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Exploring the Effectiveness of Lockdown in COVID-19 Pandemic Containment in India

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Abstract

Introduction: Countries worldwide including India, where COVID-19 is escalating day by day, are fighting constantly against it. India in response to the COVID-19 pandemic implemented lockdown measures to contain the spread of the virus SARS-CoV-2 causing COVID-19.

Objective: This study explores the effect of different phases of lockdown on COVID-19 pandemic situation in India.

Methods: The COVID-19 pandemic (India) data were retrieved from publicly accessible website from COVID-19 India. Data were analyzed to epidemiologic profiling: COVID-19 test/million, CPR (Case Positivity Rate), CFR (Case Fatality Rate) and CRR (Case Recovery Rate) for each of the four lockdown initiation days, and on the day a week before and after each lockdown (March 18th, 2020 to May 25th, 2020). We explored the prevalence and severity of COVID-19 by accounting with new tests and cases as well as new deaths and recovery per day, during May 25th, 2020 to June 15th, 2020.

Results: During March 18th, 2020 to May 25th, 2020, the COVID-19 CRR was increased from 8.8% to 41.88% (mean: 21.73; 95% CI: 13.69 to 29.77); CFR ranged 1.67% to 3.42% (mean: 2.9; 95% CI: 2.52 to 3.28). The number of COVID-19 tests was increased from 13.13 to 3033.6 per million (mean: 678.76; 95% CI: 214.99 to 1142.53), with low CPR, 1.3% to 4.78% (mean: 4.01; 95% CI: 3.36 to 4.66). In the second phase of the study (May 25th, 2020 to June 15th, 2020), increased emergence of COVID-19 cases was seen that might be linked to the gradual lifting of lockdown and the increased testing capacity as well. In this phase, increased recovery of COVID-19 patients was a notable positive side of the pandemic, while the increased death of the patients is of great concern.

Conclusion: Adopting non-pharmaceutical measures, for self-protection and patient-care, without complacency can deal with the ongoing COVID-19 pandemic in Indian context.

Keywords: COVID-19 pandemic; SARS-COV-2; Case fatality rate; Case recovery rate; Lockdowns; India

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Introduction

The COVID-19 pandemic, which was originated in Wuhan (Hubei province, China) because of the emergence and infection of a deadly novel coronavirus, SARS-CoV-2, is still spreading very fast globally outside China [1]. Because of the high contagiousness of the virus and the undefined as well as unmatched epidemiologic features of the disease, the COVID-19 pandemic is not controllable with the available interventions of infectious diseases, since specific drugs and vaccines are not discovered [2]. As of June 15th, 2020, the authorities of countries and territories dealing with the pandemic reported more than 7.8 million global COVID-19 cases including over 0.43 million deaths since China registered first cases and reported to the WHO in December 2019 [1]. Currently the sustained local transmission of SARS-CoV-2 is on in the United States, Brazil, Russia, and elsewhere including India, where there have been over 0.33 confirmed cases and 9,520 deaths, as of June 15th, 2020 [1,3]. India, in an attempt to shrink the spread of the novel coronavirus, SARS-CoV-2, and to abate the impact of the highly infectious disease, COVID-19, enacted a 21-day nationwide lockdown implementation, from March 25th, 2020 to April 14th, 2020 (Phase I), and thereafter extended up to May 3rd, 2020, in phase II, up to May 17th, 2020 in phase III, and finally up to May 31st, 2020, in phase IV [4-7]. In order of humanitarian crisis and to redefine the socio-economic activities India has started to exit the lockdown (unlock I/lockdown V) with partial relaxation since June 1st, 2020 to be

continued to June 30th, 2020 [5,6]. In view of this, the current study assess the prevalence as well as the severity of COVID-19 pandemic in terms of COVID-19 testing and CPR (Case Positivity Rate), CFR (Case Fatality Rate), and CRR (Case Recovery Rate) during March 18th, 2020 to May 25th, 2020, in order to explore the effectiveness of lockdowns on COVID-19 pandemic in India. During the advanced stage of the pandemic (May 25th, 2020 to June 15th, 2020 in this study), the lockdown exiting (unlock I) effect on it (COVID-19 pandemic) was assessed too.

Methods

The data and information on COVID-19 in India were retrieved electronically from publicly accessible website, covid19india.org, of COVID-19 India [8], and were processed computationally to determine the CFR, CRR, and COVID-19 testing and CPR for each of the four lockdown days (initiated or extended): March 25th, 2020, April 15th, 2020, May 3rd, 2020, and May 18th, 2020. The test per million, CPR, CFR, and CRR, for one week before and after each lockdown days, were determined to assess the effect of lockdowns on COVID-19 pandemic in Indian context. The COVID-19 CFR and CRR were determined following the protocol mentioned earlier [9,10]. The CPR was determined as the ratio between number of cumulative confirmed cases and number of cumulative tests, and expressed in percentages.

The post unlock I (lockdown V) COVID-19 pandemic situation (June 1st, 2020 through June 15th, 2020) as well as the COVID-19's picture for a period of one week (May 25th, 2020 to May 31st, 2020), before the initiation of unlock I on June 1st, 2020, was analyzed on the basis of daily emergence of new cases, daily recovery and death alongside the daily COVID-19 testing in order to explore the prevalence and severity of the disease, and the effect of lockdown V (unlock I) on COVID-19 pandemic in India, retrieving data as mentioned above [8].

Results and Discussion

Since its emergence in December 2019, COVID-19 pandemic has spread rapidly around the globe, with high speed of transmission and substantial mortality. As of June 15th, 2020, globally 7,823,289 confirmed cases with 431,541 deaths alongside more than 100,000 daily new cases for the last over one week have been reported [1], while India has registered 332,424 COVID-19 cases and 9,520 deaths, with the emergence of more than 9,000 new cases per day for the last 12 days.

The CRR and CFR of COVID-19 are depicted in Figure 1. The CFR is a vital epidemiologic determinant in assessing the severity of an emerging infectious disease, such as COVID-19 pandemic. The COVID-19 CRR ranged 8.8% to 41.88% (mean: 21.73; 95% CI: 13.69 to 29.77), and displayed an exponential trend of increment (Figure 1a); total COVID-19 recovery, during the study period, ranged from 15 (on March 18th, 2020) to 60,706 (on May 25th, 2020). The CFR ranged 1.67% to 3.42% (mean: 2.9; 95% CI: 2.52 to 3.28), and the death numbers were ranged from 3, on March 18th, 2020 to 4,173, on May 25th, 2020 (Figure 1b). As of June 6th, 2020, according to the WHO (India) situation report [11], India had COVID-19 CFR of 2.8%, which was much lower than the CFRs (range: 4.5% to 19.4%) displayed by some worst-affected countries including Brazil, Germany, Iran, USA, Canada, Spain, Netherlands, UK, Italy, Belgium and France. The low mortality, compared to the other worst-affected countries [12], indicates that India as per the current situation is

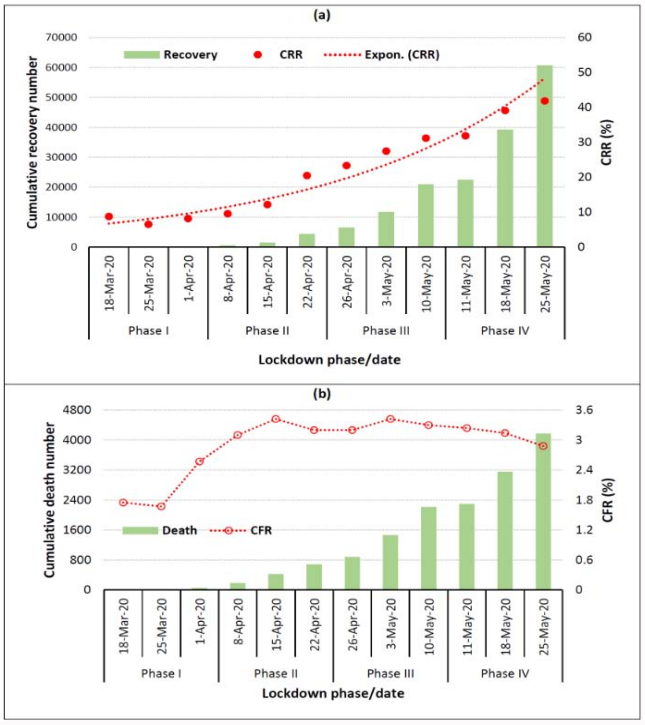

Figure 1: The COVID-19 (a) Case Recovery Rate (CRR) and (b) Case Fatality Rate (CFR) in India (March 18th, 2020 to May 25th, 2020).

within the capacity to provide required cares to the COVID-19 patients for their recovery [5,6,11].

The status and trends of COVID-19 test and CPR in India is represented in Figure 2a. Before lockdown implementation, India had 13,125 tests (on March 18th, 2020) that increased to 3,033,591 on May 25th, 2020 (during fourth phase of India's lockdown). The number of tests per million ranged from 13.13 to 3033.6 (mean: 678.76; 95% CI: 214.99 to 1142.53). There is an increasing trend of COVID-19 case in India (Figure 2b). During the study period the total COVID-19 cases increased from 171 (on March 18th, 2020) to 144,949 (on May 25th, 2020); the CPR however was low, and ranged from 1.3% to 4.78% (mean: 4.01; 95% CI: 3.36 to 4.66). The exponential nature of COVID-19 testing as well as low case positivity in India indicates the country's preparedness in the containment of SARS-CoV-2 transmission. Alongside the increased number of testing capabilities, the benefits of lockdowns in India include gaining time in the acquisition of medical supplies in hospitals to provide adequate care to the patients (except in a few big cities) [13,14] and thus reducing COVID-19 deaths [12]. This is in contrast to the situation as recorded in Europe and the United States where the disease has put a serious strain on the health systems [12]. Additionally, it is interesting to note that India has taken 130 days to reach 250,000 COVID-19 cases (because of strict containment), which was much higher than the days that other countries took: UK (118 days), Spain and the USA (70 days), and Italy (65 days) [15].

India has entered into the advanced stage of COVID-19 pandemic with a plan to relax the restrictions including the so called lockdown in some extent [3], and therefore this is high time to explore the prevalence and severity of the pandemic by accounting its status with new tests, cases, deaths, and recovery on day-to-day basis. India's COVID-19 case is currently escalating day by day (Figure 3), even with stringent lockdowns since March 25th, 2020, and that

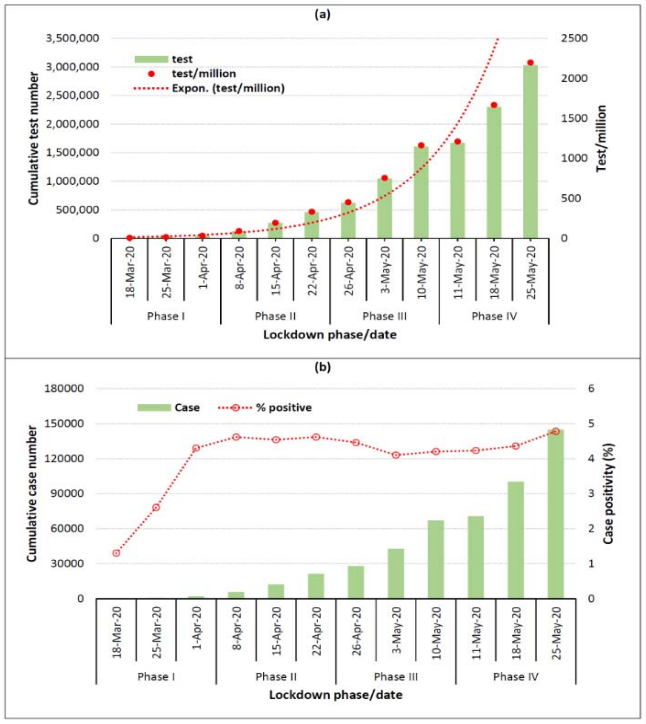

Figure 2: The COVID-19 (a) testing and (b) case positivity (%) in India (March 18th, 2020 to May 25th, 2020).

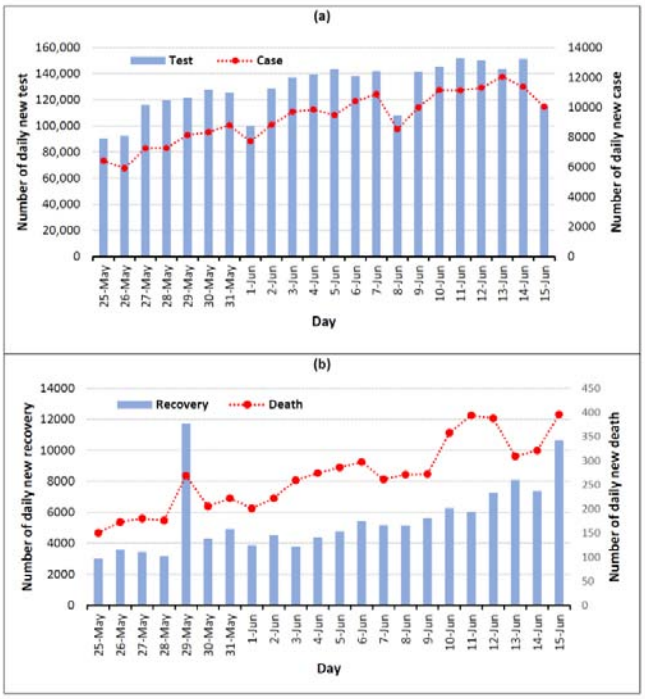

Figure 3: The COVID-19 (a) daily new test versus daily new case and (b) daily new recovery versus daily new death in India (May 25th, 2020 to June 15th, 2020).

the situation is worsening because of the exit of lockdown (unlock phase I), except in the containment zones, with effect from June 1st, 2020 [5,6]. The increasing trends of emergence of COVID-19 cases in India, in the current study, might also be linked to the improved number of testing amid COVID-19 pandemic. However, this is vital to mention that the India's current CRR of COVID-19 is 48.2% [15], and the fact of surpassing the number of recovered patients compared to active COVID-19 patients is maintained since its first occurrence on June 9th, 2020 [8].

According to the WHO [1], India (with 332,424 cases) ranks fourth, among the worst-hit countries, in terms of number of COVID-19 cases, after the US (cases: 2,057,838), Brazil (cases: 850,514) and Russia (cases: 528,964), and immediately after Belgium, India (deaths: 9,520) is 9th in terms of global COVID-19 fatality; the US is on the top (deaths: 115,112). India's overall case confirmation has been increased from 138.07 per million (on June 1st, 2020) to 240.89 per million (on June 15th, 2020), while the daily increment of confirmed COVID-19 case was ranged from 6.08 per million (on June 1st, 2020) to 8.34 per million (on June 15th, 2020) [12]. To deal with the COVID-19 pandemic the WHO by this time reminds countries to find, isolate, test and care for every case, and trace and quarantine every contact [16], and, therefore, to continue to work hard, on the basis of science, solutions and solidarity [17], in order to tackle the global COVID-19 pandemic. Notably, India has stepped up efforts to contain the spread of SARS-CoV-2 by increasing response to life-saving treatments, detection and infection reduction of COVID-19. Finally, if we continue the practice of wearing of face masks in combination with home staying, physical distancing, standard hygiene (hand washing and respiratory etiquette), and avoid touching of surface of plausibly contaminated objects, we will defeat this deadly virus. Also, perfect caring of vulnerable people (old and comorbid) and children is imperative along.

Conclusion

Prioritizing the current COVID-19 pandemic situation (with sustained daily increase of confirmed cases and deaths) and partial exit of lockdown measures (now restricted only to the containment zones) in India, the overall active and decisive action with all possible cooperation, without any complacency, might limit the speed of SARS-CoV-2 transmission. Other basic measures, such as hand and respiratory hygiene, physical distancing and use of face masks, and eye protection, are still crucial in tackling the dangerous virus, SARS-CoV-2, which was originated in Wuhan (China), in December 2019.

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