



Flattening the Pandemic Curve of COVID-19 Explosion in India

Tipu Khalil Syed^{1*}

¹*Department of Community Medicine, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences (Deemed to be University), Sawangi (Meghe), Wardha-442001, Maharashtra, India.*

Author's contribution

The sole author designed, analyzed, interpreted and prepared the manuscript.

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ABSTRACT

Background: COVID-19 is pandemic which recently crossed the hundred million mark of infection cases all over the world. In the last one year from its inception China, two million people lost their lives struggling with COVID-19 related complications.

Summary: COVID-19 or coronavirus disease 2019 is seriously hurting almost all the aspect of human lives. Flattened curve of COVID-19 infections is the desired outcome of mitigation measures which must be achieved at the earliest. Various methods can be employed to mitigate the viral spread such as mask wearing, hand hygiene and so on so that flattening of the curve can be attained as soon as possible to avoid any further damage.

Conclusion: COVID-19 must be mitigated with all means and follow up of each activity must be done. More study is needed to analyze which measure is particularly effective in certain set of conditions.

Keywords: *Health care system; flattening COVID-19 curve; pandemic; mitigation measures; COVID-19.*

*Corresponding author: E-mail: sammy.sayyed@gmail.com;

1. INTRODUCTION

Coronavirus disease 2019 or COVID-19 has been successful in enlarging its expanse all over the world. Since its inception in Wuhan city of Hubei province in China, almost all the human population inhabiting the earth has been affected one way or the other [1]. As of February 1, 2021, 103,395,781 people has been affected by the COVID-19 by infection and 2,237,294 case fatalities has been reported due to COVID-19 related complications [2]. The novel coronavirus has crossed hundred million mark in infections and two million mark in case fatalities which is unfortunate and unprecedented. World Health Organization (WHO) has declared coronavirus disease 2019 as pandemic way back in March, 2020. It was first such declaration by the WHO since its inception as no other disease was as lethal and virulent as COVID-19. United States of America, India, Brazil, Russian Federation, United Kingdom and France are the top countries affected by the pandemic [3]. These countries account for more than half of disease infection and associated case fatalities. The spurt of new cases associated with mutated strain of coronavirus from South Africa, United Kingdom and Brazil is a serious cause of concern [4]. As the world is eyeing for flattening of the curve, such news disheartens the viewers. As the lockdown was announced to control the spread and buy some time to ramp up the health care infrastructure. Coercively controlling the viral spread through measures like movement restriction and lockdown were useful but to certain degree as exponential rise in cases was witnessed when these measures were eased up [5]. Therefore, non-coercive measures which are easily adapted by the people on their own will only produce sustainable results. Previous outbreaks associated with coronavirus has many lessons to offer especially in mitigating the viral spread. Several preventive measures such as wearing of mask, maintaining the safe and minimum physical distance, maintaining the hand hygiene are some steps which can help in keeping the infection away from us [6]. This and other associated measures which can be beneficial in flattening the COVID-19 curve are comprehensively reviewed in this article.

2. HEALTH CARE SYSTEM DURING COVID-19

Coronavirus disease 2019 or COVID-19 is the unprecedented disease outbreak that unfolded in month of December 2019. The highly virulent

nature of the virus and capacity of producing lethal clinical outcomes makes it more difficult to control and complex to understand. A health emergency like COVID-19 needs a health infrastructure which is robust. But the sheer suddenness of the pandemic of COVID-19 and its unpredictable behavior along with high virulent nature made it difficult to contain the viral spread with current health infrastructure. Even before the pandemic was yet to arrive, health care sector was always underfunded and understaffed. Various reports at national and international levels told that the numbers of doctors and allied health care professionals per unit population are less and more health care professionals are needed to accommodate the pre COVID-19 demand [7]. But after the pandemic arrived the demands rose many times and the health care infrastructure was overwhelmed. In some regions it collapsed and international agencies intervention such as United Nations was demanded, in some cases it is on the brink. Even the advanced economies which have resources and have state of the art infrastructure were unable to cater the demand of tremendous case infections. Even access to bed was difficult as hospitals and health care facilities were running on full capacity. Pictures coming out of European countries which are categorized as advanced economies such as Spain and Italy showed the horrendous scenario that infected people had to face. The health care infrastructure was completely collapsed under the burden of infected cases of COVID-19 of these two countries. Daily more than ten thousand case fatalities have been registered by these countries. As compared to the emerging economies of south Asia and Asia as a whole, the infrastructure in western countries is way more developed and advanced. These emerging economies struggled to get tested the people but surely maintained the case fatality rate at very low level. The behavior of novel coronavirus or SARS-COV-2 was so uncertain that whenever the peak of cases was supposed to be happening the case infections grew rapidly so all predictions were gone in vain. In emerging economies and countries with huge population like India, the scenario was different. The lockdown was imposed as a non-pharmacological intervention to contain the viral spread. The idea behind that was to buy out some to enhance the infrastructural facilities that will be requiring when lockdown will be lifted [8]. The lockdown was stretched for more than a month and when the question of lives versus livelihood arose, government started to lift the

curbs and ease some movement restrictions so as to open up the economy. But as soon as the curbs were eased, massive spike in the cases was registered. At one point, beds were lacking and then new ideas had to be implemented. For example, to solve the lack of bed problem, government converted various facilities like stadiums and open spaces into a makeshift hospital where beds were installed. Also, hotels and lodges were acquired in hard hit cities such as New Delhi where the infected people with mild to moderate symptoms were treated. Rail coaches were converted into makeshift hospital and clinic and were parked in the respective station. Large number of stands by beds were prepared to deal with any eventualities that may rise in future. In Mumbai, where there is one of the largest slum areas situated, saw massive spike as clusters were infected and city infrastructure alone was not adequate. Large stadiums and halls were converted into temporary clinics where doctors and nurses started to check the patients. Mitigation measure at this scale surely reduced the burden on the city but overall case load was unaffected as the novel coronavirus shifted its battle ground to another interior city. The health care system has been not successful in tackling the COVID-19 pandemic. Therefore, it needs a necessary push in several steps so that on the longer run, if another pandemic breaks out then our health care infrastructure is resilient to bear all the brunt's of any disease outbreak. Especially least developed countries where the health and education sectors are not up to the mark, must be invested in by international stakeholders so as to minimize the chances of any loophole exploitation by and disease. Often these countries are neglected and are left on their own. The poor and backward countries have less resources to meet their needs and also, they harbor millions of people which needs to be treated humanely and tight to healthcare must also be given to them. As these geographical regions have lush green vegetation and many wild animals reside here. Also, there are some precedent about how spillover of many epidemics has been reported from the African region as the underdeveloped regions are left with no choice but to exploit the wild life and habitats. Therefore more attention needs to be given in these backward areas where there is an immense scope of development [9].

3. FLATTENING THE CURVE OF COVID-19

As the cases were on rise and more and more people were getting tested for COVID-19, people wanted

to know that when the rise of cases will be arrested. By what date the case mortalities attached to COVID-19 reduced. All the people and researchers were looking at the flattening of the curve phenomenon. When the infection cases newly reported are equal to or less than the discharged patients or treated patients then the situation is known as flattening of the curve. All the resources here in this case are adequate to deal with the medical emergency. Critical clinical infrastructure such as intensive care unit beds and equipment's are available to all and there is no lack of it. Generally, this term is discussed when the medical emergency of such scale such as COVID-19 strikes the health care infrastructure. It may take considerable amount of time to achieve the flattening of curve especially in disease outbreak where no history is known such as COVID-19. Initial days are passed on by nominal treatment meanwhile health care agencies utilize this time to devise an effective strategy. Mitigation measures are the best way in which one can achieve the flattening of the curve sooner. Another way is to ramp up the health care infrastructure so that a greater number of people can be accommodated for treatment. But in the pandemic like COVID-19 where the case numbers are huge and there is no time in increasing the infrastructure, mitigation measures must be focused on first place [10].

4. MITIGATION MEASURES

In order to arrest the rapid spread of the novel coronavirus or SARS-COV-2, various measures have been used to achieve the gain control on the virus. Novel coronavirus is the successor of coronavirus or SARS-COV which was the reason behind the severe acute respiratory syndrome (SARS) outbreak [11]. ALSO, Middle Eastern respiratory syndrome is associated with the coronaviruses. These outbreaks have a lot to offer in terms of lessons on how to successfully control the viral spread. Some tried and tested methods can implement right away to reap maximum benefits. As the governments were taken aback during the initial days of the pandemic and did not know about the history of the disease, various governments around the world resorted to measures like lockdown and movement restrictions. This coercive measure made people sit at home and all the passengers coming from abroad were quarantined and if tested positive were treated for the same. The intensity of the lockdown was varying in various countries from harsher to more adjustable. Only the essential services providers were able to

roam freely for work related journey. Break the chain formula was used where people were sitting at home so that they cannot transmit the disease. The efficacy of lockdown felt during the duration of lockdown as cases were not growing rapidly and health care system was able to respond to all the infected patients. But as soon as the lockdown and movement restrictions measure were eased up, the rise in infection cases was exponential. Along with the infection cases the case fatalities also grew as somewhat chaotic situation was there as health care infrastructure was overwhelmed by the burden of cases and proper care to each patient was not possible in such rush. Mixed results were obtained from lockdown measure as persisting lockdown was not feasible.

As the lockdown measure started to ease up, researchers and scientists along with health care and governmental agencies was looking up to some non-coercive measure which can be taken up by public and is not enforced from top [12]. Public should enthusiastically adopt such measure to safeguard themselves and also help in restarting economic wheels which are necessary for sustenance. These mitigation measures include wearing masks, maintaining safe and minimum physical distance from fellow persons, wearing personal and protective equipment (PPE) kits, face shields, regular sanitization of hands before and after touching any public surface. These are the measures which are tried and tested in previous outbreaks so these can be readily implemented. Their efficacy has been established already. Wearing of masks in really important as the transmission of the novel coronavirus or SARS-COV-2 happens through nose and mouth. Speaking, sneezing can transmit the virus. Mask of safe standard must be used in order to protect us from any such infection in public places. Mask was proven extremely beneficial in Ebola outbreak in Africa [13]. Mask enabled the health care workers to trace the patient so as to treat them for the disease. The widespread use of mask in SARS and MERS helped to control the spread of these outbreaks. So far face mask has been successful in arresting the viral spread of the virus. It should be sported all the time when you are out in meeting people. The tiny droplets are prohibited from entering the mouth. Also wearing mask properly is necessary to take out maximum benefits. Improper usage such as wearing it lower, constantly touching the mask, lowering the mask while talking can be very dangerous. It creates a false sense of security

that one is fully protected even if he or she wears the mask improperly. Masks will prove to be one of the key factors in flattening the curve of COVID-19 [14].

Health care professionals and front-line workers are at the forefront of the fight against COVID-19. They must be given proper personal and protective equipment's (PPE) kits in order to safeguard them from the COVID-19. Already there are lack of manpower in the health sector and COVID-19 infection will lower the available pool of professionals even more. Therefore, these professional must be provided with adequate number of resources in fight against COVID-19. Certainly, health care professionals will only help in flattening the curve of COVID-19 infection cases. Sanitizing hands regularly and properly is yet another mitigation measure through which case infections can be reduced and one can safeguard themselves from the lethal infection. The transmission of disease from hand to mouth or nose has been widely reported. Further virus can stay on certain surfaces for hours. So, it is important to clean and sanitize hands regularly with soap and water or alcohol based sanitizing liquids which are effective in eliminating the virus from the surface. Before eating and drinking and after touching any surface, this hand hygiene practice must be followed. Sanitizer dispenser must be installed at regular intervals so that people can access the sanitizer which does not require water to wash off [15].

These are some external practices that can be followed to ward off the lethal virus from entering into our body. Novel coronavirus works on a mechanism which exploits the loophole of weakened immune system of the human being. It then enters the human body and takes the control of the cell through angiotensin enzyme 2 (ACE 2) receptor which acts as the gateway for the novel coronavirus. If we maintain our immune system at certain level so that any invasion of external pathogen can be dealt with more force and finally eliminating the virus from the body. Eating properly, taking essential supplements and probiotics, maintaining physical and mental balance will strengthen the immune system of the body which then be capable of eliminating not only novel coronavirus but other similar diseases. Various foods containing Vitamin C, Vitamin D and probiotics can be inculcated in the daily balance diet which can strengthen the metabolism of the body. Vitamin D is associated with anti-inflammatory properties and anti-

oxidants. Novel coronavirus induce COVID-19 initiate's inflammation in the body and increases the oxidative stress in the body [16]. Therefore, Vitamin C containing foods can be immensely helpful in building immunity and in turn warding off the virus from us. Vitamin D is not only associated with absorption of calcium from the food but also have direct impact on immune system. Mere standing under the sun early morning can be beneficial in order to fulfill the body's need of Vitamin D. Various food substances can also be inculcated so that these vitamins can provide necessary support to the body functions. Probiotics are helpful in maintaining the gut flora or microbiota. Many substances need these good bacteria which reside in the intestine of the body to be broken down. Probiotics maintains these good gut bacteria at minimum and safe levels so that bodily functions are working properly. In infected patients too, where ongoing treatment can be supplemented with curated diet according to patients' condition. Diet which are having high anti-oxidants and other beneficial things can be administered under supervision to achieve better results [17]. Similar studies on immunity enhancing diet were reported by Bhutada et. al. [18] and Biswas et. al. [19]. Few related studies on Covid-19 impact were reported [20-22]. Bawiskar et. al. reflected on haematological manifestations of COVID 19 [23]. Borage et. al. reported about positive effects of Covid-19 on the earth [24].

5. VACCINATION DRIVE

As many vaccine candidates got approval all over the world and are in final phases of distribution. Normal activities can restart. But to vaccinate seven billion inhabitants is a humongous task and needs considerable amount of time [25]. Also, vaccine nationalism and hoarding of vaccine or ordering many times the need can prove to be bad as many underdeveloped countries are eagerly waiting for the shot. International vaccine alliance must think on providing these countries vaccine so that they can flatten their infection curve. Also, vaccination drive must be accompanied with continuation of present mitigation measures such wearing of mask and physical distancing [26]. Vaccine approval is an important step toward the flattening of curve but vaccine hesitance emerging from Infodemic and misinformation may hinder the efforts of containing the viral spread [27-30].

6. CONCLUSION

Flattening of the COVID-19 curve must be the temporary goal and defenestrating the ruckus creating virus from the human life by adopting measures must be the permanent goal. As the vaccine candidates has arrived, there can be seen complacencies and lax behavior in following the preventive measures. But we have to remember that the overall distribution and impact of vaccine will take time and till then mitigation measures must be followed without any hesitancy. Shortages of masks and PPE kits must be addressed and proper usage must be ensured in order to avoid more infection cases. The vaccine is believed to be effective against all the present strains of the virus but till then infection due to new strain which is mutated must be controlled by all means. Vaccine hesitancy can be addressed by disseminating the authenticated information from highest possible authority so that legitimacy of the information should not be questioned. The achievement of flattened curve must not be the ultimate goal has one has to ensure that we are able to face the upcoming pandemic if happens. Resilience and sustainability are the two key factors that are needed to take into account while making any policy related decisions. More sustainable interaction with nature as whole will only prove to be effective. Strengthened infrastructure will surely be beneficial in upcoming period but neglected sectors must be rechecked so that another spurt of cases does not follow the closure of COVID-19 cases.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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