



## COVID-19 (NOVEL CORONA VIRUS-2019)- TRENDS OF CORONA PANDEMIC OVER A PERIOD OF ONE YEAR IN HIMALAYAN REGION IN INDIA.

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**ABSTRACT** COVID-19 is a emerging disease and is of public health importance. This study was done to analyse the trends of corona pandemic over a period of one year in Himalayan region in India. Data regarding state statistics from January 2020 to January 2021, was gathered from various sources. Since objective and authentic data was released by different agencies daily and reported to WHO, so the state profile of new cases, cumulative cases, recoveries, cumulative deaths, samples tested, positive samples was taken based on availability of information from National Health Mission site, other state websites and news papers and analysed for various parameters. The current study conducted in Himachal Pradesh showed Case fatality rate as 1.7%, recovery rate 99% and positivity rate 6.1% with Shimla having highest CFR 2.5%. Population wise most affected district was Lahul & Spiti with affected population 4.0%. It may be considered as a severe public health threat of this decade. COVID-19 trends, pattern and its analysis will be very important for control and preventive measures.

**KEYWORDS** : COVID-19, Trends, Pattern, World Health Organisation, National Health Mission.

### INTRODUCTION

Coronavirus belongs to the order Nidovirales, family Coronaviridae, and subfamily Coronavirinae<sup>[1]</sup> with high pathogenicity to mammalian, vertebrates, and avian hosts<sup>[2]</sup>. The structure of coronavirus consists of the single-stranded positive-sense viral RNA, Nucleocapsid protein, Envelope protein, Membrane glycoprotein and Spike protein<sup>[3]</sup>. Coronaviruses are transmitted from animals to human and hence zoonotic. Coronaviruses (CoV) are a large family of viruses that cause illness ranging from the common cold to more Severe Acute Respiratory Syndrome (SARS-CoV)<sup>[4]</sup>.

There have been 7 kinds of coronaviruses known to infect humans including Human Coronavirus 229E (HCoV-229E), Human Coronavirus OC43 (HCoV-OC43), severe acute respiratory syndrome coronavirus (SARS-CoV), Human Coronavirus NL63 (HCoV-NL63), Human Coronavirus HKU1 (HCoV-HKU1), Middle East respiratory syndrome coronavirus (MERS-CoV) and Coronavirus Disease 2019 (COVID-19)<sup>[5,6]</sup>. The SARS-CoV and MERS-CoV are two highly transmissible and pathogenic viruses, emerged in humans in 2002 and 2012 respectively and resulted in spread and pathogenic infection in humans<sup>[7,8]</sup>. Detailed investigations found that SARS-CoV was transmitted from civet cats to humans and MERS CoV from dromedary camels to humans<sup>[1]</sup>.

The latest corona virus causing pandemic 2020 has been named as COVID-19 by World Health Organisation<sup>[9]</sup> (WHO). The COVID-19 strains are genetically related with SARS-CoV (Severe Acute Respiratory Syndrome coronavirus) and MERS-CoV (Middle East Respiratory Syndrome coronavirus)<sup>[10]</sup>. Surprisingly, the epidemiology of COVID-19 is similar to SARS-CoV[11]. The genome of COVID-19 shares sequence identity with both SARS-CoV and MERS-CoV<sup>[12]</sup>.

### Objective

The aim of our study was to assess the evolutionary trends and pattern of occurrence of COVID-19 pandemic in state of Himachal Pradesh in India.

### Materials and Methods

Data regarding state statistics from January 2020 to January 2021 was gathered from various sources. Since, objective and authentic data was released by different agencies daily and reported to WHO, so the state profile of new cases, cumulative cases, recoveries, cumulative deaths, samples tested, positive samples was taken based on availability of information from government and National Health Mission site, other State websites and newspapers and analysed for various parameters.

### RESULTS

The results were documented and pattern were analysed using various formulas. The following observations were made.

**Table-I: District wise breakdown of COVID-19 cases in Himachal Pradesh (Data as on 31<sup>st</sup> January 2021)**

District	Total confirmed cases	Active cases	New cases	Recovered	Deaths	Population	Percentage of affected Population
Himachal	57536	390	42	56163	967	68,64,602	0.8%
Shimla	10378	57	6	10054	263	8.14 lakhs	1.2%
Mandi	9990	94	21	9768	124	9,99,777	1.0%
Kangra	8193	59	3	7930	202	15,10,000	0.5%
Solan	6719	25	8	6622	72	5.8 lakhs	1.0%
Kullu	4416	15	0	4316	83	4.38 lakhs	1.0%
Sirmour	3433	46	2	3358	29	5.3 lakhs	0.6%
Hamirpur	3040	16	0	2974	49	4.55 lakhs	0.7%
Chamba	2953	14	0	2886	51	5.19 lakhs	0.6%
Bilaspur	2917	5	0	2887	24	26.6 lakhs	0.1%
Una	2880	38	1	2800	42	5,21,173	0.6%
Kinnaur	1359	21	1	1322	16	84,121	1.6%
Lahul & Spiti	1258	0	0	1246	12	31,564	4.0%

The district-wise pattern of rise and fall of COVID-19 cases in Himachal is shown in [Table - 1]. As on 31st January 2021, Shimla had the highest number of cases in comparison to other districts like Mandi, Kangra, Solan, Kullu, Sirmour, Hamirpur, Chamba, Bilaspur, Una, Kinnaur and Lahul & Spiti in descending order. Total cases reported in Himachal Pradesh were 57536 with 390 active cases, 56163 recovered cases and 967 deaths. It also shows district wise percentage of COVID-19 affected population. Population wise most affected district was Lahul & Spiti having 4.0% affected population, followed by Kinnaur 1.6%, Shimla 1.2%, Solan and Mandi 1.0% each, Hamirpur 0.7%, Chamba and Una 0.6% each, Kangra 0.5%. Least affected district was Bilaspur with affected population 0.1%.

**Table 2 : COVID-19 case scenario in Himachal Pradesh month wise (Data as on 31st January 2021)**

Name of month	Total cases	Active cases	Recoveries	Deaths
January 2020	-	-	-	-
February 2020	-	-	-	-
March 2020	2	-	1	1
April 2020	41	9	30	2
May 2020	182	121	57	4
June 2020	837	338	491	8
July 2020	2584	1094	1388	13
August 2020	5154	1323	3748	29
September 2020	14747	3598	10971	178
October 2020	22059	2880	18838	312
November 2020	40518	8289	31548	635
December 2020	55277	2615	51692	922
January 2021	57536	390	56163	967

Since August, there was a constant rise in both the infections and fatalities. The new cases added in August were 2570 with two fold rise. This was followed by a sudden surge in cases by October-end, the new case added in October were 7312 with three fold rise. While total cases rose to 22,059 and 312 deaths occurred in the month of October in state of Himachal. Maximum rise was in November when the state witnessed 18459 new cases with two fold rise and total cases rose to 40,518 cases and 635 deaths and the trend continued in December[13]. Active cases decreased to 390 in January 2021 with total confirmed cases 57536 and 967 deaths. Cases were reported from almost all the districts of the state(Table-2).

**Table-3: District wise recovery rate in Himachal Pradesh(Data as on 31st January 2021)**

Name of District	Confirmed cases	Recoveries	Deaths	Recovery rate
Himachal	57536	56163	967	99%
Shimla	10378	10054	263	99.4%
Mandi	9990	9768	124	99%
Kangra	8193	7930	202	99.2%
Solan	6719	6622	72	99.6%
Kullu	4416	4316	83	99.1%
Sirmour	3433	3358	29	98.7%
Hamirpur	3040	2974	49	99.4%
Chamba	2953	2886	51	99.4%
Bilaspur	2917	2887	24	99.7%
Una	2880	2800	42	98.7%
Kinnaur	1359	1322	16	98.4%
Lahul & Spiti	1258	1246	12	100%

Himachal recovery rate was 99% as compared to 79% in the month of November and 70% in the month of July 2020. Lahul & Spiti had 100% recovery rate followed by Bilaspur 99.7%, Solan 99.6%, Hamirpur, Chamba and Shimla 99.4% each, Kangra 99.2%, Kullu 99.1%, Mandi 99%, Sirmour and Una 98.7% each, Kinnaur 98.4%(Table-3).

**Table-4: District wise Case fatality rate(Data as on 31st January 2021)**

Name of District	Total confirmed cases	Deaths	Case fatality rate
Himachal Pradesh	57536	967	1.7%
Shimla	10378	263	2.5%
Mandi	9990	124	1.2%
Kangra	8193	202	2.4%
Solan	6719	72	1.0%
Kullu	4416	83	1.9%
Sirmour	3433	29	0.8%
Hamirpur	3040	49	1.6%
Chamba	2953	51	1.7%
Bilaspur	2917	24	0.8%
Una	2880	42	1.5%
Kinnaur	1359	16	1.2%
Lahul & Spiti	1259	12	1.0%

The cumulative cases in Himachal were 57536 as on 31st January 2021 with case fatality rate 1.7% which was higher than Indian average of 1.5% which in turn was nearly half of the global average of 3.7%. Himachal Pradesh witnessed a sharp surge in the coronavirus cases, Shimla district recorded the maximum deaths of 263 during the above said period which was a significant contributor and its case fatality rate was highest 2.5%, which was greater than state average of 1.7%. In comparison, Bilaspur and Sirmour had a low case fatality rate of 0.8%. Kangra is the biggest district in terms of population, and was the 2nd worst-hit district with a fatality rate of 2.4%. (Table-4).

**Table- 5: Comparative study (Data as on January 2021)**

Sr. No.	Himachal Pradesh	India
Doubling time	854 days	579 days
Case fatality rate	1.7%	1.44%
Recovery rate	99%	97.05%
Positivity rate	6.1%	5.79%
Tests per million	135681	195081
Growth Rate	0.4%	0.9%

COVID-19 case doubling time was 854 days in January against 20.2 days in June, while national average was 579 days. Average growth rate of new infections over a seven day period in Himachal was about 0.4% as compared to 2.2% in the month of November and was lower

than Indian average of 0.9%. Positivity rate of Himachal was 6.1% as compared to 16.5% in the month of November which was highest in country. The influx of Himachalis, who had permanently settled in other states for business or jobs had lead to surge in number of cases and pushed the state's Covid-19 related parameters from bad to worse in the beginning of epidemic. Tests per million conducted in Himachal till January were 135681 against the national average of 195081(Table-5).

## DISCUSSION

Coronavirus (COVID-19) is the etiological agent of<sup>[14]</sup> of this global pandemic. The first case of the COVID-19 pandemic in India was reported on 30 January 2020, originating from China. Slowly, the pandemic spread to various states and union territories including the state of Himachal Pradesh. The first case of the disease was recorded in this region on 20th March 2020<sup>[15]</sup> in Kangra district and the first fatality occurred within 3 days of the first case on 23rd March 2020<sup>[16]</sup>. Till July, the situation was much better as only 2,584 infections were reported and 13 people had died over a period of 5 months.

The cumulative cases in Himachal were 57536 as on 31st January 2021 with case fatality rate 1.7%, while Shimla and Kangra were having case fatality rate of 2.5% and 2.4% respectively. The reason for the high case fatality rate in Shimla and Kangra was that Dr Rajendra Prasad Government Medical College (RPGMC)Tanda and Indira Gandhi Medical College (IGMC)Shimla were designated as tertiary COVID-19 care centres where serious patients with SPO2 less than 40%, were referred for treatment from other districts

State of Himachal Pradesh recorded high male mortality. Sixty seven percent of the total deaths reported in state were men. Sixty five percent of corona deaths were related to co-morbid conditions like hypertension and Diabetes. About 27.9% of people who died, were in the age group of 61-70 years, 22% in age group 71-80 years, 21% between 51-60 years and 10% victims were 80 years or above. The younger people too were vulnerable with 17% of victims in the age group of 11-50 years. The youngest victim was a 1.5 year old kid.

Estimating the evolutionary trends of this Covid-19 outbreak is very important for the allocation of economic, scarce medical resources, regulation of human activities and even for national economic development of the country<sup>[17]</sup>.

According to WHO, the novel coronavirus is ten times deadlier than swine flu, which resulted in global pandemic in 2009. A vaccine is necessarily required to halt the transmission entirely<sup>[18]</sup>. Till that, the government must continue to encourage the strict adherence of public health measures such as social distancing, wearing mask, personal hygiene practices and cough etiquette along with extensive testing and tracing. Disaster management and infectious disease control system was put in place to contain the spread.

Vaccination: Covid-19 vaccine inoculation mega drive was launched in India on 16th January by using CO-WIN App across all 27 states and Union Territories using Covisheild vaccine, and Co-vaxin. To begin with, Covisheild vaccine, produced by Pune-based Serum Institute of India was used for vaccination. It is made up from a weakened version of a common cold virus (known as an adenovirus) from chimpanzees, administered in two doses given four weeks apart, 0.5 ml each in deltoid by deep intramuscular route. It can be safely stored at temperatures of 2°C to 8°C and has efficacy of 70.42% after two doses. In first phase, frontline corona warriors were vaccinated, followed by senior citizens and patients with co-morbidities in second phase. On day one, total of 1536 front line corona warriors were vaccinated in Himachal. The total beneficiaries vaccinated in Himachal as on 21st February 2021 for first and second dose were 64294 and 12092 respectively.

Incidence of Covid-19 had suddenly dropped before vaccination. May be the intense public health measures like imposition of curfew, social distancing, wearing masks, frequent hand washing might have broken the chain of transmission. Another reason could be, the vulnerable population has already been infected and others are either not vulnerable or asymptomatic.

## CONCLUSION:

The current study presented the evolution and decline of corona pandemic and its trends in state of Himachal Pradesh. Covid-19 symptoms are milder but infectivity is higher compared to SARS- CoV

and MERS- CoV. It may be considered as a severe public health threat of this decade. Himachal Pradesh has recovery rate of 99% and case fatality ratio of 1.7% with Shimla having highest case fatality rate of 2.5%. Population wise most affected district was Lahul & Spiti with affected population of 4%. In order to prevent the 2nd wave of Covid-19 pandemic there is need to continue the containment strategies in the state.

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