A COMPARATIVE STUDY BETWEEN THE FIRST AND SECOND WAVES OF WORLD THREATENING COVID-19 DISEASE

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Abstract:
The global pandemic caused by severe acute respiratory syndrome (Corona virus disease - COVID-19) is the major concern of mankind now. The tiny virus has wiped out million of lives and changed the total economic scenario of world. The present review is formulated with a view to study and analyse the epidemics of first and second wave of COVID-19 in relation to its effects on human health. The infection pattern has been changed and many countries have witnessed higher number of people infected in the second wave than the first one. The result of stimulation suggests that the second wave may occur in the mid July 2020 to the last week of December 2020. One of the main problems in managing the COVID-19 epidemic crisis in second wave is its effects on human health and disease syndrome as compared to the first wave of COVID-19 and also the technical and calculated capabilities of nations. According to scientists, 18 mutations in 7 genes have been observed as a result of mutation and the new variant has been named B.1.617. The pair of spike genes has been linked to amino acid deletion and the ability to evade vaccines. As a result, he is entering the receptor faster and infection is spreading rapidly. Corona virus enters the human body through this spike protein. In India RT-PCR tests are targeted at three genomic sequences of viruses. Only if three different genomic sequences match then there will be a positive report.

Key-words: Genomic sequence, Mutation, Virus, Microbiology, COVID-19, Pathology, Biology.
Introduction:
The World threatening COVID-19 disease is sweeping throughout the World. Second wave of COVID-19 daily case numbers have exploded since last October 2020 in India. Rising of daily COVID-19 cases has worstly impact on people. The scenario is getting awfull day by day due to people’s carelessness, limited availability of vaccine etc. Many researcher’s analysis that the major country U.S. and Europe, including the proposed method, model and results, published discretion responses and limited additions may create the effects of the second wave and of corona virus (COVID-19) epidemics on the human health is more effect than the first one. And result indicated that the regulations were effective in increasing the number dates from the beginning of mid-June in several countries to July mid-week in the others.

Fig: COVID-19
The European countries results continue to relax from 30 to 55% and if the actual trend countries if not checked there could be a significant 2nd wave that is longer lasting than the previous waves. The United States, various number of cases has already peaked for the next time, an expanded version of it, the model conceive that the transmission of infection may now be similar after the first wave. 2nd wave of COVID-19 diseases flooded in India from last week of October 2020. These cases peak is rises on daily basis. A study by an American University has warned expected optimum peak at mid December 2020.

The major differences between the properties of the two first and second waves are generally obscure. The human population examinations because of technical and calculated capabilities of nations, among them are the identification and diagnosis of non-symptomatic people and gently symptomatic people. There have been a lot of improvement in the six months and it is through that the frequency of infections in the early stages of the epidemic was a lot of higher than reported. Be that as it may, a more precise correlation of the first and second wave can be concentrated through the investigation of patients for which the illnesses was affirmed by (reverse transcriptase polymerase chain reaction) RT- PCR and extreme manifestation. According to WHO creates a virus and its own replica or multiple replicas which is called mutation. The three most risky variations are US (B.1.1.1.7 variant), South Africa (B.1.1. 351) and Brazil (B.1.1.1.28.2.1 variant). Double mutation variant first known as cross conversion. According to the researchers 18 mutations in 7
genes have been observed as a result of mutation. As a result, the virus has become more powerful. Kalyani National institute of biomedical genomics has discovered a new genome sequence for this virus. This new variant has been named B.1.617. Another triple mutation was also found that was named as B.1.618. Changes in spike protein are usually observed here. The first appearance of this variant was found on 25 October. A genomic sequencing in March showed that the presence of this variant in the COVID samples are increasing. The corona virus also contains glycoprotein, a type of S1 and S2. S1 contains a lot of amino acids of which 69 to 70 are amino acids. As a result, he does not have to make two amino acids. As a result, he enters the receptor faster than his old incarnation. As a result, the infection is spreading rapidly. According to scientists this is probably the reason why the South African AstraZeneca or COVISHIELD vaccine has not been effective. A very harmful second wave of the COVID-19, the world class pandemic has attacked India very hard. Approximately 2lakhs infections are reported in the country India. Many states are grappling with the shortage of medical oxygen, the antiviral Remdesivir, hospital beds and vaccines. ICMR, the top medical research body of India has put the data to us that states about the comparison between the hospitalization of first and second wave of COVID-19 pandemic. The data is clearly putting light upon the evidence of the younger population getting more probable to get infected in the waves of COVID-19. More and more asymptomatic people are been admitted to the hospitals in the second wave. It was stated by the ICMR has done interim analysis.

**Fig: Cases of corona virus 2nd wave worldwide**
Colombia with 10th highest Covid Case hold, has been several mini waves after 1st big wave started abating in August.

In top 10, only India & Argentina have escaped a 2nd wave so far.

<table>
<thead>
<tr>
<th>Age</th>
<th>COVID 19 patients in first wave</th>
<th>Covid19 patients in second wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 19 year old</td>
<td>4.9</td>
<td>5.8</td>
</tr>
<tr>
<td>20 to 24 year old</td>
<td>23.9</td>
<td>25.5</td>
</tr>
<tr>
<td>After 30 year old</td>
<td>30</td>
<td>32</td>
</tr>
</tbody>
</table>

Table: Age wise break up of younger COVID-19 patients compared between first and second wave.

Graph: Age wise break up of younger COVID-19 patients compared between first and second wave.
It shows that the older population continues to be more vulnerable to Covid – 19 in the second wave while a marginal increase is recorded in the number of young people testing positive the virus.

**Materials and Methods:**

- **First wave of and second wave of COVID comparison based on mortality:**
  Low paces of contrast were found for the rushes of Corona virus dependent on the mortality. Both have high paces of death overall. Be that as it may, the mortality outline of India has seen a very distinction for this situation alongside numerous blistering environment nations. This is said by the specialist in charges of National Corona virus the board system unit of India. It was discovered that there's the relative expansion in breathing issues to individuals over 60 years in the primary wave which stays still unaltered in the subsequent wave. In any case, the primary contrast was found in the cases for individuals fewer than 20. The disease rates among more youthful patients are barely higher. Contrasted with first wave (4.2% youngsters contaminated) the subsequent wave is feeling to be exceptionally cataclysmic with 5.8% individuals tainted. For the contamination of mid age individuals as 20-40 years of age the main wave is 25.5% where the current wave is having lower pace of disease in mid age individuals of 23.7%.

  From the information of a segment of hospitalized patients from the first and second wave, Director-General, Indian Council of Medical Research (ICMR) said 44% of indicative patients introduced 'windedness' in the subsequent wave (October – December 2020) contrasted with 41% in the principal wave (Sept.- Nov.’20).

  The side effects related with the infection of COVID are for the most part coughing, chills, joint agony, and quick breathing weakness. Both first and second wave have comparable manifestations however there are varieties as well. 6,642 patients were dissected in the main wave however and in the subsequent wave, just 1,405 were broke down.

  Of 6, 650 conceded patients from September-November a year ago, 9.6% capitulated though from March-April, 9.7% of a gathering of 351died from the infection.

  Specialists have confronted the huge contrast in the patient needed to have mechanical ventilation because of the illness.
The subsequent wave — aside from a precarious ascent in Covid cases — has been portrayed by phenomenal interest for clinical evaluation oxygen prompting serious deficiencies. Dr. Bhargava said the unexpected flood may have set off alarm and an interest for more oxygen. "This is information from clinic settings thus we don't yet have the foggiest idea what's setting off the interest from outside these settings," he said at an internet meeting.

Dr. V.K. Paul seats upon the enabled bunch on inoculations and COVID the board (NEGVC). He said there was no distinction in mortality, in the first and second wave, in those 40 and under. "There is no overall extra/abundance hazard of more youthful turning out to be COVID positive," he said.

On drug convention for treatment, Dr. Randeep Guleria focused on that none of the antiviral medications Remdesivir, Fapiravir just as gaining strength plasma had any settled advantage in relieving the illness. Other medicine the utilization of the steroids like dexamethasone, tocilizumab too had restricted utilize particularly in examples of basically sick patients who were encountered an invulnerable framework over-response, called a cytokine storm.

"Steroids, Tocilizumab, Remdesivir these are to be given, if need be, at the ideal time. Giving a mixed drink of medications (solo) can be deadly. Remdesivir is valuable in moderate ailment and to treat abatement in oxygen immersion yet has a restricted job. Whenever given too soon, dexamethasone (Steroid) is hurtful and Tocilizumab is just valuable during a cytokine storm," he added.

- **General difference between the waves of corona virus:**

In the second flood of Covid-19 this year, the more seasoned populace keeps on being more powerless while just a minor increment has been recorded in the quantity of more youthful individuals testing positive for COVID, said Indian Council of Medical Research (ICMR) chief general, Dr. Balram Bhargava on Monday.

Almost a half year after the pinnacle of the main wave in September 2020, COVID cases in India indeed began ascending from the primary seven day stretch of March flagging the appearance of the second rush of the pandemic in the country.
Doing an examination of the first and the second influx of Covid-19 that hit India in mid 2020 and end 2020 separately, the ICMR DG said that there is no significant change in the manner diverse age bunches have been influenced by Covid-19 in the two waves. "More than 70% patients in the two waves are over 40 years of age, just possibly higher extent of more youthful patients," Bhargava said dependent on the investigation of 1,885 patients in the subsequent waves and 7,600 patients in the primary wave.

In light of ICMR's investigation, Bhargava said in the subsequent waves, a higher extent of asymptomatic patients have been recorded. Tending to the media, he said there is no distinction in passing’s between the first and second wave among hospitalized patients. In the subsequent wave, while the oxygen necessity is higher, ventilator prerequisite isn't high, said Bhargava. Bhargava advanced that wastage of oxygen should not occur and it ought to be think. NITI Aayog part (wellbeing) VK Paul said: "basically there is no distinction" in age correlation of patients in the first and second wave. Paul added that Remdesivir should be utilized on hospitalized patients in moderate phases of disease on oxygen and it isn't to be utilized in home settings.

Fig: The difference of COVID-19 second wave and first wave worldwide.
Syndromatic difference between the waves of corona virus:

In the midst of an enormous flood in novel Covid cases in the nation, there's a great deal of worry over the indications of Covid-19 and its seriousness in the second rush of the pandemic.

Considering this, the Indian Council of Medical Research Director General Dr. Balram Bhargava clarified the distinction in the seriousness of the manifestations saying that Coivd-19 side effects in this wave are significantly less than a year ago.

"On the off chance that you see the side effects, seriousness is less this time. In this wave, we have seen more instances of shortness of breath while in the last wave, manifestations like dry hack, joint torment, migraines were more," Dr Bhargava clarified, according to news organization ANI.

He additionally said that RT-PCR test is highest quality level of testing. "We measure two qualities or more, in this way, there is no possibility of missing location of any freak," he said over worries of infection freak strains and their recognition through RT-PCR.

Bhargava additionally said there is no distinction in the percentage of death between the principal wave and second wave.

He further said that solitary an insignificantly high extent of COVID-19 patients are of more youthful age and that the normal of patients in the main wave was 50 years and in this wave, it is 49 years. He additionally said that the more seasoned populace keeps on being more powerless against be conceded in the medical clinic in the momentum wave.

"From zero to 19 years – the thing that matters was 5.8 percent versus 4.2 percent, and in 20-40 years, the thing that matters was 25% versus 23%. There is a peripheral distinction in this. More than 70% were above or equivalent to 40 years old. A higher number of asymptomatic people got conceded for the current year, than a higher extent of patients conceded with shortness of breath," he said.

He additionally said that asymptomatic/gentle disease can be overseen at home and doesn't need hospitalization and furthermore added that ventilator necessity in second wave isn't high.

"There is no adjustment of the passing rate between the principal wave and the subsequent wave. Comparative patterns are being seen across every one of the states since this is a countrywide information of a public library information which has been
gathered of just hospitalized patients, so this is 10,000 hospitalized patients that are being investigated," added Dr. Bhargava.

The ICMR boss additionally thought that there was an enormous measure of laxity in regards to the pandemic and numerous occurrences of COVID-unseemly conduct were likewise seen. He additionally focused on that the RT-PCR test estimates at least two qualities in the body and there is zero chance of missing the recognition of a COVID-19 freak through the test.

"I might want to accentuate that the RT-PCR test that we are using, they measure at least two qualities and they never miss a test. We have consistently utilized at least two qualities for testing and thusly missing is totally unthinkable. It can track down any sort of freak since it estimates at least two qualities at various locales," he told ANI.

Dr. Bhargava further said that the pace of contagiousness of the 'twofold freak' found in India has not yet been set up.

Three fundamental variations from the United Kingdom, South Africa and Brazil have effectively been found in India.

As indicated by the Health Ministry, India announced 2,73,810 new COVID-19 cases, taking the absolute number of positive cases in the country to 1,50,61,919. There are right now 19,29,329 dynamic cases in the country as of Monday. The loss of life arrived at 1,78,769 with extra 1,619 fatalities.

Just now, upwards of 1,44,178 individuals recuperated from the infection. With this, the absolute number of recuperations arrived at 1,29,53,821 in India.

![Fig: Corona virus cases in UK and hospital occupancy](image-url)
Medical oxygen-based difference between waves of corona virus:

In this wave, more instances of windedness have been seen while in the past one, side effects like dry hack, joint agony, cerebral pains were more, as indicated by the ICMR. The manifestations of joint throb, exhaustion, muscle hurt, loss of smell or sore throat are significantly less contrasted with the principal wave. In any case, windedness is higher in this wave, fundamentally raising the necessity of supplemental oxygen in the country.

**First wave:**
Symptoms like dry hack, joint torment, migraines were more.

**Hospitalized patients:**
41.7% reporting shortness of breath.

**Second wave:**
Shortness of breath is higher in this wave and so there is a higher requirement of oxygen.

**Hospitalized patients:**
47.5% reporting shortness of breath.

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**Fig:** Major difference between the hospitalized patients in the first and second wave of COVID-19
- **Difference between the waves of corona virus based on infection in young individuals:**

  Individuals between 30-45 years old testing positive continue as before as a year ago at 21%. No overabundance pace of youngsters testing positive.

  - **First wave:**
    People under 30 years old established 31% positive cases.

  - **Second wave:**
    People under 30 years old establish 32% of positive cases.

- **Difference between the waves of corona virus based on age:**

  Just barely high extents of COVID-19 patients are of more youthful age and that of the normal time of patients. Over 70% were above or equivalent to 40 years old.

  - **First wave:**
    Average period of patients was 50 years.

  - **Second wave:**
    Average time of patients is 49 years.

- **Difference between the waves of corona virus based on Death rate:**

  The second wave of Covid-19 in India is ‘more severe’ than the first wave and there is no change in the death rate.

- **Difference between the waves of corona virus based on Virus itself: SARS-CoV-2:**

  In the previous year, the infection has transformed many occasions over and there are different unidentified transformations; of them, some are of concern.

  - **First wave:**
    Original type of SARS-CoV-2

  - **Second wave:**
    There is a twofold freak, in addition to the U.K., Brazilian, South African variations that have exhibited to have higher contagiousness. According to WHO creates a virus and its own replica or multiple replicas which is called mutation.

    The three most risky variations are US (B.1.1.1.7 variant), South Africa (B.1.1.
Double mutation variant first known as cross conversion. According to the researchers 18 mutations in 7 genes have been observed as a result of mutation. As a result, the virus has become more powerful. Kalyani National institute of biomedical genomics has discovered a new genome sequence for this virus. This new variant has been named B.1.617. Another triple mutation was also found that was named as B.1.618. Changes in spike protein are usually observed here. The first appearance of this variant was found on 25 October. A genomic sequencing in March showed that the presence of this variant in the COVID samples are increasing. The corona virus also contains glycoprotein, a type of S1 and S2. S1 contains a lot of amino acids of which 69 to 70 are amino acids. As a result, he does not have to make two amino acids. As a result, he enters the receptor faster than his old incarnation.

- **The reason behind COVID-19 surge:**

Expressing the purposes for the unexpected spike in sure cases, he said that individual have shown a huge measure of laxity in after COVID-19 unseemly conduct and different unidentified change of the infection have additionally added to the flood. He said some changed infection strains from the UK, Brazil and South Africa are of worry as they showed to have higher contagiousness. 'We have likewise tracked down a twofold freak in India yet the higher contagiousness of this isn't set up,' he added. India so far has recorded more than 1,50,61,919 positive cases, out of which 1,29,53,821 have effectively recuperated and 1,78,769 have kicked the bucket. According to the most recent reports from MoHFW, in the previous 24 hours 2,73,810 new cases, 1,44,178 new recuperations and 1,619 passing’s have been accounted for. At present, the absolute number of dynamic cases in India is 19,29,329.

- **COVID-19: First Wave vs. Second Wave:**

The first influx of the infection in quite a while had seen a spike in September 2020 and proceeded to decrease. Slice to December 2020, new instances of the contamination fired appearance up and today on 25th December, 2020, India is the second-most noticeably terrible hit country with 98,26,775 dynamic cases and an aggregate of 1,42,628 passing up until this point.
The second influx of the infection is being looked at as milder than the principal wave back in 2020. There are huge loads of inquiries around how the second floor of the COVID is unique in relation to the first wave in quite a while of side effects, spread and age profile and freak variations.

- **Symptoms:**
  - The first flood of the COVID included chills, fever, loss of smell and taste, body throb, and respiratory inconveniences.
  - The new indications detailed during the second rush of COVID-19 incorporate free movements, hearing weakness and pin eyes.

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>First wave</th>
<th>Second wave</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>94.1</td>
<td>94.5</td>
</tr>
<tr>
<td>Coughing</td>
<td>92.1</td>
<td>92.6</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>94.5</td>
<td>94.7</td>
</tr>
<tr>
<td>Runny or stuffy nose</td>
<td>53.5</td>
<td>55.8</td>
</tr>
<tr>
<td>Headache</td>
<td>70.3</td>
<td>72.7</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>49.5</td>
<td>53.5</td>
</tr>
<tr>
<td>Loss of smell of test</td>
<td>75.7</td>
<td>78.9</td>
</tr>
<tr>
<td>Rash on the body</td>
<td>34.8</td>
<td>36.8</td>
</tr>
<tr>
<td>Sore throat</td>
<td>86.2</td>
<td>86.9</td>
</tr>
</tbody>
</table>

Table: Increase rate of the Nobel corona virus symptoms in the first and second wave.
Class a symptoms | Class b symptoms
---|---
Fever | Headache
Cough | Sore throat
Chills | Fatigue
Shortness of breath | Runny nose
Loss of smell and taste | Neustria, vomiting or diarrhea

- **Spread:**
  - The principal wave of the infection was more inescapable topographically though the subsequent wave is more grouped. This implies the contamination during the subsequent wave is restricted to a lesser number of areas of interest yet with a higher number of cases in those very hotpots.
  - The second wave, in contrast to the principal wave, is showing the quickest spread pace of COVID-19.

![Number of Tests Occurred For Identifying the New Cases](image)

**Fig:** The number of tests concluded for COVID-19 analysis worldwide.
- **Age Profile:**
  - In the primary wave, the death rate among more established individuals was higher however the subsequent wave is holding more youthful individuals under 45 years old.
  - Maharashtra and Karnataka, the two most exceedingly awful hit states in the nation have detailed 50% of the cases among individuals under 45 years old.
  - Also, specialists and specialists and the information by the public authority have shown that more kids are trying positive for the infection in the subsequent wave.

- **Mutant Variants:**
  The subsequent wave is accepted to observe a spike in the quantity of cases because of the twofold freak variation of COVID-19. Maharashtra has revealed 60% of twofold freak COVID-19 cases. Double mutation variant first known as cross conversion. According to the researchers 18 mutations in 7 genes have been observed as a result of mutation. As a result, the virus has become more powerful. Kalyani National institute of biomedical genomics has discovered a new genome sequence for this virus. This new variant has been named B.1.617. Another triple mutation was also found that was named as B.1.618. Changes in spike protein are usually observed here. The first appearance of this variant was found on 25 October. A genomic sequencing in March showed that the presence of this variant in the COVID samples are increasing. The corona virus also contains glycoprotein, a type of S1 and S2. S1 contains a lot of amino acids of which 69 to 70 are amino acids. As a result, he does not have to make two amino acids. As a result, he enters the receptor faster than his old incarnation.

  ➢ **Vaccine:**
  India chose to give crisis licensure to antibodies which are approved for use in the U.S., U.K., Europe and Japan or by the World Health Organization (WHO), an immunization deficiency is comforting in India and is battling to fulfill developing needs. Such unfamiliar antibodies from the initial 100 recipients are survived for 7 days and then are carried out in Country. Two Indian organizations – Serum Institute of India and Bharat Biotech are the two organizations inside
which antibodies were affirmed through one year for crisis use in India. Two diverse adenovirus-based vectors are contained in the Sputnik immunization. Each vector converting SARS antigen. One is used for the first and another one for the subsequent portion. Says Polly Roy “The two dosages make significant degrees of antibodies”, Roy is a Virology Educator in the Department of Infection Biology at the London School of Hygiene and Tropical Medicine. She says “IN light of the utilization of two distinct vectors for two portions, this antibody might be more compelling”.

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Characters of viruses</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinovac</td>
<td>Whole virus vaccine</td>
<td>The benefit of a whole virus inactivated vaccine is including the fact that it’s a well-established technology and to increase the immune system but low.</td>
</tr>
<tr>
<td>PfizerbioNtechmoderna</td>
<td>RNA or mRNA vaccine</td>
<td>Boast the immune system and the killer t-cells destroy the infected cells.</td>
</tr>
<tr>
<td>Sputnik v</td>
<td>Non replicating viral vector</td>
<td>Viral vector-based vaccination is another well-established technology that can help in triggering strong immune response m</td>
</tr>
<tr>
<td>Novavax</td>
<td>Protein subunit</td>
<td>The protein subunit vaccine is a well-established technology and can boost the immune response.</td>
</tr>
<tr>
<td>Covaxin</td>
<td>Inactivated vaccine</td>
<td>Covaxin is immune potential oralso known as vaccine adjuvants. And this vaccine increases the immune response in human</td>
</tr>
<tr>
<td>Covisheild</td>
<td>Adenovirus viral vectors</td>
<td>Protects against SARS COV -2 virus and increase immunity.</td>
</tr>
</tbody>
</table>
Conclusion:
From this examination we have tracked down a more prominent contrast between the two waves in the Covid. The examination is worldwide however there is a primary premise upon the COVID19 pandemic circumstance dependent on India. The investigation has centered upon the significant contrasts between the two floods of Covid pandemic. The examination appeared about the death rate unaltered in the two waves. Be that as it may, the infectivity has extreme contrast between the waves. The infectivity of first wave was similarly lower than that of the subsequent wave. Second wave additionally can taint the youngsters more. The subsequent wave has hereditary change in the Covid strains so it has greater chance contamination. It likewise can have the safe getaway. So, the RT-PCR may fizzle for certain instances of second wave disease. The distinction likewise present as per freak variation, period of patients, side effects, region contaminated, disease rate, manifestations, clinical oxygen interest, syndromatic contrast and a few more distinction.

References:


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