



Covid-19 in Pune-A Case Study

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ABSTRACT: Pune Metropolitan region (PMR) in Maharashtra state of Asian Country, India, with 7.5 million population was worst affected cities in India with Novel Corona virus infection reaching around 2.03 lakh (0.203 million Corona cases) within a period of 3 to 4 months with initial outbreak of Corona virus in the month of March 2020. The Government and Local bodies have immediately imposed lockdown and sanitation measure vigorously, accompanied by the treatment and isolation of infected patients in various hospitals encountering, in the process, certain infrastructural constraints in containment of the virus spread. The Virus spread during the later part of the lockdown period in July, August and September 2020 months reaching the total Corona affected cases to 0.203 million mark in the first week of September 2020 despite all the efforts to contain the spread. So far 2.71 percent population of the Pune Metro were infected by the virus with mortality rate and recovery percentages among the total affected patients constituted 2.36 % and 79.60 % respectively. However, by lapse of 3 weeks, the cases, by month end, as on 30th September, 2020, in PMR, cumulated to around 2.81 lakh (0.281 million), with overall mortality and recovery percentages at 2.30 and 83.85.

The article also includes a case study pertaining to a resident doctor working in one of the reputed Hospital in Pune who is familiarly known to authors of this article. The Doctor while treating the Novel Corona Covid -19 infected patients had contracted the viral infection himself as an occupational hazard and was admitted in the same Hospital where he is working for hospital quarantine and treatment of the infection for 3 weeks, later recovered fully and tested negative. The Doctor, before contracting the Covid-19 infection got administered with BCG vaccination around 10 days prior to contracting the infection as a precautionary measure. This prophylactic BCG vaccination was found to have slowed down or prevented the spread of virus from the affected Doctor to his family members and as also 130 families of his Residential Housing Cooperative Society. This suggests that BCG

Vaccination possibly helped in arresting or slowing down the spread of fast spreading Corona Novel Covid Virus, as observed by a few American Research workers regarding the BCG vaccination and its ability to slow down the community spread for 30 days period.

I. INTRODUCTION.

Pune Metropolitan Region (PMR) in Maharashtra state of Asian Country, India, with 7.5 million population was one of the worst affected cities in India with Novel Corona virus infections reaching around 2.03 lakh (0.203 million Corona cases) within a period of 3 to 4 months with initial outbreak of Corona virus in the month of March 2020. The Government and Local bodies have immediately imposed lockdown and sanitation measure vigorously, accompanied by the treatment and isolation of infected patients in various hospitals encountering, in the process, certain infrastructural constraints in containment of the virus spread. The virus spread during the later part of the lockdown period from July to September 2020 reaching the total Corona affected cases to 0.203 million mark in the first week of September 2020 despite all the efforts to contain the spread. So far 2.71 percent population of PMR is infected by the virus with mortality rate and recovery percentages among the total affected patients constituting 2.36 % and 79.60 % respectively. However, after lapse of 3 weeks, the cases, by on 30th September 2020 accumulated to around 2.81 lakh (0.281 million), with overall mortality and recovery percentages at 2.30 and 83.85.

The article also includes a case study pertaining to a resident doctor working in one of the reputed Hospital in Pune who is familiarly known to authors of this article. The Doctor while treating the Novel Corona Covid -19 infected patients had contracted the viral infection himself as an occupational hazard and was admitted in the same Hospital where he is working, for hospital quarantine and treatment of the infection for 3 weeks, later recovered fully and tested negative. The Doctor, before contracting the Covid-19 infection got administered with BCG vaccination



around 10 days prior to contracting the infection as a precautionary measure. This prophylactic BCG vaccination was found to have slowed down or prevented the spread of virus from the affected Doctor to his family members and as also 130 families of his Residential Housing Cooperative Society. This suggests that BCG Vaccination possibly helped in arresting or slowing down the spread of fast spreading Corona Novel Covid Virus, as observed by a few **American Research workers regarding the BCG vaccination and its ability to slow down the community spread for 30 days period.**

The Pune district falls under four Agro-climatic zones, as follows:-

- (i) Western Ghat Zone (average annual rainfall 3000-6000 mm)
- (ii) Western Maharashtra Scarcity Zone (average annual rainfall below 750 mm)
- (iii) Sub Mountain Zone (average annual rainfall between 700-1250 mm)
- (iv) Western Maharashtra Plains Zone (average annual rainfall between 700-1250 mm).

Pune Metropolitan Region (PMR):

PMR is situated on leeward site of Deccan Plateau (Sahyadri Hills/Western Ghats) between 18° 32' North Latitude and 72° 51' East longitudes, Pune is well connected by road, rail and air network with important cities of India. The city is located around confluence of Mula and Mutha rivers (plains of Bhima and Nira River basin) at a height of 560m above Mean Sea Level (MSL) and characterized by vast stretches of undulating plains interspersed by low and medium ranges of hills.

Pune city is a major educational hub, and known as Oxford of the East. Pune is one of the historical cities of India with a glorious past, an innovative present and a promising future. Pune city has been growing by leaps and bounds. Today, Pune is one of the fastest growing cities in India, Pune is bestowed with various advantages such as good climate, river, forts, lakes and cultural legacy. A major Cantonment of India it is also home to major Military Training Institutes and Training Centers. The city has become a single urban zone involving the two largest Municipal Corporations, viz., Pune City and Pimpri-Chinchwad as twin cities. Owing to its proximity to Mumbai Pune, it facilitates exports of goods from Pune. The PMR is in ever expanding mode with incorporation of fringe villages into the PMR. The **Pune Municipal Corporation (PMC)** administers the Pune city. Pune is among the

greenest urban areas in the country. Pune Municipal Corporation is well known as Pune Maha Nagar Palika (PMPL) and serving citizens since 1950. In 1999, the State Assembly had passed a resolution for formation of Pune Metropolitan Region Development Authority (PMRDA) for spearheading the holistic development of Pune Metropolitan Region (PMR) as Pune urban agglomerate encompassing Pune city under the jurisdiction of Pune Municipal Corporation (PMC), Pimpri and Chinchwad towns under Pimpri-Chinchwad Municipal Corporation (PCMC) and the towns of Khadki and Dehu under Military Cantonments

The total human population of Pune Metropolitan Region, which besides Pune City, Pune Cantonment, Pimpri-Chinchwad and includes the towns and cantonments of Dehu and Khadki, is 60.49 lakh (6.05 million) in 2011 (Source census 2011 of GOI). The decadal growth of human population between 2001 and 2011 for Pune was shown to be 36.60% or 3.66% per annum. Pune is a growing urban agglomeration; therefore, besides the mere decadal growth percentage, yet another factor which needs to be considered in respect of growth of human population of Pune Metropolitan Region (PMR) will be the geographical expansion of PMR with the anticipated merger of some more peripheral villages to the present PMR. On the basis of average decadal growth rate of last 5 decades from 1961 to 2011 at around 40% i.e. 4% p.a., the projected human population of PMR during the next 6 years period commencing from the base year 2014 would be around 75.41 lakhs (7.54 million) by 2020 and around 76.50 lakh (7.65 million) by 2021 being the next Decadal Population Census year for India. The population density of PMR is estimated to be around 1000 persons per sq.Km which is not higher than other Metropolitan Cities of India.

Genesis and progress of Corona-Covid-19 Infection in Pune.

COVID-19 (previously known as "2019 novel corona virus") and the disease it causes known as Corona virus disease (COVID-19) is caused by officially named virus --Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2-). Although, there was a disputable controversy about the genesis of Corona virus infection in the world, according to various authenticated publications, the researchers studied partial genetic sequences of some 1240 Corona viruses found in Bats in China. They later stated that Novel Corona Virus is most closely related to



group of viruses found in Horse-Shoe shaped Bats called **Rhinolophus**. The study backed earlier research which stated that a Corona Virus called RATG 13, which was found in Horse-shoe shaped bats (**Rhinolophus affirus**) in Yunnan province shared 96 % of its genetic sequence with SARS-COV-21. These studies note that Viral group to which both Viruses belong most likely originated deep inside Yunnan Province far from wet markets of WUHAN, which made global headlines ,after several scientists suggested it was the location from where the Novel Corona virus transmitted to Humans.

The first case of Coronavirus was reported in December 2019, in Wuhan city in China as a Pneumonia outbreak. Later, its root were traced to a Novel strain of Corona virus. The outbreak of Corona virus , forcing the lockdown of a dozen of cities with millions of people. Within weeks, the Corona virus spread outside of the country to other nations, like South Korea, Iran, Italy, United States, India, Pakistan among others. The novel coronavirus also knocked down the global financial markets with billions of dollars being wiped off in a matter of a few weeks.

Appearance and progress in spread of Covid-19 infection in Pune:

Covid-19 infection entered much later in January - February months of 2020 in India, however, the first two cases in Pune were detected on 09th March 2020. According to some medical reports, the first patient of Covid-19 infection in Pune had a travel history of having flown from

Dubai, a few days prior to 09th March 2020. Dubai was already in the grip of Covid-19 infection, though the Government had not declared the outbreak. The patient who took a flight from Dubai had landed at Mumbai International Airport and availed taxi services to reach Pune which is around 150 km. During next few days, the person who returned from Dubai as well as the taxi driver who drove him to Pune, both reported with symptoms akin to Corona disease to Naidu Hospital, in Pune which is the designated Government Hospital for contagious diseases. The hospital conducted Covid-19 virus test (RT-PCR) and declared both the infected persons positive for Covid-19 infection and started symptomatic treatment with strict quarantine of the two patients. Perhaps these two infected patients might have already contacted their relatives and neighbors prior to their hospitalization, resulting in 38 more persons out of the total 40 patients (including the above mentioned 2 patients) in Pune reporting Covid-19 positive in due course in the month of March 2020.

There on the number of cases in Pune grew exponentially reaching to 20,023 cases by 17th June 2020. The cases doubled within one month and by 14th July the number swelled to 41,326, which soon doubled 81,771 by 30th July 2020, and hit one lakh mark by 06th August 2020. In the country, Delhi region and Maharashtra state were leading in the number of Covid -19 cases from the beginning. The Table given below indicates the swift pace of the spread of Covid-19 infection in Pune city area per se.

Table:1, Progress in spread of Corona virus infection in Pune city:

Months (2020)	Total Cases*	Deaths (in Nos)	Deaths (%)	Cured (in Nos)	Cured (%)
March	40	0	0	40.00	16
April	1652	92	5.90	18.75	293
May	6050	245	4.05	69.31	4193
June	14,679	426	2.90	62.87	9229
July	59,342	1,159	1.95	65.25	38,719
August upto 06 th August 2020	15,499	309	1.99	79.44	12,313
Averages per month	18,727.64	429.58	2.19	66.59	12,470.01

** Note: The number of cases, deaths and recovered cases shown are not cumulative and pertain only to the month given.

The above Table clearly indicates the faster progress in spread of infection despite the several preventive measures initiated by the State

Government and Local Bodies(Pune Municipal Corporation ,PMC) which are discussed in succeeding paragraphs.

According to the latest situation in September 2020, the number of confirmed cases of novel coronavirus infection in **Pune reached**



2,00,000 (0.20 million) mark. The infection count in Pune (2.03 lakh) is not just more than any other city, **including Delhi** (1.93 lakh) or **Mumbai** (1.57 lakh), but is even more than every Indian states except the five States in the Country with the highest caseload. What baffles Pune's high Covid-19 count is, that Pune has a substantially lower population than either Delhi or Mumbai, the two cities with the second and third highest number of confirmed cases, and it is less densely packed as well. Both Mumbai and Delhi have a higher number of migrants, a far higher number of international travellers coming in, and much more economic activity. However, the emergence of Pune as the city with the highest number of cases is somewhat intriguing.

One reason often cited for Pune's high count is that the city has been carrying out many more tests. While it is true that Pune right now is conducting more tests than any other city in Maharashtra, including Mumbai, the number of tests in Delhi is even higher. Scientists, health officials have flagged several other things that could have contributed to Pune's rise as the worst affected city. A recent serological survey in Pune revealed that in some of the surveyed areas, more than 50% to 60% of the population had already been infected although most of these had not been detected. Similar surveys in other cities, Delhi, Mumbai, Chennai, Ahmedabad, have shown far lower degree of disease spread. Delhi, for example, has been found to have a disease prevalence of about 29%, and Mumbai 40% in some areas. This could mean that Pune has a far higher proportion of its population already infected. As testing increases, more and more of these are getting detected, that could be the reason that Pune was one of the earliest cities to report coronavirus infection.

Containment measures for preventing spread and infected patients promulgated in Pune.

The State Government & the instructions issued by the Central Government of India, immediately from 23rd March 2020 on wards declared-emergency and imposed strict Lockdown with curfew like restrictions for Public movement.

The Medical department and The Corporation's Medical wing adopted two pronged approach in containing the virus spread in Pune district in general and the Pune City province in particular.

. These measures are:

1. Immediate isolation and treatment of Covid-19 Positive patients in City Hospitals and newly created Covid Isolation Centers (CICs) depending on the severity of the infection in the patients. The patients with milder symptoms are initially kept in CICs and with severe symptoms are directly admitted in to fulfilled Hospitals.
2. Preventive measures completely restricting the public movement by imposing strict Lockdown conditions implemented scrupulously by the Police Department.
3. The line of treatment of covid-19 affected positive tested patients by the hospitals, in general, was on the lines as recommended by Indian Council of Medical Research(ICMR) and world Health Organization(WHO). The same is briefly described below:

In respect of the treatment, the persons who report to the hospitals ,with the tell-tale symptoms akin to Corona Covid-19 virus infection showing mild temperature rise, sore throat and dry cough with or without breathing problem and lung infection for admission is first subjected to Corona Covid-19 Virus test (RT-PCR) and the positive tested patients are immediately admitted and quarantined /isolated completely sealing them off from out side contact in the **Covid-19 Isolation wards** separately demarcated within the hospital. The patients are also strictly restricted from contacting the other patients ailing and undergoing treatment in the hospital premises. The corona affected patients are closely monitored and provided initially the symptomatic treatment for controlling body temperature, cough mixtures and some antibiotics for preventing any secondary infection. Normal soft diet is provided. The older patients with co-morbidity preconditions like high blood pressure(hypertension), Diabetes,Arthritis, Pneumonia,lung infection, are given special care depending on the severity of symptoms and if needed would be shifted to **Intensive Care Units(ICUs) or Oxygen chambers**, equipped with other special medical gadgets ,to combat any emergency situations. The patients succumbed to the disease would be shifted immediately to the mortuary rooms of the Hospital and the bodies are strictly sanitized before handing them over to the relatives of the patient who died.

In this context, it may be relevant to discuss the Medical Infrastructural facilities available in Pune city to handle the fast spreading virus infected Corona patients. Approximately, Pune Metropolitan Region(PMR) and



Pimpri-Chinchwad Municipal (PCMC) area- a twin Urban conglomeration adjacent to Pune city, there may be around 200 Hospitals and out of which around 120 hospitals might have been permitted to handle the Corona Patients in the Pune city area. The famous Sassoon Hospital, near Pune Railway Station, Rajeev Gandhi Hospital near Yerwada, KEM hospital near Quarter gate, Central Pune, Naidu Hospital and Yeshwant Chouhan Hospital near Pimpri are the major hospitals in Government sector. The Private sector Hospitals with major recognition are Jahangir Hospital near Pune Railway station, Ruby Hall Clinic near Railway station, Inlak -Budhrani Hospital near Konark nagar, Deenanath Mangeshkar Hospital and Sahyadri group hospitals in two three campuses, etc. Out of these, a few major Hospitals are equipped with Intensive Care Units (ICUs) Ventilators, Oxygen Chambers and such other sophisticated medical gadgets to handle emergency situations.

Apart from these medical facilities, the State Government and Pune Municipal Corporation (PMC) erected at a few places **Corona Isolation Centers (CICs)** where the patients with milder symptoms are isolated and their condition is closely monitored so as to shift them to Proper Hospitals if patient's health condition warrants.

Despite all these above mentioned medical facilities, there were deaths due to Virus infection and lack of availability of medical assistance and denial of hospital admission due to over flooding of Corona Patients in hospitals. Some patients neglected the symptoms leading to their mortality due to virus infection before reaching to the medical centre. Even deaths occurred due to non-availability of Ambulances to shift the patients from remote areas to the nearby Hospitals. Besides this, the Hospital charges levied for Corona patients were also prohibitive in certain private sector hospitals which might have discouraged a few poor patients approaching hospitals for timely treatment. 3. The preventive measures implemented by the State Government, the Pune district Government and the local Quasi Governmental Body, namely Pune Municipal Corporation (PMC), Pimpri-Chinchwad Municipal Corporation (PCMC), Pune Contonement Board (PCB), Khadki Contonement Board (KCB) and Dehu Contonement Board (DCB), constituting the mega Pune Metropolitan Region and Rural Pune area.

The preventive measures mostly relied on Complete Lockdown of the entire city dis-allowing

the People from stepping out of their houses, except for procuring essential daily consumables like milk, Grocery items, vegetables and Medicines. Only a single member of the family was allowed to procure essential items daily for the entire family. The shops selling the essential items were also restricted to function only for limited hours in the morning and all other shops, selling non-essential items were completely closed. Government and Private offices were also initially closed, Malls, Cinema Halls, Historical monuments and other Institutions including the religious ones viz., temples, Mosques and Churches, Gurudwaras were also closed since 22nd March 2020 during 1st to 4th Lock down periods and even during the month of September 2020, the lockdown is still continued with some relaxations.

The Housing Cooperative Societies and other Residential Colonies also in turn restricted on the PMCs advice, the entry of any out- siders and exit of insider residents from their flats. The sanitiser use, wearing face masks by every individual venturing out were made mandatory with imposition of fines and punishments by the Police Personnel for violation of these practices by the public.

The city was divided into red, Orange and green zones depending on the number of infected patients in the given area. Further, these zones were demarcated as "Containment zones" for stricter monitoring and surveillance of the Infection. Public Transport, Rail way trains were also completely halted and Passenger car of private and Public Taxis were banned including the auto-rickshaws to ply. The barber shops, Spas, Beauty parlours, Gyms were completely closed. The District authorities and Corporation initiated screening of residents who came in contact with Covid-19 affected patients with Viral tests.

Despite all these preventive and curative measures, the spread of Virus did not contain, and fresh cases increased to around 2000 on an average on per day basis in the city area. On the dates of writing this article, the total number of cases registered in the PMR area by 08th September 2020 crossed around 2 lakh mark, with 4651 deaths and 1,57,029 recovered cases constituting 2.36 percent mortality and 79.60 percent recovery of cases. So far, the region with around 75 lakh (7.50 million) estimated population, the infected percentage works out to 2.71. However, after 3 weeks by the end of September, 2020, the daily addition average of new cases have reduced and on last day of the September month 2020, the total number of



Covid-19 positive Cases in PMR were 2.807 lakh (0.2807 million). The recovered patients number was 2.354 lakh (0.2354 million) constituting 83.85%. The mortality rate has also reduced to 2.30 in percentage terms. Among the ailing patients, 22,264 were in Hospital admitted quarantine and balance 16,531 were in home quarantine.

A Case Study From Pune Highlighting Efficacy Of Bcg Vaccine In Prevention Of Spread Of Covid 19

Preview.

India recorded its first case of COVID-19 on 30 Jan 20, in an Indian citizen evacuated from China. COVID-19 cases are reported very much less in the countries with universal BCG vaccination policies such as India, Afghanistan, Nepal, Bhutan, Bangladesh, Israel, Japan, etc. as compared to without BCG implemented countries such as the USA, Italy, Spain, Canada, UK, etc. The Bacillus Calmette–Guerin (BCG) vaccine gives broad protection against respiratory infections as it induces expressions of the gene that are involved in the antiviral innate immune response against viral infections with long-term maintenance of BCG vaccine-induced cellular immunity.

The first two cases in Pune were detected on 09th March 2020, pertained to a traveller from Dubai. In the three hours of road journey he undertook in a taxi led the transmission of disease to the driver, thereby establishing the highly viral nature of the virus.

Aim:

This case study attempts to examine the efficacy of BCG in containing the severity and spread.

Review of Literature:

According to the literature available, BCG activates the human immune system against several types of viruses such as Human Respiratory Syncytial Virus (hRSV), Human Papilloma (HPV)1 and Tuberculosis. The WHO recommends that one dose of the BCG vaccine should be administered in all neonates of countries with a high incidence of TB. Another controlled trial stated the efficacy of the BCG vaccine with long term protection, approximately 60 years of age after vaccination. Thus it is safe to presume that the BCG vaccine provides protection for 50–60 years of immunization, so the elderly population needs to be revaccinated with BCG. Several countries started

clinical trials of the BCG vaccine for health care workers and elderly people. Current data is emphasizing that the available vaccines prevent viral infections by activation of the antiviral immune response, such as BCG. The BCG can be used as a prophylactic treatment until the availability of the COVID-19 vaccine. Studies have shown the correlation between BCG vaccination and COVID-19 infection, and studies have also shown fewer COVID-19 cases in universally implemented countries. The BCG vaccination thus provides a wide range of safety against bacterial and viral infections but there is no evidence of BCG, neither affording any protection from COVID-19 nor directly reduces the COVID-19 infection or its severity. The BCG vaccine may boost the immune system's ability to fight off pathogens, including the deadly coronavirus. Various investigations showed that the BCG vaccine also defends against viral infections affecting the respiratory tract in humans and mice. BCG protects against bacterial infection and also protects against respiratory viral infections. Several countries started clinical trials of the BCG vaccine for health care workers and elderly people. BCG can be used as a prophylactic treatment until the availability of the COVID-19 vaccine.

Geography and Location:

India, Maharashtra State, between 18 0 32' North Latitude and 72 0 51' East longitudes,

The Residential Premises:

A seven storey ed Housing Co- operative Society of 143 Flats, with four flats on each floor, located at Viman Nagar, Pune (411 014). The family under study are residents of one of the flats measuring about 650 sq ft of carpet area.

The Family. The case study involves the joint family of 9 members consisting of 6 Adult members including two senior citizens and three young children co habiting in the same flat.

The Case in Brief:

The case pertains to a Doctor serving in a Hospital (whose name is withheld for valid reasons) and a familiar friend of first author of this article, and residing in the said premises had contracted the Covid-19 infection as an occupational hazard while he was treating live Covid -19 Positive patients in his Hospital despite strict precautionary measures adopted by him from screening away from the Virus. This case study



may be worthwhile to be captured as Medical Case Study. The same is briefly given below:

Background :

Dr. Yogesh Lohar's (First author of the article) familiar friend is a resident Doctor working in one of the reputed hospital in Pune (the name of the Hospital is withheld for valid reasons) located in the North-East of Pune city. He is basically, a Diagnostic Specialists in the Hospital but he was also entrusted by the hospital to treat Covid-19 infected patients due to heavy pressure on the Hospital. He was strictly complying with all the precautionary measures of insulating himself from contracting the Viral infection while treating 20 Covid-19 Patients per day in his allocated ward. Although, he resides around 5 Km from his hospital in a Housing Cooperative Society at Viman Nagar near Pune Airport, but used to mostly stay back in his hospital premises day & night. At frequent intervals, he was visiting his home. While at home he strictly observed all the prescribed precautions, protocols and norms.

Despite all these precautionary measures scrupulously observed by the Doctor, he contracted the Covid-19 infection himself as an occupational hazard. He was declared **positive for Covid-19** on 16.07.20 and hospitalized for quarantine and symptomatic daily treatment against the viral infection for 5 days. Besides, the Doctor's Residential Colony premises and the lift chamber of his building were completely sanitized after the doctor left residential flat for hospitalization and his family members were totally home quarantined and were prevented from contacting with all society residents from 17.07.20, for full one week despite having been tested **negative** for the virus.

II. DISCUSSION:

Main & relevant issue involved with the case that merits to be highlighted here is that the Doctor, as a precautionary measure, had got vaccinated with the BCG Vaccine on 24.06.20, exactly 22 days prior to he was declared positive for Covid-19 infection on 17.07.20. For all practical purposes the Doctor might be carrying the virus prior to he being declared positive and was also mixing with family members and a few of the residents in the colony premises where the Doctor lives. Thus, there were clear chances of infection being spread from the Doctor to his family members and potential contact persons i.e. society maintenance staff, service vendors and other members of the society. Secondly, after the Doctor

had been discharged from the hospital, and provisionally declared negative for virus on 02.08.20 as well as during the next following 14 days of convalescence/ post quarantine periods, lasting till 16.08.20, had the potential of transmission of the virus, among his family members as well as the other Colony residents who came in contact with the Doctor and his family members.

Despite all these potential possibilities, not a single member of the Doctor's family nor any other residents of the Colony (considering possibility of community spread) were found to have contracted the infection. This phenomenon where the fast spreading Corona -Covid-19 virus did not and failed to infect any of the Doctor's family members and also the colony residents, may be attributable to BCG Vaccination taken by the Doctor much prior to his contracting the Covid-19 infection..

Although, there are no evidential proof exists in this case of slow or total failure of spread of corona virus, thus attributable to doctor's Vaccination of BCG as a precautionary measure without anticipating any future happening that were to pass through him. It is said" that BCG vaccination spurts innate and cell mediated immunity-- and both these play an important roles in reducing the severity of illness and spread of infection of a sick person", which strongly supports the opinion expressed by the **American Research workers regarding the BCG vaccination and its ability to slow down the community spread atleast for 30 days period.**

The study was published in Science Advances, a medical journal by American Association for the Advancement of Science has showed that countries with mandatory BCG vaccination showed slower infection and date rates during the first 30 days of the coronavirus outbreak, the paper claimed.

Scientists have found that the Bacillus Calmette-Guerin or BCG slows down the rate of infection and death of the coronavirus disease. The research says that the effect is very prominent in the first 30 days of the BCG vaccination. The research comes as countries race to find a vaccine for Covid-19, which has devastated almost the entire globe. The study, published in one of the journals of non-profit American Association for the Advancement of Science, says that the United States - the worst-affected country by Covid-19 - would not have such a high fatality rate if the



government there had instituted mandatory BCG vaccination several decades ago.

The findings suggest that BCG vaccination policies can be effective in fight against Covid-19. The BCG vaccine is usually given at the time of the birth of a child to prevent tuberculosis. The research says that the BCG vaccine helps develop immunity against various other infectious diseases, perhaps including Covid-19.

The experts analysed daily rate of increase of confirmed cases in 135 countries and deaths in 134 countries in the first 30-day period of each country's outbreak. It was seen that "mandatory BCG vaccination correlated with a flattening of the curve in the spread of Covid-19". However, the researchers did not portray the BCG vaccine as "magic bullet" against Covid-19, and said more analysis is needed. There are nearly 100 vaccine candidates for Covid-19 which are at different stages of research and trials across the world. Since most deaths reported in elders are attributed to co morbidity revaccination of older people over 60 years in absence of any vaccine, and its efficacy in affording protection against COVID 19 needs to conclusively established for which Randomized controlled trials across geographies are needed to determine the role of BCG vaccination in immune activation against COVID-19.

III. CONCLUSION:

The BCG vaccination confers broad enhanced immunity to respiratory infections. It is a safe vaccine that has a proven and tested record of around 100 years of offering protection against various other respiratory diseases besides TB for which it was originally given. The life of the BCG vaccine is estimated to be around 50 to 60 years hence there is no harm to give booster dose to senior citizens as protection till development of a customized vaccine. The universal use of the BCG vaccine for the community might decrease the spread of COVID-19, and it can help to stop the transmission of the disease. Since most deaths reported in elders are attributed to co morbidity revaccination of older people over 60 years in absence of any vaccine, and its efficacy in affording protection against COVID 19 needs to be conclusively established for which Randomized controlled trials across Geographies are needed to determine the role of BCG vaccination in immune activation against COVID-19.

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