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A statistical outlook on the effect of festival on COVID-19 in West Bengal, India

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ABSTRACT

Novel Coronavirus (SARS-CoV-2) causing Coronavirus disease (COVID-19) has become a pandemic and a great concern for the human beings throughout the Globe. There is a thought that during the festive season transmission will become more alarming due to large gathering and/or non maintenance of physical distancing. To have an idea about the effect of festivals on COVID-19, the present paper discussed upon the statistical databases of COVID infected patients and death in the state of West Bengal, India, during its most popular festival, *i.e.*, Durga Puja. The secondary data was collected from the databases of Government of West Bengal and categorized into three different phases: (i) pre puja-phase (8 to 21 October; 14 days); (ii) puja phase (22 to 26 October; 5 days); and (iii) post-puja phase (27 October to 9 November; 14 days) for statistical analysis. It was found that there was no such significant impact of festival on the rise of COVID-19 in the state, which may be possible due to the rules imposed by the Government and growing consciousness among people. The findings of the present paper may give an insight in near future.

KEY WORDS: COVID-19, Festivals, Statistics, Herd Immunity

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INTRODUCTION

The fourth-most populous state in the eastern region of India along the Bay of Bengal is West Bengal, with over 91 million of inhabitants and is the fourteenth-largest state by area in India. Compared to the world population, it is the seventh-most populated country subdivision. In a place like India with so many cultures and subcultures, there prevails a plethora of religious festivals throughout the year. The two months specially month of September-October and October-November are very significant for the cradles major festivals like Navaratri, followed by Durga Puja, Dushehra, Diwali and Chhath Puja. But peculiarly enough this year, *i.e.*, 2020, celebration of various festivals have seen forbidden causing much worry due to COVID-19 pandemic. In West Bengal, the major festival is Durga puja, which took place during 22 October to 26 October in this year. The main ethnic group of the state is Bengalis with Bengali Hindus forming the demographic majority that celebrates this festival with great emotion. Festivals experts are much more apprehensive about the ‘Pandemic Fatigue’ when the people are not taking precautions for COVID-19 prevention like washing hands regularly, wearing masks and maintaining physical distancing. This ‘Pandemic Fatigue’ is quite natural as said by WHO, producing reactions of unsettled danger in people’s lives¹. The present study is, therefore, aimed to explore the recent wave of the pandemic and the effects of the past festivals in the context of the state of West Bengal which attracted large gatherings during the festive seasons, and also in the beginning of winters when there is excessive rise of air pollution in the eastern region of India.

A statistical approach towards COVID-19 attack in the district of Nadia, West Bengal, India had already been explored². Earlier, Davies³ has explored some of the issues and possibilities for the future of the festival industry by using an ecological economist’s view of the potential shift in economic paradigms as outcomes of the pandemic. It is also of great concern for the people and has an unparalleled impact on festivals across the world including India. In view of ever increasing effects of COVID-19, there seems to be a dire need to evaluate such effects during festive season throughout the world as the global community will be celebrating a lot of festivals in the coming days. The present paper aims at to evaluate a statistical analysis to square out any influence of festivals on COVID 19 in West Bengal, India to suggest precautionary measure for the attack of this virus in future.

METHODOLOGY OF THE STUDY

In West Bengal, the Durga puja was held during 22 to 26 October (five consecutive days) in 2020. In this pandemic situation, there was a chance of mixing of people due to festive celebrations.

Thus, it is imperative to look into the statistical databases. WHO recommends that contacts of patients with laboratory-confirmed COVID-19 be quarantined for 14 days from the last time they were exposed to the patient⁴. Thus, secondary data for COVID infected and dead were collected from the website of the Government of West Bengal (<https://www.wbhealth.gov.in>) and categorized in to three different phases: (i) pre puja -phase (8 to 21 October; 14 days; P-1); (ii) puja phase (22 to 26 October; 5 days; P-2); and (iii) post - puja phase (27 October to 9 November; 14 days; P-3) for statistical analysis.

DATA ANALYSIS

Number of COVID infected person and death have been considered for statistical analysis for all the three phases. Mean and standard error (SE) for all the three phases have been calculated by using SPSS software. Significance level of the mean data was calculated between P-1 versus P-2 and P-2 versus P-3 for both infected persons and death relating with COVID. All data were statistically analyzed by single factor analysis of variance (ANOVA) and significant differences were calculated at 5% level of probability⁵. Tabulation and figures were illustrated using excel program.

RESULTS AND DISCUSSION

The data found for the COVID infected patients in all the three phases showed a linear progression (figure-1). A summarization of the data showed that the mean of infected person was 3758.71 ± 51.31 , 4139.20 ± 6.67 and 3957.07 ± 7.87 for P-1, P-2 and P-3 respectively, showed highest infection in P-2 phase (figure-1 & table-1). It was found that the increase of infected patients from P-1 to P-2 showed statistically significant ($p < 0.001$), (table-1). On the contrary, it is interesting to find that there was a decrease of infected patients from P-2 to P-3 showing also a statistically significant ($p < 0.001$) result (table-1).

The analysis of data for the dead due to COVID-19 for all the three phases also showed a linear progression (figure-2; table-1). A summarization of the data showed that the mean of death person was 62.00 ± 0.41 , 60.40 ± 0.93 and 57.43 ± 0.55 for P-1, P-2 and P-3 respectively, where P-1 shows highest number of deaths and P-3 shows lowest number of deaths (figure-2 & table-1). It was found that although the decrease of deaths from P-1 to P-2 is not-significant, but decrease of death from P-2 to P-3 shows statistically significant ($p < 0.05$) result (table-1).

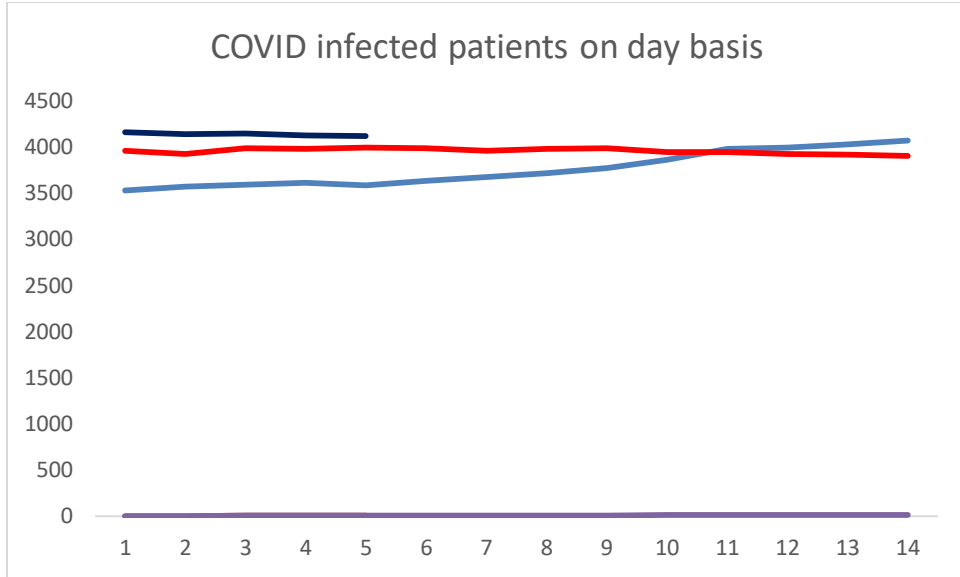


Fig -1: A comparison of the data of infected person in P-1, P-2 and P-3 (P-1: Blue; P-2: Dark Blue; P-3: Red)

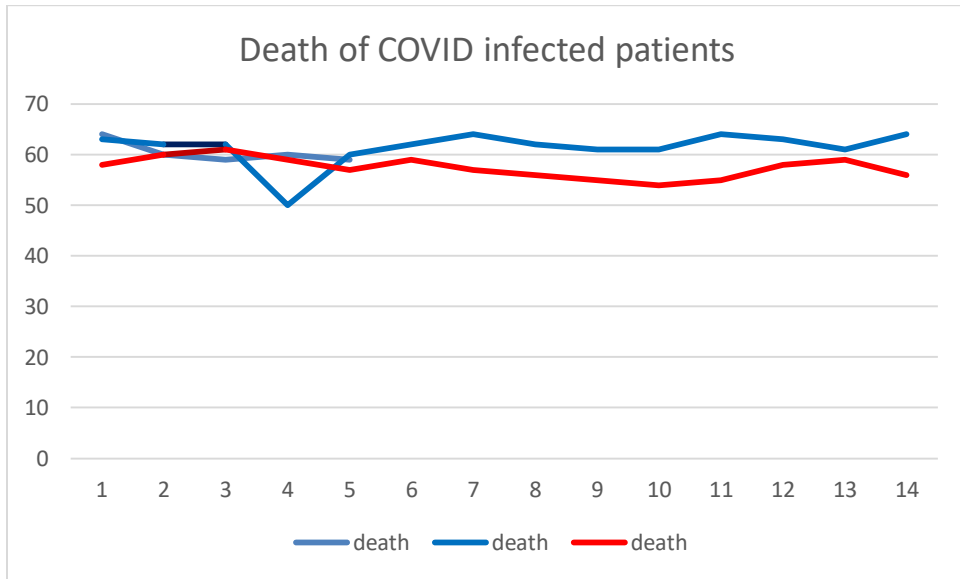


Fig-2: A comparison of the data of death persons in P-1, P-2 and P-3 (P-1: Blue; P-2: Dark Blue; P-3: Red)

Table-1: Result of significance test (t-test) of COVID infected and dead person in three different phases

Parameter	Different phases of study			Level of significance	
	P-1	P-2	P-3	P-1 vs. P-2	P-2 vs. P-3
Infected person (Mean ± SE)	3758.71 ± 51.31	4139.20± 6.67	3957.07±7.87	p<0.001	p<0.001
Death due to COVID (Mean ± SE)	62.00 ± 0.41	60.40 ± 0.93	57.43±0.55	Non-significant	p<0.05

From the data it was apprehended that the infected persons and deaths might increase due to the festive celebrations, but the exact reason for lowering the parameters need to be critically analyzed. On the onset of festive season experts said that the country would soon be facing the triple whammy of the pandemic because of the upcoming festivals that attract large gatherings and also the onset of winters which are typically characterized by rising air pollution in the northern part of the country¹. However, the data showed that the mean of both the infected person and dead was lowered after the festival in West Bengal (Table-1). Thus, from the foregoing observation three different conclusions may be drawn - 1) Peoples of West Bengal fully or partially obeyed the five tips advocated by Government of India during celebrations in the time of COVID-19, viz., (a) follow all precautions like wearing masks, washing hands regularly; (b) do not ignore any symptoms; (c) avoid assumptions; (d) avoid greetings like shaking hands; and (e) refrain from eating outside⁶. 2) The verdict given by the Hon'ble Supreme Court to consider all the Puja premises as the quarantine zone during the festival have been maintained in properly. 3) There may be possibilities of growing herd immunity among the people of West Bengal. As per the guidelines of WHO, there are two ways to achieve herd immunity: a large proportion of the population either gets infected or gets a protective vaccine⁷. Till date no unanimous vaccine for COVID-19 has come into picture; thus the first option may not be ruled out. However, further in-depth study is required to come to any final conclusion.

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