, China, which evolved into the COVID-19 pandemic [8].

Epidemiology was originally for epidemics of diseases that could spread [3] but was extended to affect endemic both communicable diseases and non-communicable diseases which are infectious also. By 20th Century due to technological advancements, additional epidemiologic methods evolved with great peak and applied to chronic diseases such as common flu, fever, injuries, birth disorders, maternal-child health due to genetic issues, and also due to both occupational and environmental health. Then later epidemiologists began to eye at the behavior associated with health, well-being, lifestyle of various age groups considering the factors like the period for which they do exercises and types of safety belt that they have been using and their food style and many other factors. Now, with the recent outburst in various molecular methods, epidemiologists can come to an important conclusion while examining for vectors of

disease risk [10][11]. Indeed, the term health-related disorders are the events that could also be seen as a vector that might affect the well-being and lifestyle of the population. Anyways, most of the epidemiologists still use the term “disease” as a keyword for the wide selection of health-related disorders and events that are examined. The objective of this paper is to know the level of awareness towards coronavirus, and to examine respondents attitude towards precautionary steps taken against COVID19, and to offer suggestions based on the findings of the study based on guidelines suggested by World Health Organization (WHO) and Indian Council of Medical Research (ICMR) to overcome the crisis during the pandemic situation all along the world and India.

PANDEMIC SPREAD

It is now evident that COVID 19 eventually spreads from human to human in most of the case either when touch or droplets of coughing and sneezing. It is not an airborne disease. The dataset used in this study is extracted from Database for the COVID 19, Dashboard provided by the Center for Systems Science and Engineering from Johns Hopkins University for (JHU CSSE) [13][17]. The spread appears to be following in exponential form and the growth is calculated as the number of cases on a given day by N_d ; where if average number of people infected on each day is ‘E’ and the probability of appearing to be an infection is ‘p’ and N_{d+1} is the probability for the next day then the number of new cases ΔN_d is given by the expression

$$\Delta N_d = E.p.N_d \quad (I)$$

$$N_{d+1} = N_d + E.p.N \quad (II)$$

$$N_{d+1} = (1+E.p)N_d \text{ is same as}$$

$$N_{d+1} = (1+E.p)^d N_d \quad (III)$$

$$\text{Where } p = (1 - N_d / \text{population size})$$

INTERPRETATION

3.1 Based on age

About 39.8% of the respondents belong to the age group below 25 years, 24% belong to 35-44 years of age, 18.6% belongs to 26-34 years of age category, 11% belong to 45-54 years of age category and 5.9% belong to 55-64 years of age category as seen in Fig.2 [16].

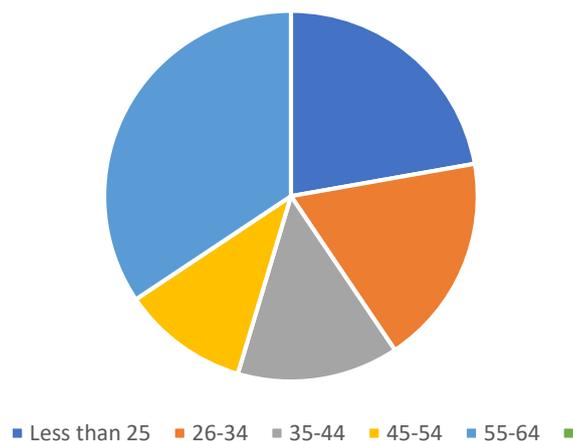


Fig 2: Age Wise Outspread

3.2 Various factors for the outbreak

The various reason for the outspread includes traveling from infected place to other places where the extent of the disease is seen as the vital reason for the outbreak of the pandemic in the present situation apart from not maintaining personal hygiene and social distancing and also factors like use of objects used by an infected person, transmitted from other countries, droplets of sneezing, over-crowding, delay in diagnosis, poor infection control practices[12].

From the records released by World Health Organization (WHO) when compared with many countries considering the total number of positive case, totally recovered and total death is seen as a threat with various deadly reason shown as in fig 3 and it is seen in many countries that the one's taking more number of test show out to be more number which would be positively seen with a great sense that it can be treated at the very beginning stage and when not possible the death rate shoot up.

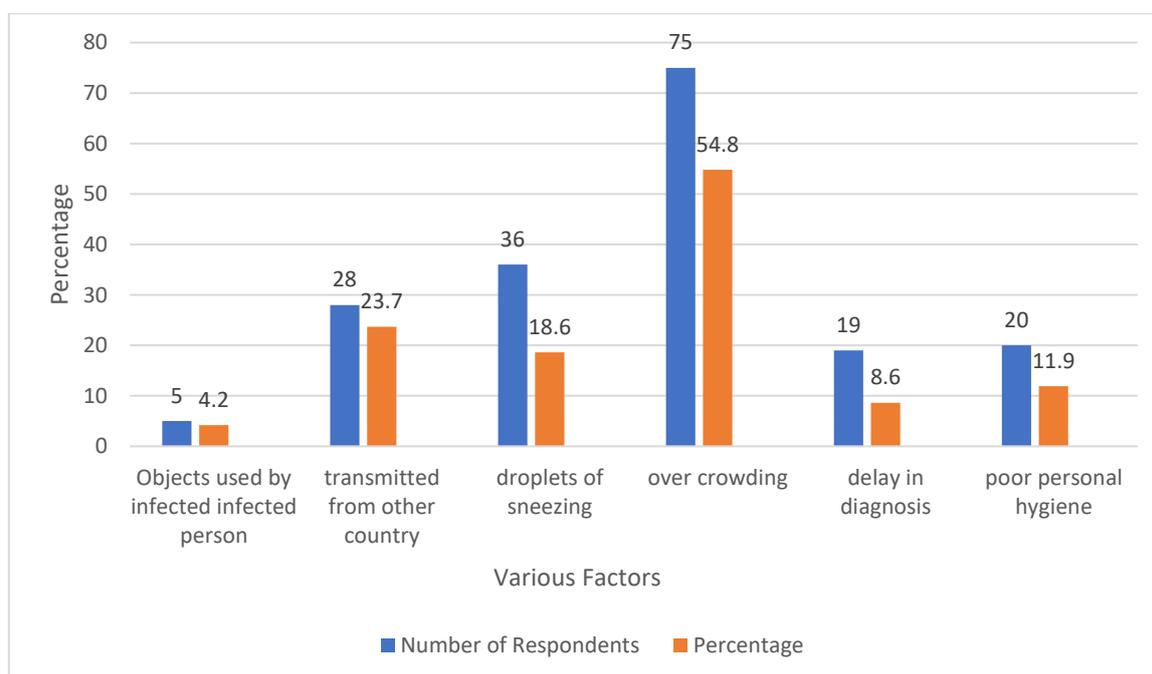


Fig 3: Reason behind Outspread

3.3 COVID-19 Statistics

In this study, data of various factors which are seen as a major cause for the pandemic till 6th June 2020, is analyzed based on basic socio-demographic data like age, sex, and symptoms are considered. This study concludes data about confirmed cases that were reported between the period of 1st December

to 6th June 2020 of the COVID -19 of all affected countries like the United States, Brazil, Russia, the United Kingdom, Spain, India, Italy, Peru, and Germany is considered for analysis. In this paper, the count for confirmed, recovered, and death cases are pertained to selected few countries which are leading with more number of positive cases all around the globe are only included in the graph seen in fig 4.

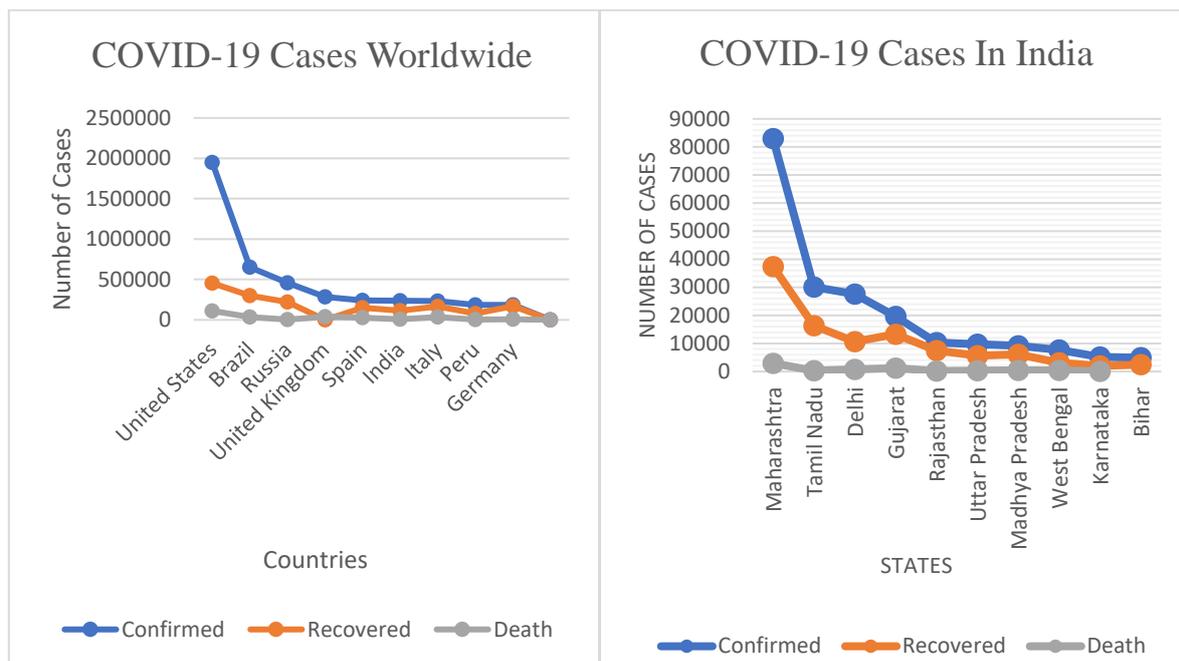


Fig 4: COVID-19 Statistics

While overviewing the cases in India and worldwide it is seen that the total confirmed cases are 6.8M worldwide and death is 397K. While comparing it with India it has 257K confirmed cases and death is 7200 which is around 3.77% to the total confirmed cases while India corresponds to 1.813 % of total death cases worldwide. Amongst other countries, India stands in 6th position in this pandemic. The WHO has complimented India due to its nationwide lockdown which has reduced the total number of positive cases. It also said that the number of cases might increase to new extreme and has asked to take necessary remedial measures for the same.

COVID-19 cases in India is steeply increasing due to various other reason like cluster and traveling from other infected places as seen in the fig.3 which is the major reason for this increase in India at recent times as of 06 June 2020. One of the major clusters in the state of Tamil Nadu was seen due to the Koyambedu fruits and vegetable market which is seen as the major cluster in Tamil Nadu according to World Health Organization (WHO). Many people accumulate in large numbers for their needs and travel to other places which increased the rate of positive cases. Also when India is concerned a group of people from Delhi cultural gathering went back all over the places which is also seen as one of the major reasons for the increase in COVID-19 cases.

The range of death rate depends on the number of comorbidities that is people with other health disorder. Diabetes is reported as a crucial factor for hospitalization and the reason for mortality of the COVID-19 infection. A survey taken in 52 intensive care patients revealed that diabetes was one of the major factors for comorbidity in 22% of 32 non-survivors, and also 173 patients with severe disease out of which 16.2% of the patients had diabetes. Mortality came out to be about threefold of the people with diabetes compared with normal death by COVID-19 cases that is been reported [17].

3.4 Socio-Demographic Profile

Compared to many studies and research on COVID-19 it is proved that men are affected more than women due to various reasons related to their social well being and also due to their day to day activities. A study calculated that men between the age group of 21-40 are more prone to the pandemic and in India near about 64 % of the men are affected. State-wise analysis was carried out and the results obtained are depicted in table 1 and fig.5 which shows in most of the states of India men are affected than women which are in the ratio of 1:2 that is for every 2 men 1 woman is affected by the virus.

Table 1: Gender Analysis

State	Male (%)	Female (%)
Maharashtra	62	38
Tamil Nadu	68	32
Telangana	66	33
Karnataka	64	36
Bihar	58	42
Odisha	64	36
Jharkhand	75	25

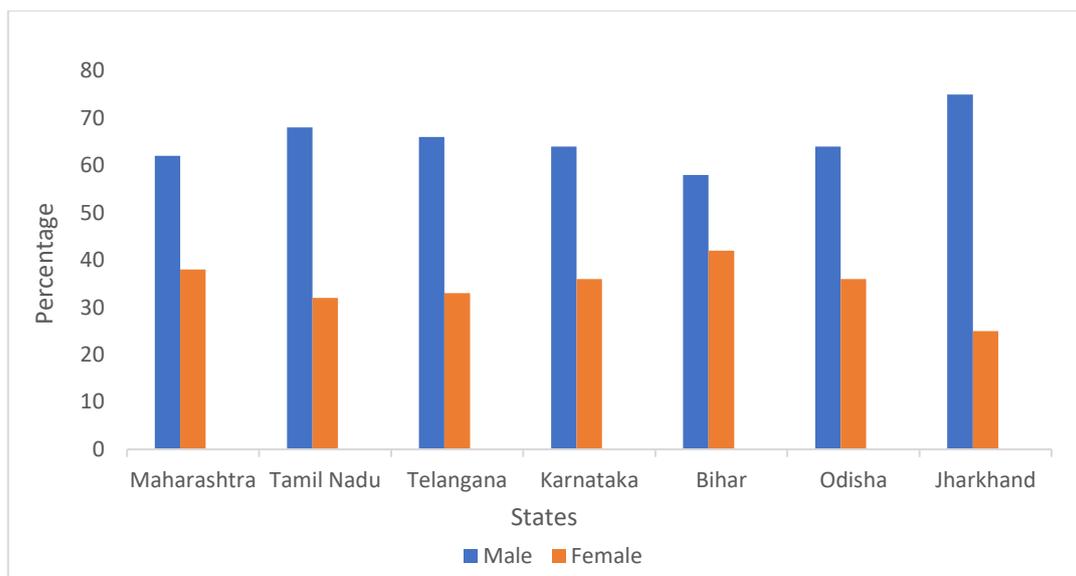


Fig 5: State-wise gender analysis

3.4 Vaccine Research

The spike protein of SARS-COV, HCoV-NL63, and SARS-Cov-2 possess quite similar structure among them. The hypothesis of antibody-dependent enhancement in South Asians due to exposure to the Dengue and Zika virus may be the reason for the slow pace of increase in COVID-19 cases. With confirmed cases surpassing over 6.9 million and continuing to grow, many researchers are developing vaccines and treatments to slow down the pace of the pandemic. Many of the drugs developed or tested for the COVID-19 are antiviral. This would target the virus in people who are already prone to infection.

3.5 Medical Research Bodies

The Indian Council of Medical Research has directed all hospitals to take nasal swab samples from deceased suspects from coronavirus disease, to test for the virus, in a detailed autopsy guideline for patients. To deal with the ongoing pandemic, the general body World Health Organization and

Indian Council of Medical Research have given recommendations to be followed like using rapid testing kits and masks. In areas with huge transmission, WHO advises to use surgical masks for all frontline workers working in clinical areas of a health facility, not only for those workers dealing with patients with COVID-19 but for all. While in the areas with social widespread, WHO advises that people in the age group of 60 years or above or those with critical conditions or comorbidities, should use surgical masks in a situation where social or physical distancing is not possible to maintain in the gathering.

For India, ICMR's bounded guidelines for using the PCR testing kit procured from China and general testing guidelines also. In the recent study, it is proved that the virus is attacking without any symptoms such as cough, cold, or problem in respiratory track known to be asymptomatic. Now it is also found that the virus is changing its behavior in terms of A131 which is another virus with a more deadly impact to human mankind.

Table 2: Origin of COVID-19

Origin	No. of Respondents	Percentage
Animal	63	53.4
Humans	55	46.6
Total	118	100

The above table 2 reveals that 53.4% of respondents were aware that COVID-19 comes from animals and 46.6% knows that it has been transmitted by humans. The report confined by WHO-China joint mission was put on air by 28 February 2020. Based on 55,924 swab confirmed cases, it is evident that about 61.8% of the male share death rate, and 38.2% of females share death rates worldwide.

RESULT AND DISCUSSION

It is prominent that the major reason for the infected cases to shoot up is because of people traveling to various places in the world since December 2019 besides the widespread which

was about to emerge to a greater extent. The cases predominantly appeared after traveling to the city of Wuhan situated in China, which is considered to be the origin of the widespread, however other travelers who have destined to other parts of the world were also proposed to the risk of introductions [18][19]. The tremendous number of cases which is seen to be reported till date despite enhanced medical advancement, the death rate in some countries are rising in huge volume, while many countries are helping other countries with aid like India supplying hydroxychloroquine to the United States while the country was facing deadly outbreak day by day than Italy which

previously recorded massive outbreak than any other country around the world later came the United States.

Out of this pandemic, many countries are looking after their citizens to bring out the economic stability to maintain all-around with their citizens like helping them with many aids such as loans with a much lower rate of interest and helping migrant laborers by feeding them with food and shelter [20]. Also for daily wage workers with rationing and food supplies and offering them with staples as well. Various masks are been prescribed to be used during the pandemic and some of them are N95, Surgical mask, etc. out of which N95 is most prescribed and hand sanitizer are also prescribed. One's older than the age of 65 and below 35 are the most affected due to comorbidities for elder ones and also due to low immunity for the younger ones. The below table compares the various symptoms for the age group for 33-36.

Stabilization in an oxygen-support status survey was carried out and was concluded for about 68% of the patients, and the overall death rate was to be 13% over a median in about 18 days. In a recent study for the possibilities for controlled testing of lopinavir-ritonavir in patients hospitalized for COVID-19, the death rate was 22% in a period of 28-days. It is important to observe that only 1 out of 199 patients in that trial were under ventilation at baseline for external support for oxygen, which is only 0.502% of the respondents of the trial. In certain cohort studies, majorly from China, death rates of 17% to 78% have been reported to be critical and such cases were given utmost priority and were taken care, and desperately were admitted to an intensive care unit for external support like invasive ventilation, or both.

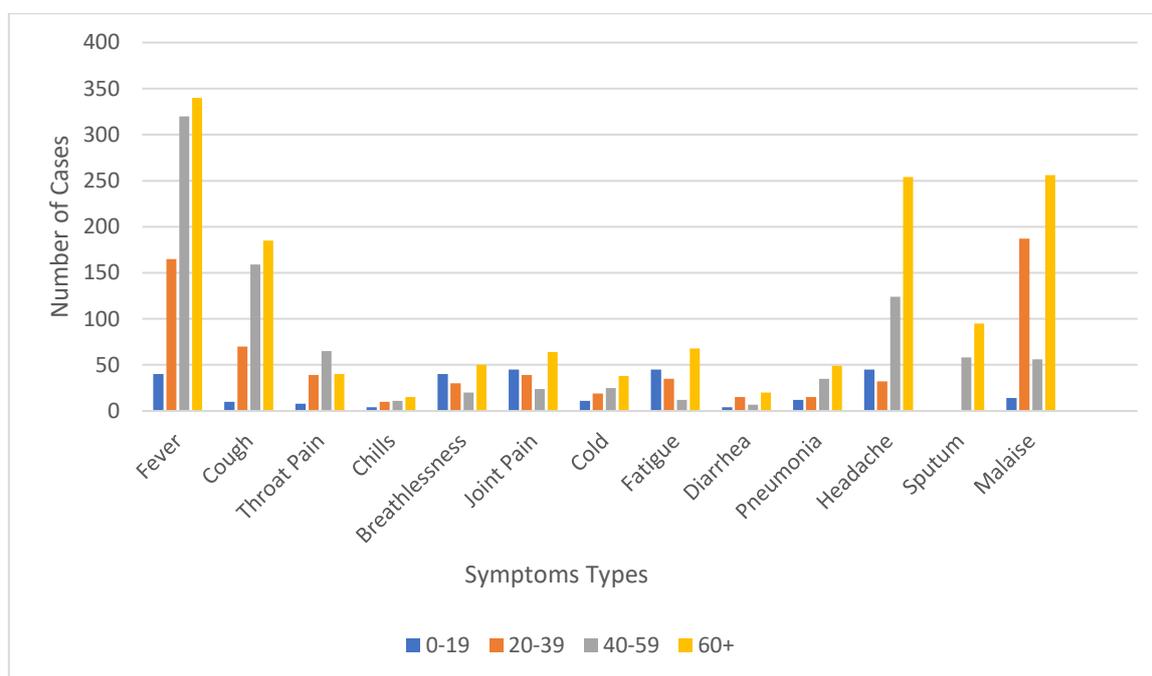


Fig 6: Age-wise analysis based on symptoms

After various studies fig 6. shows the age vs symptoms which is the primary clinical highlights of COVID 19 across all age groups are fever, cough, throat pain, chills, breathlessness, joint pain, cold, fatigue, diarrhea, pneumonia, headache, sputum, malaise. In which the people in the age group of over 60 and above are more affected in each of the category and likewise people under the age group of 0-30 are also affected. The virus is known to even attack infants of 3-7 months of age group also. So, this virus is attacking a variety of age groups and more precisely people with less immunity power to fight against basic flu are the ones who become prey for the virus and develop comorbidities, and sometimes it may lead to death at times. It is said by one of the doctors that one who is kept under a ventilator for any reason under COVID-19 are 50% more likely to face death.

4.1 Medical Aid

The clinical management include hydroxychloroquine (HCQ) acts as a game-changer during the outbreak in COVID 19. The molecule blocks the multiplication of enveloped viruses including coronavirus at a later stage by interfering pH-dependent steps for the virus invasion. The composition includes an effective concentration 50 (EC50) value with 6.25 micromole of HCQ at 24 hours was reported to have a prominent effect in COVID-19.

The pharmacokinetics of azithromycin and chloroquine have a good impact on the pathogen to fight the invasion of the virus [15]. It is well known for the phase IV potassium channel repolarization delay. Further, the genetic polymorphism plays a crucial role in the release of cytochrome P450 enzyme 2D6 (CYP2D6), an enzyme of chloroquine. The global Ayurveda study recommends few guidelines for cautious health measures and to enhance

immunity with special adherence to respiratory health as it is seen that this virus has a direct impact on the respiratory tract and further the degree of attack increases. The practice includes chyavanprash 10g and or drinking herbal tea containing basil leaves are prescribed [14].

Various medications to fight the virus include lopinavir/ritonavir, GS-441524, Oral vitamin D tablets, and other drugs like APN01, Anticoagulants, cimetidine and antiviral drugs like favipiravir and antiparasitic like

mefloquine, hydroxychloroquine and antibiotics like azithromycin, monensin, teicoplanin. All these drugs are prescribed to increase the immunity to fight against the virus, because of no vaccination developed as of now.

4.2 Following were the findings of the study:

Table 3 shows the study carried out for this paper and various factors related to awareness are presented in tabular as well as graphical form.

Table 3: Findings of the study

S. No	Factors	Percentage
1	Affected below the age of 25	39.8
2	Gender wise respondents	54.2 Male and 45.8 Female
3	Occupation	28% Educationalist and 34% other occupation
Awareness		
4	Cause for the pandemic	53.4
5	Spreading awareness	51
6	About the symptoms	83.1
7	Period of recovery	88.1
8	Sources of the Infection	49.2
9	Overcrowding	80.5
10	Wearing of facemask	42.4
11	Grade of mask to be used	37.3
12	Medical care	40.7

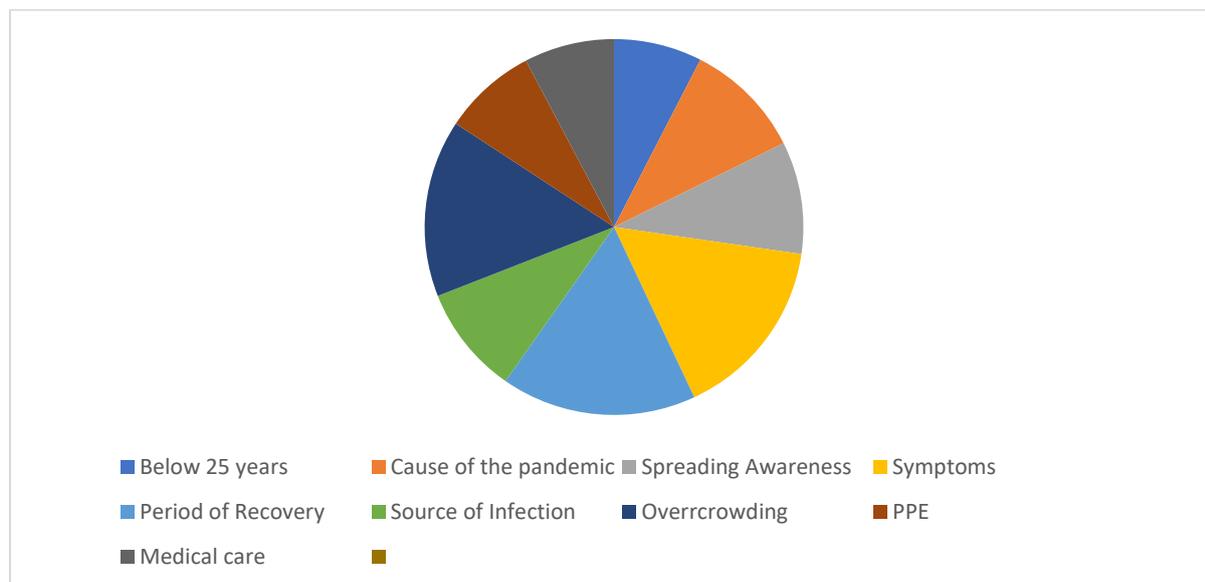


Fig 7: Awareness towards the virus

It is clear from the study, that majority of the respondents have good knowledge of the spread and preventive measures of COVID 19. It is inferred from the recent study, that major respondents have a strong opinion towards Indian food habits, the traditional method of living, anti-viral intakes, and weather condition are the barriers for the spread of COVID 19 in India when compared to other countries. One of the major reasons for the outbreak is seen as overcrowding and not wearing PPE as it is supposed to be used. Mainly frontline workers are at the urge to use it properly to fight the virus. Overall people in India are aware regarding the basic

perspective like a source of infection, its cause, a period of recovery, medical care, and symptoms as seen in fig 7.

4.3 Preventive Measures

Foremost measures for the existing COVID 19 pandemic is maintaining personal hygiene and social distancing. There are many guidelines provided to handle this pandemic situation like wearing a face mask when one needs to reach out to someone or go in a public place. It is suggested to use normal cotton masks that are available in the local retailers to prevent possible problems in breathing. Also, for frontline workers like doctors, care-takers, and scavengers who are

more prone to the virus they are asked to use graded masks such as N95 and KN95 and other surgical masks. If the masks are re-usable the make use of it over some time if not it is strictly prohibited to use it again. While sneezing or coughing cover your mouth with a tissue and throw it away, then sanitize yourself after handling with tissue. Wash your hands either with soap at least for 20 seconds, or use an alcohol-based sanitizer. When a person encounters any of the known symptoms then they must be isolated from others and any sort of public gatherings. They must be provided food in separate vessels and must be kept separately and must be cleaned with proper care and make sure that no one else makes use of them.

Personal hygiene of the ones who are isolated is much more important than the normal people. Beddings and their belongings must be taken proper care and should be washed with graded detergents at the hottest temperature which is possible. In this situation, they must ensure proper ventilation and must not make use of the air conditioner at any cause as it seen as a vector in spreading the virus. It is also important to not allow any outsiders in this situation without any important reason, if it can't be avoided, they must be disinfected before entering into the house. With regular intervals, all the materials like windows, hand railings, blinds, doors must be disinfected using suitable chemical or alcohol-based liquid. It is important to take care of one's immunity and take proper immune-boosting diet and one with identified comorbidities they must take their medications in the proper time course. To help contact tracing it is asked to collect personal information like their previous place of visit and so on.

CONCLUSION

Even though COVID 19 epidemic has caused public panic, most of the respondents had almost good awareness and knowledge towards the spread of COVID 19 in India. As the COVID 19 pandemic is emerging in greater numbers, the Indian government should take collaborative efforts coordinated by the World Health organization and ministry of Health for the better control of the infectious disease. Such efforts should focus on educating and training the public about their role to be played in limiting the spread of the disease through media resources instantly. Besides all these prescribed by the medical advisers, it is mandatory to maintain personal hygiene like washing hands using proper sanitizer having a mixture of alcohol, isopropyl, hydrogen peroxide (H₂O₂) and maintaining personal distance in a public gathering and to use N95 categorized mask and proper disposal of them may be a good sign to fight against the pandemic.

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