# Plausible Transition of COVID-19 from Pandemic to Endemic State: Impact of Variant UK Strain, B 7.1.1 on the Spread of COVID-19 in the Population.

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**ABSTRACT**

COVID-19 is a contagious disease spreading without showing any signs of abatement across the world. Presently, SARS-CoV-2, the causative agent of COVID-19, is giving a fresh threatening signs to renew its devastation as several new mutated strains have been detected in Unite Kingdom, South Africa, Brazil & the USA; the first variant being detected in the United Kingdom (B 7.1.1). Here we have shown that there was a gradual waning of active cases of COVID-19 (original strain) across the Nation after implementation of Lockdown; this suggests that COVID-19 has lost its sheen and the COVID-19 pandemic is nearing its end. However, the recent emergence of the mutated forms of SARS-CoV-2 in different countries, being more contagious and virulent than the original form, could turn the table of this ongoing pandemic. The implication of all the data obtained from the old and the new UK variant, B7.1.1, in context of pandemic in India, has been discussed in this article.

Key words: COVID-19 – Lockdown- active cases – passive immunity – Endemic- Variant Strain.

## I. INTRODUCTION

SARS virus belongs to the family *Coronaviridae*, which is known to cause respiratory illnesses in humans and animals. SARS-CoV-2 is a novel member of this family which causes acute respiratory distress syndrome (ARDS), associated with high mortality rate. A new strain, more virulent than the previously known strains, was identified recently in United Kingdom and it gradually has spread to different parts of the world. Now there are more mutated variants of SARS-CoV-2, originating in different countries, having higher virulence and contagious nature, threatening to destabilise human survival. The only hope to combat this virus is by developing effective immune response against the virus. This has highlighted the need for developing effective vaccination strategies to fight this menace.

The alarming nature of the spread of SARS-CoV-2 virus during early part of 2020, prompted the Indian Authorities to call for a country wide complete Lockdown from March 25, 2020. The complete lockdown implemented country wide was relaxed in a phased manner from 1st June, 2020 onwards. In a series of papers, it has been shown by us that a) Evaluating percent change of COVID-19 in the population was a better way to assess the progression and alternation, if any, in the spread of COVID-19 in the population; b) Implementation of timely Lockdown resulted in an increase in doubling time of COVID-19 in the population; c) Due to implementation of timely Lockdown, there was slowing down in the rate of growth of COVID-19 & d) Due to implementation of timely Lockdown, recovery from COVID-19 was on the rise reflecting an emergence of protective Immunity against

SARS-CoV-2 in the population (1-6). It was hypothesized that among the people in the population there could have been existence of prior immunity which were able to cross-react with SARS-CoV-2 and provide protection against COVID-19. Now, we further add that implementation of effective Lockdown slowed down the viral progression resulting in weakening (attenuation) of the live virus aiding in passive immunization (vaccination) against SARS-CoV-2. Recent study published in the journal Science has shown generation of adaptive immunity in response to SARS-CoV-2 virus in individuals with COVID-19 (13). In this article, we have taken up studies in a section of population, to further elucidate the role of passive immunization, induced by sustained Lockdown, in protecting the population against the SARS-CoV-2 infection.

**METHODS:** The present study was carried out on the data collected from different sources that include the Ministry of Health (Health bulletin) Government of India and from other National and International News outlets starting from March 15, 2020 until March 25, June, 2020 as also described previously by us (1-3). The Statistical analysis was performed by Microsoft Excel and power point programs and the correlation studies were done using Pearson Correlation Coefficient program.

**II. RESULTS AND CONCLUSIONS:** The present study was carried out on the data collected from the Govt. Portals and other News portals pertaining to COVID-19 from the beginning of its spread in India during March 2020. Briefly stated that a two month Lookdown was imposed on March 25, 2020 which ended on May 30, 2020. Following which the Lockdown was unlocked

in phases of one month and even today some restrictions are maintained. The implementation of Lockdown had a profound effect on the progression of COVID-19 in the population and possibly on the physical nature of SARS-CoV-2. The **Figure 1** reflects the distribution of COVID-19 in the entire country from 14 March, 2020 until 25 January, 2021. It is clear from the graph that number of total confirmed cases of COVID-19 is slowing down with time, instead of accelerating like it happened in the Western countries, suggesting that some kind of protection exists in the population in general against the SARS-CoV-2 virus. It is clear from the graph that from the time of first appearance of COVID-19 to the end of complete Lockdown, that is up to 31 May, 2020, there was insignificant spread of COVID-19 and this pattern continued subsequent to relaxation of Lockdown. However, from the 2nd week of July, 2020 there was an abrupt spurt in the number of COVID-19 cases among the population which continued until 3rd week of September, 2020. This sudden increase in the number of COVID-19 cases was due to some 'extrinsic factors' which have been discussed elsewhere in details (3). The sigmoid growth curve, in the figure: 1 clearly demonstrates that after 1st week of January, 2021 the growth curve began bucking the trend line of growth and began descending, signifying that the pandemic could be nearing an end. Only some 'untoward incident' could change the strong direction, as depicted in the graph, and cause it to move upwards.

Since the beginning of change in number of total COVID-19 cases was evident from December, 2020, as shown in the figure: 1, we decided to study the percent change of COVID-19 cases from December, 2020 onwards. We

have demonstrated earlier that evaluating the percent of COVID-19 cases in the population could accurately reflect the actual progression and any abrupt changes taking place in the distribution of COVID-19 (1). The result from this study is shown in Figure: 2. The figure reflects the percent change in total COVID-19 cases from 1 December, 2020 to 25 December, 2021.

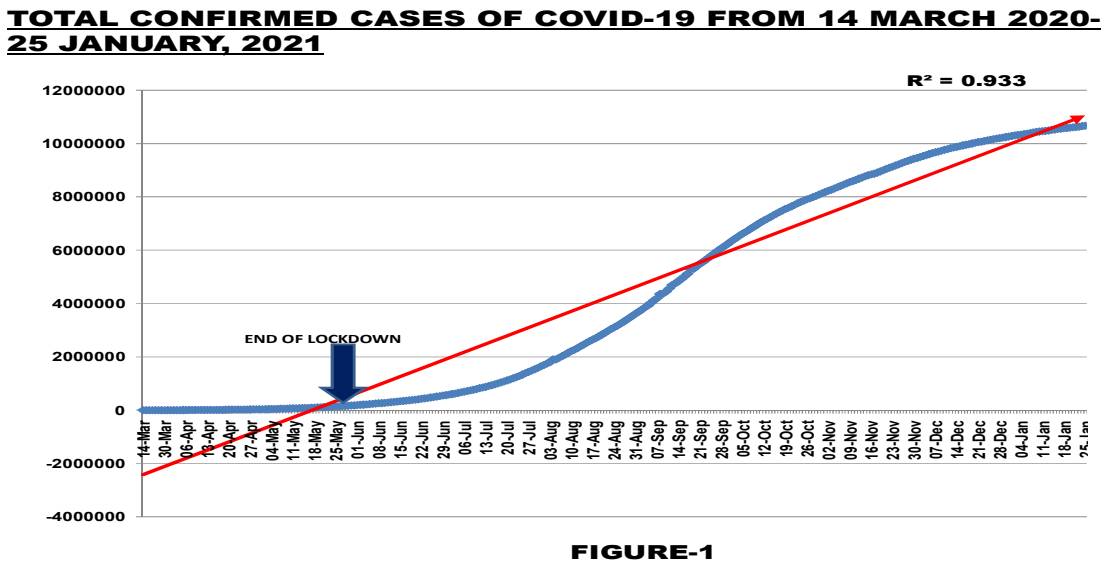


**Figure 1: The figure shows the distribution of total number of confirmed COVID-19 in the entire population from 25 March, 2020 to 25 January, 2021.**

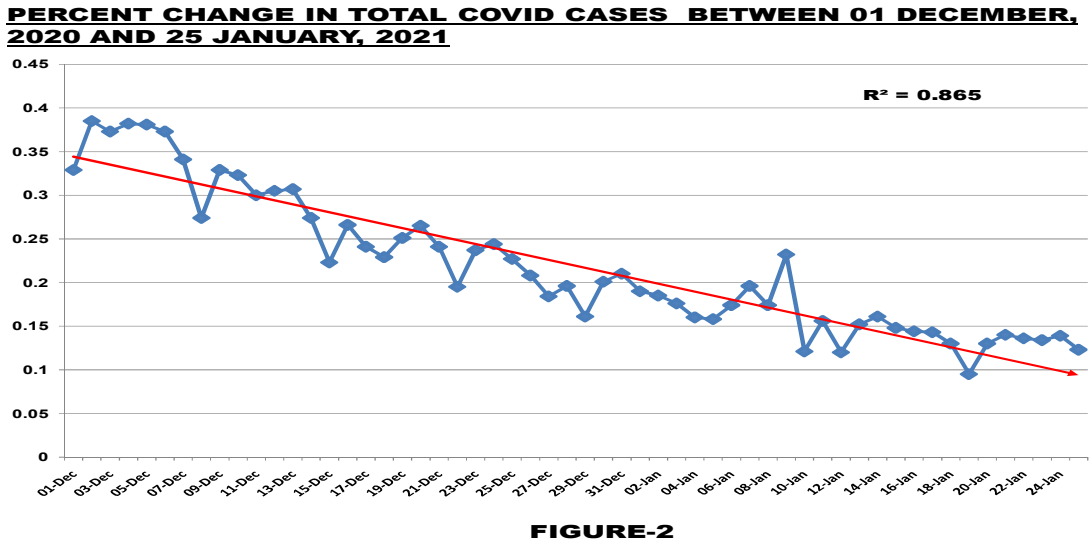


**Figure 2: The figure shows the rate of change of COVID-19 in the population.**

The Figure: 2 clearly demonstrated that the rate of COVID-19 cases in the population, though showed some volatility, had a consistent downward trend and percent of COVID-19 cases was beginning to buck the trend line and the result was significant at $p < 0.01$. This data clearly demonstrated that the pandemic was plausibly under control and could end if no other extrinsic factors interfered with the growth of COVID-19. Masking up was considered from the beginning as one important factor to control spreading of COVID-19 in the population. In order to understand the co-relation of masking with spread of COVID-19, we carried out a quick sample survey in the population, to determine the number of individuals using mask when they were carrying out outdoor activities. The result obtained is shown in Figure: 3. The study reflected that a substantial number (30%) of people, irrespective of gender, were moving around without any mask during different time of the day. The number of people with mask,was slightly higher during noon (11AM-1PM) compared to morning hours (7AM-8.30AM).

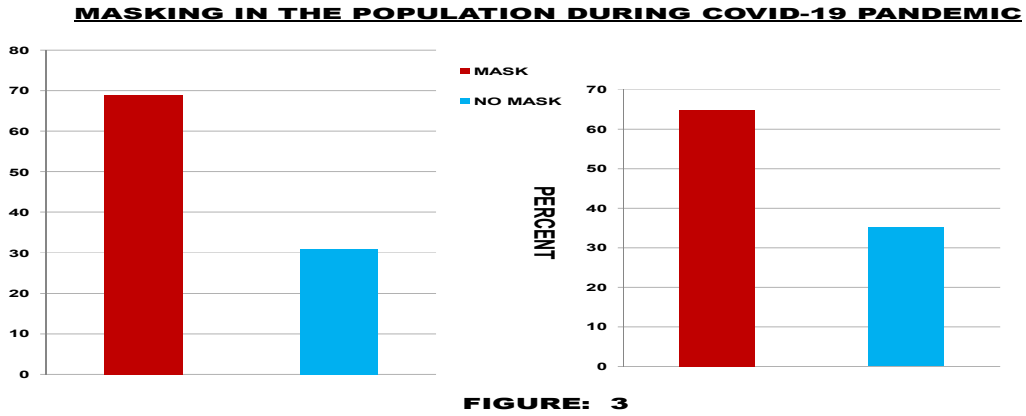


**Figure 3: The figure shows the percent of people wearing mask compared to those who were not putting on mask; during two separate time periods. The left panel represents time between 7 AM-8.30 AM and right panel represents time between 11 AM- 1 PM.**

However, the results during the month of January, 2021 reflected that the not putting on mask did not influence the growth of COVID-19 in the population; the number of active cases continuing to show a downward trend. But this survey was local and wide spread survey taking into other factors like gender etc. More importantly, the recent appearance of SARS-CoV-2 variants could influence the spread of COVID-19 which is threatening a second innings of the pandemic. However, one conclusion could be drawn that there were other reasons which was protecting the population against the SARS-CoV-2 infection. The new coronavirus variants have been detected in the United Kingdom, Brazil, South Africa and in different parts of the USA as shown in the Figure: 4. The major variant which appeared first was in the UK (UK variant B 1.1.7) and that variant is also detected in India.

**MAP OF DETECTED CASES OF SARS-CoV-2 VARIANTS # B 117 OR 501YV.1 AND # 501V.2**

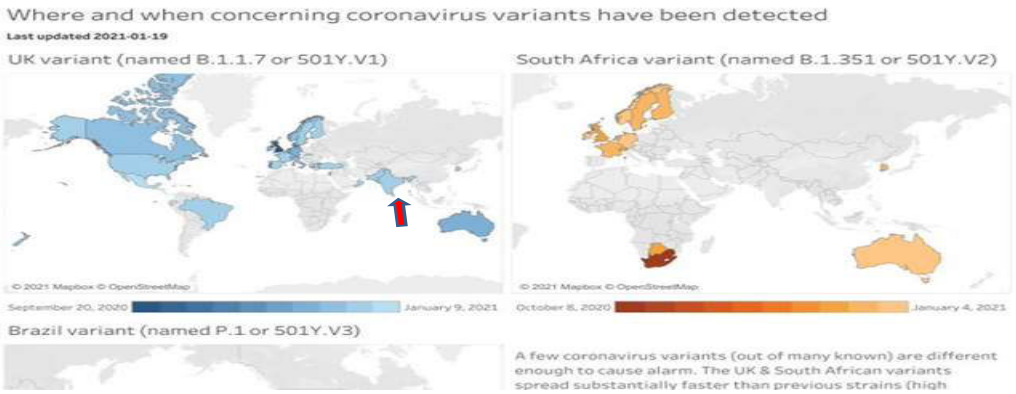


**FIGURE:4**

**Figure 4: The Figure shows the distribution of the new-variants of SARS-CoV-2 in different countries of the world including India (red arrow).**

The Figure: 4 depict the distribution of the UK Variant in different parts of the world. It is ironical that just when it was thought that the COVID-19

pandemic may be reaching an end at least in some parts of the world, the new COVID strain has caused a major concern in controlling this pandemic. The new strain has been found to be more contagious than the previous one which came from Wuhan China. As per the US Centres for Disease Control and Prevention (CDC), the new, more contagious variants are likely to accelerate the spread of the virus. Cases of the new COVID strain, B.1.1.7., discovered first in the UK was also found in many of the countries in the world (Figure: 4). Multiple lines of evidence indicate that B.1.1.7 is more efficiently transmitted than are other SARS-CoV-2 variants and has the potential to increase the pandemic trajectory in many countries. However, in India though the strain has been detected in the population more than a month back, it was unable to spread until date. However, the Centre for Disease Control (CDC), USA, has suggested "B.1.1.7 prevalence is initially low, yet because it is more transmissible than the older form, the B.1.1.7 strain may become the predominant variant in USA, in March, 2021". However, in India the picture is not as grim as stated by CDC. The total number of people infected with UK variant in India is observed to be comparatively modest during the month of January, 2021 (Figure: 5). The drop in the number of UK variants could imply that the new UK variant also is facing resistance like the older strain. We put forward an argument that there is an immune protective mechanism among the Indian population against a broad spectrum of pathogens which could respond to SARS-CoV-2 and its variants entering in the Indian population. This is perhaps better depicted when the percent of COVID-19 cases infected with the new UK

variant is evaluated. The Figure: 6 depict the percent change in the progression of COVID-19 (UK strain) during the month of January. The results clearly indicate that there is high volatility during this period.

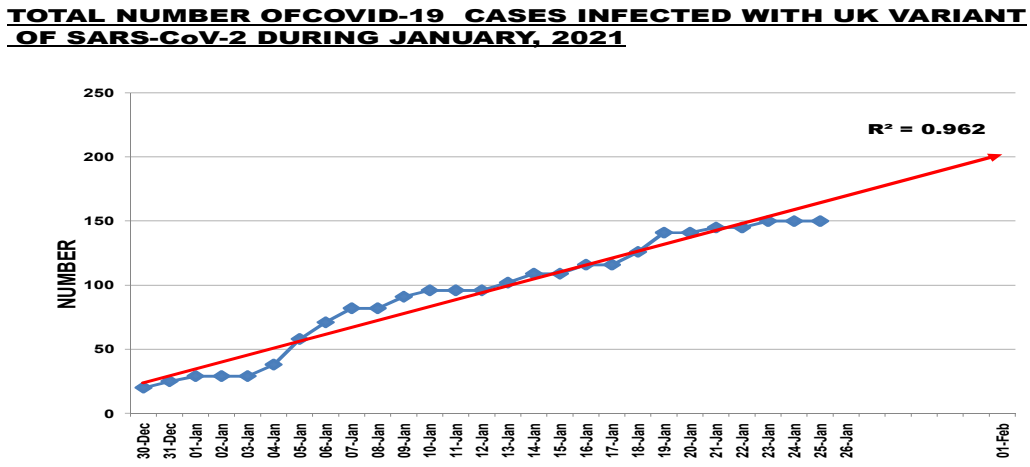


FIGURE: 5

**Figure- 5: The figure shows total number of UK variant in the entire population. The trend line shows an upward trend. However, the actual number appears to have slowed down since 25 January, 2021.**

However, the trend in the percent of COVID-19 cases (UK strain) among the population is showing a downward trend. The high level of volatility observed in the percent of COVID-19 cases is reflected in the $R^2$ value of 0.385. The curve has taken a flattened nature from 21 January and it continues until now. When the percent of COVID-19 cases infected with old strain was correlated with the percent of COVID-19 cases with infected with the new UK variant strain during the month of January, 2021, it was observed that there was a non-significant correlation between the two variables as depicted in Figure-7. However, the $R^2$ value in this correlation study appears to be on the rise with the $R^2$ value until 25 January was

equal to 0.187, which suggests that the UK variant of SARS-CoV-2 (B7.1.1.) may also wane with time within the population.

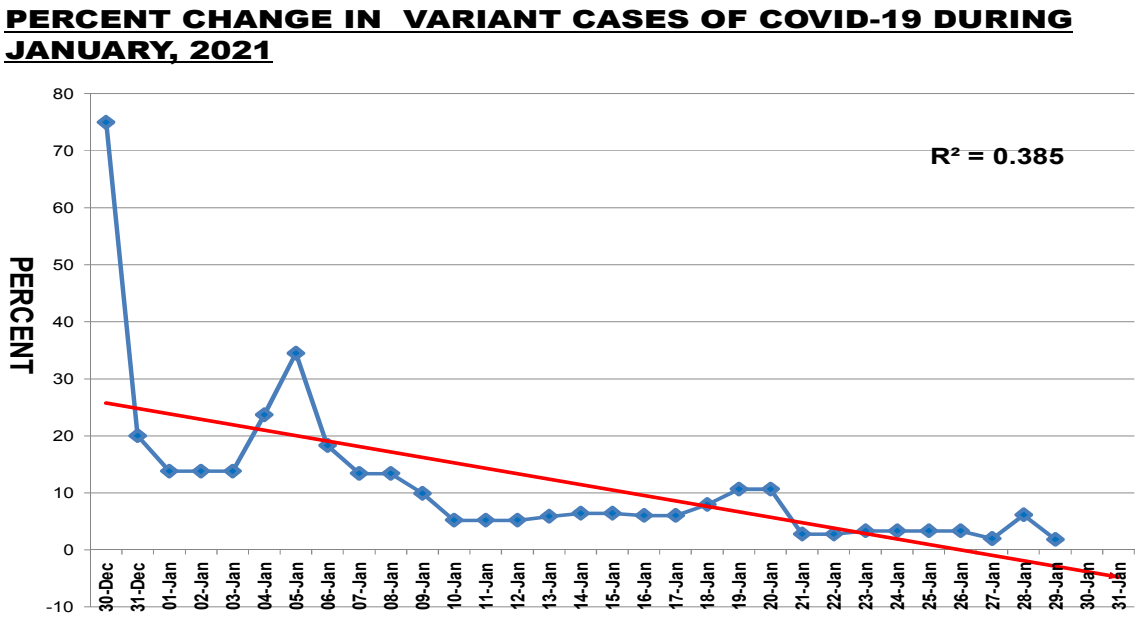


**FIGURE:6**

**Figure- 6: The figure shows the percent of UK variant of COVID-19 in the entire population. The trend line shows there is a gradual decrease in the percent of COVID-19 cases. However, rate is not significant at p<0.05.**

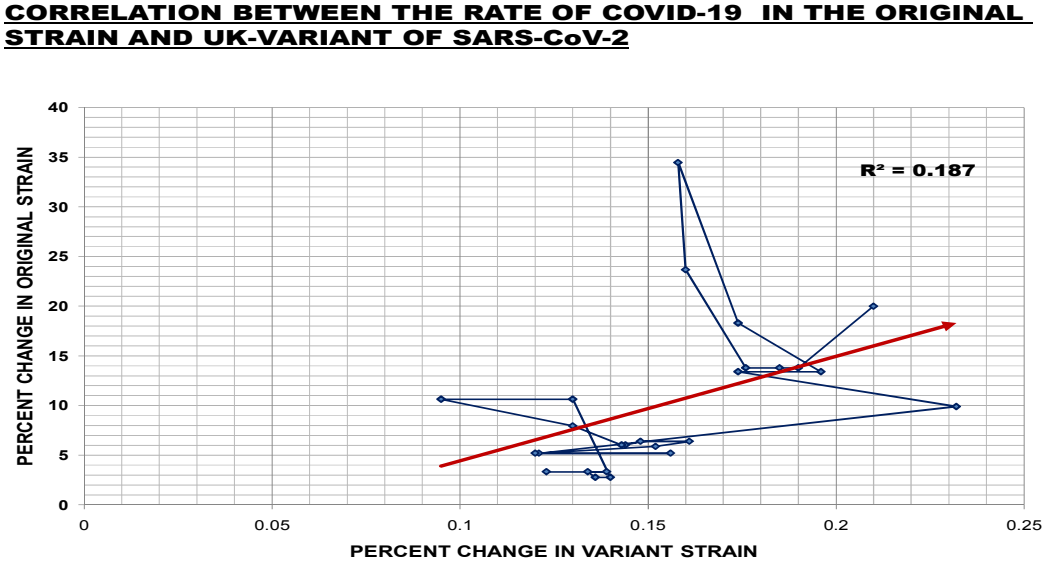


**FIGURE : 7**

**Figure- 7: The figure shows the correlation between percent of COVID-19 cases of old and new strain. However, the result is not significant at p<0.05.**

Our previous studies have reflected that in spite of initial volatility in the rate of COVID-19 cases following complete Lockdown, the rate of spread of COVID-19 stabilised from the second week of May, 2020 and based on the available data, we had concluded that the Indian population could be having protective immunity against COVID-19. And enforcing a complete Lockdown at an early stage of COVID-19, only helped in widening the net of protective immunity by passive vaccination of the population by live attenuated SARS-CoV-2 virus (1-7). We have emphasized that passive entry of the live attenuated virus was able to generate immune response in the host without having the ability to cause fatality from COVID-19 (7). This is consistent with the finding in a recent study which has indicated that in individuals vaccinated with live attenuated Yellow fever virus, the mortality rate was very low. The mortality rate due to COVID-19 in India is also very low (1.4%).

In the present study, as observed in the Figure: 1, the total number of COVID-19 cases reflected an 'S-shape growth curve. A typical S-shaped growth curve (sigmoid growth curve) increases slowly initially, in a positive acceleration phase; then increases rapidly approaching an exponential growth rate as in the J-shaped curve. However, in our study, though there was a belated increase from September, 2020 onwards, there was no exponential growth of COVID-19 cases. On the contrary, gradual decline in total number of COVID-19 cases was registered from the end of October'20. In order to confirm the conclusion, we concentrated on evaluation total number of active cases at the time period from when there was an increase

in total number of confirmed cases of COVID-19, as depicted in the S- graph (Figure:1).

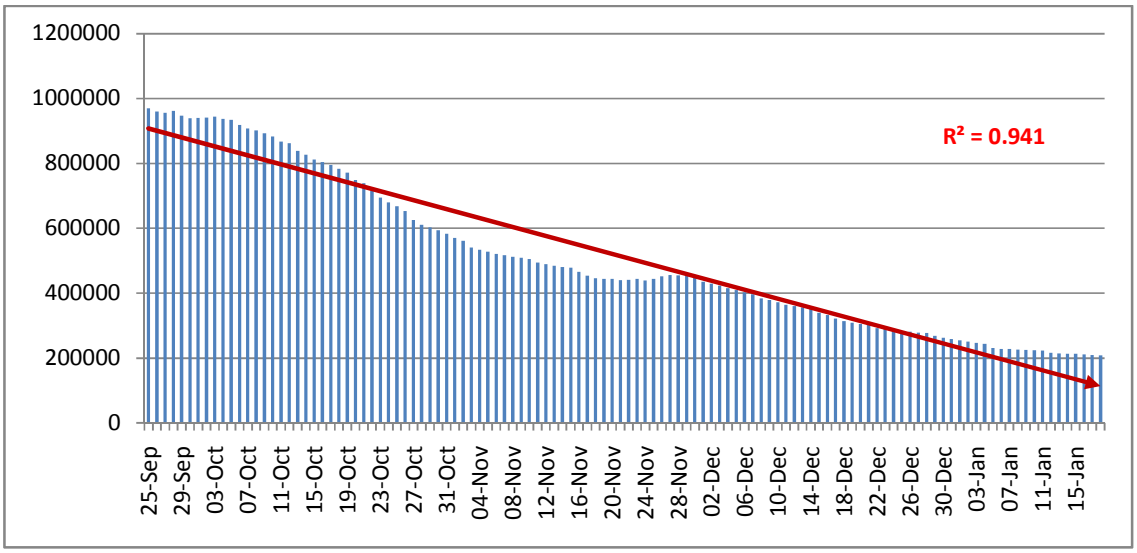


**FIGURE: 8**

**Figure 8: The figure shows the rise and decline of active cases of COVID-19 (old strain) from 25 September until 25 January, 2021 during which an increase in number of confirmed cases was noted as evident from Figure:1.**

The Figure: 8 show that there was an increase in the total number of active cases from 25 September, 2020 consistent with the increase in total number of confirmed cases of COVID-10 as shown in Figure-1. However, from the Figure: 8, it is apparent that there was a dip in number of active cases of COVID-19 from October, 2020 onwards which continued until 24 November, 2020. Following which the number of active cases again increased until 02 December, 2020 and thereafter continued its downward trend until 25 January, 2020. The trajectory of total number of active cases beginning from 20 October, 2020 in the population, substantiates the beginning of the end of epidemic of COVID-19. The trend line in the graph clearly demonstrates that there is a strong downward trend with p value being very significant at

$p < 0.001$. This perception gives further credence to the fact that live attenuated SARS-CoV-2 virus during served as an effective vaccine during Lockdown. The live attenuated SARS-CoV-2 virus lost its ability to cause serious illness but retained the capability to stimulate immunity in the host. The live attenuated virus did produce a mild or subclinical form of COVID-19 which did not have serious impact on the health of affected individual leading to their quick recovery and thereby lowering the number of active cases and mortality. A recent study with Yellow fever vaccine has reflected that when live attenuated virus was used as a vaccine, it caused very low mortality. The Yellow fever vaccine was highly effective in animal model and if it passes clinical trials, the new vaccine could have some advantages over other SARS-CoV-2 vaccines (8, 9). In the COVID-19 pandemic in India, after Lockdown, very low mortality was noted. Literature has also shown that vaccination with measles-mumps-rubella (MMR) could protect individuals from developing COVID-19 (8). On that context it is required to be mentioned that different vaccines have been used in India since 1893 to protect individuals against different bacterial/viral diseases (10); such vaccination appears to have been useful in protecting the population against SARS-CoV-2 infection. A more recent study has corroborated such an outcome, where blood collected from SARS-CoV-1 infected individuals in the year 2015, was able to mount an immune response, *in vitro*, against SARS-CoV-2 infected cells (11). Studies have also shown that individuals with COVID-19 have cross-reactive $T_h$ cells that are capable of recognizing & responding faster to the SARS-CoV-2 virus (12, 13). Our findings, reported

in this article, is in line with some recent data available regarding the presence of antibody in the population, which suggests that some regions have minimal number of active COVID-19 cases in India (7).

The above discussion clearly demonstrates that there is a gradual transition from pandemic state to endemic state of COVID-19 in the population. However, the new UK variant of SARS-CoV-2 detected in India so far could influence the prevailing COVID-19 in India. The UK variant has mutations which increases the ability of the outer spike protein to efficiently bind to the ACE-2 receptor bearing cells lining the nasal tract; this makes the UK variant more contagious and gives the virus the ability to re-infect people who are already sick with Covid-19 but did not show an immune response to the new variant increasing the mortality rate in the population. One aspect is clear that people infected with the UK Variant (B.1.1.7) are about one third more likely to die than similar people infected with the pre-existing viral lineages, that is, they have a more mortality rate than the older strain. However, our study, with the new strain of UK Variant, B.1.1.7, is rather encouraging as after first reported case of COVID-19 in the population in December 2020, no deaths have been reported so far and the spread of the UK variant of SARS-CoV-2 has been very restricted in the population. And as our data shows that the spread is gradually slowing down, though volatile, there is a strong downward trend in the rate of spread of the new strain; suggesting that the underlying resistance present in the population is also effective against the new UK variant of B 7.1.1.

In conclusion, this study demonstrated that Lockdown not only played a major role in controlling the immediate spread of COVID-19 in the largely immune protected population but also assisted in attenuation of SARS-CoV-2 virus which acted as a live attenuated vaccine against COVID-19. Our data also supports that at present there is gradual end to the country wide pandemic and the virus is being restricted to some pockets of the population. Once the endemic phase is reached and primary exposure during childhood, SARS-CoV-2 may be no more virulent than the common cold and the specific immune response generated to maintain endemicity has been recently defined (14). These results reinforce the importance of behavioural containment for continuing vaccination in the endemic phase.

## III. DECLARATIONS:

1. Ethics approval and consent to participate: Not Applicable
2. Consent to publish: Yes
3. Availability of data and materials: From public domain (Ref: 1, 2, & 3).
4. Competing interests: No competing interest
5. Funding: No funding was available for this study
6. Authors' Contributions: Full
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