

A STATISTICAL APPROACH TOWARDS COVID - 19 ATTACK IN THE DISTRICT OF NADIA, WEST BENGAL, INDIA

Biological Science

B. Guha

Assistant Professor of Zoology, Netaji Subhas Open University, Kolkata-700 064.

C.R. Sahu*

Former Professor of Zoology, University of Kalyani, Kalyani, Naia-741235.

*Corresponding Author

ABSTRACT

In recent decades, the picture of COVID -19 virus attack in human population has become increasingly more worrying, while therapeutic interventions might help, they are vexing for the people and often burdened with high death rate and the cost of treatment. Avoidance in terms of social distancing and wearing of mask is the most successful approach to combat such virus attack in males and females alike. We performed a statistical analysis especially in the district of Nadia, a state of West Bengal, India on the number of attack, their distribution both block-wise as well as municipality-wise and the ratio of death on Covid-19 virus attack. A considerable statistical approach en route for explanation of these findings has been carried out. The present study suggests a prevalence of attack in higher percentage in male (63.5%) as compared to female (36.5%). Though, all age groups are affected but the age groups between 31 and 40 are more affected by such virus. However, the attack for a baby of 3-months and an aged people of 106 years is a notable feature of the study, suggesting an attack irrespective of age groups. The negative linear relationship ($r = -0.5703$) may not represent causation between the two variables, but it does designate a pattern. The coefficient of determination ($r^2 = 0.3252$) is considered as none or very weak effect size, while the residual effect under study reflects the model prediction. Test of significance through ANOVA for the regression shows a highly significant data. A high positive linear correlation ($r = 0.9973$) is pointed out between infection and death. Conversely, the role of migratory workers in increasing the number of patients in different months is quite obvious. While evidence in these regards is still far from solid, it is safe to assume that use of mask and maintaining social distance might represent the best course of action for any people trying to avoid such deadly virus attack.

KEYWORDS

COVID-19, Nadia District, Age, Infection, Death.

INTRODUCTION

The first major pandemic of the new millennium (Drosten et al., 2003; Ksiazek et al., 2003; Peiris et al., 2003) was caused by a novel virus as severe acute respiratory syndrome (SARS) coronavirus (SARS-CoV). Recently the coronavirus that spreads throughout the world is scientifically known as SARS-CoV-2 or Severe Acute Respiratory Syndrome Coronavirus-2 (Gobalenya et al., 2020), which emerged in late 2019 and reflected a noxious phenomenon. WHO (2020a) termed the same virus as 2019-nCoV or 2019 novel coronavirus or COVID-19. The spreading of the virus is mainly through droplets of an infected person having cough or sneezes or exhalas. The droplets however fall on floors or surfaces due to its heavy nature. A person can be infected by breathing if one is in close contiguity of someone who bears COVID -19 virus or by touching the adulterated surface and from there to the exposed surface like eyes, nose or mouth. Of course, most of the people experienced mild symptoms, like fever, cough, sneeze etc. (WHO, 2020b) but likely to recover without special treatment. But in acute condition, the person needs special care and treatment.

The data available so far regarding COVID-19 is that the virus affects 213 countries and territories around the world and 2 international passages. This pandemic does not exclude Indian continent and the virus gradually increasing day by day in Indian part compare to other parts of the world. The mostly affected part of the Indian state is Maharashtra particularly in city of Mumbai, Tamil Nadu in city of Chennai and the West Bengal Kolkata part. The spread of the virus in the West Bengal part particularly in its capital at Kolkata is now increasingly similar and running at par with the city of Mumbai. Thus Kolkata cannot be ignored in terms of transmission of the virus. The virus spreading so vigorously and affects the other part or in district level in West Bengal due to infiltration of workers from different states. In this conjecture the district of Nadia under West Bengal cannot be overlooked.

The geographical boundary of Nadia district is peculiar. In the East it is bounded by another country i.e., Bangladesh. The West side is featured by Bardhaman and Hooghly district. Murshidabad district is positioned on the North and North West while South and South East is covered by North 24 Parganas and is well connected by rail or road that helps migrant to access the district from other parts of the country. Nadia had population of 5,167,600 during 2011 of which male and female were 2,653,768 (51.35%) and 2,513,832 (48.65%) respectively (<https://www.census2011.co.in>). Presently, the population of this district reached to a peak due to infiltration, prospect of business,

improvement in agriculture sector etc. Since there is a scope of huge migration from different parts of the country, the chance of COVID-19 attack in this district is very much pronounced and warrants its analysis during the pandemic. The study is therefore to have a statistical outlook of the COVID- 19 attack on the district during the period of 25 March to 24 September, 2020, which may help the researcher to predict any further idea regarding its future prevalence. Of late, it may help the reader to have a sound knowledge about the attack particularly the people of the district of Nadia and the reasons for quick spreading of the virus and its onward recovery process.

MATERIALS AND METHODS

A survey was conducted with the data collected from the District Magistrate office of Nadia district with a view to prepare a concise report about the attack of COVID -19 virus for a period of 184 days covering specified date. Different data was analysed concerning age group with the infection in different blocks and municipality as well.

DATA ANALYSIS

Statistical analysis of the collected data was performed using statistical analysis tool pack. The regression linear model were used to test the association between different parametric variables. chart and diagrams were illustrated using excel program.

RESULTS AND DISCUSSION

It was reported that the first COVID-19 patient was a migratory worker from the state of Uttarakhand that ultimately reached to a sudden increased number of 5915 till 24th September, 2020. It was further observed that mostly the male (3756 out of 5915) was affected than the female (2159 out of 5915) causing a high percentage (63.5%) of attack in male, while the percentage value (36.5%) of female cannot be ignored. Literature depicts (Giacomo et al., 2020; CCDC weekly, 2020) that in advanced countries the females are affecting less than males substantiating the present report. While attack of a 3 months baby is alarming in the present situation, the case of 106 year old individual undoubtedly reflecting a noteworthy feature.

The strange feature is that the trend line of infection is in linear form (Fig. 1). It started with a negligible number but consequently reached to a peaked level till the period of study. Thus it is thought-provoking to note that with the increase of days there is steady increase in infection and it is maximum in the month of September. Mostly the affected age groups are between 31 and 40 (Fig. 1). Present scenario is increase of age affects less number of people showing a negative trend of infection

(Fig.2). Of course this rule does not follow in each state of the country or district of a particular state. It can be inferred from the study that the attack of virus is not restricted to one but targeting irrespective of any age. A negative correlation ($r = -0.5703$) between age and infected person validates this fact. Moreover, in regression the dependent variable as ($R^2 = 0.3252$) reveals that 32% of the data fit the regression model, indicating not a good fit model (Fig.2). The best fitting regression equation is $y = -4.9209x + 763.93$. The slope thus indicates that every unit increase of age there is down of infection by - 4.92. Had the age been 0 the infection rate would be 763.93. A negative correlation thus suggests an increase of independent variable (age) have a tendency to decrease the dependent variable (infection). Further, the regression plot (Fig. 2) suggests that (i) there is a decreasing linear relationship between two variables under study; (ii) there are no unusual data points in the data set; (iii) the variation around the estimated regression line is constant suggesting reasonable assumption of equal error variances. The residuals study (Fig. 2) clearly stated that the values are randomly scattered around zero for the entire range of fitted values. Only one/two residuals centred on zero indicating model's prediction on average is correct rather than systematically too high or too low. Analysis of Variance (F-test) for the estimated value of regression coefficient (b) shows a statistically highly significant [$F_{cal} = 887044.4$ (Reg MS) / 204497.6 (Res MS) = 4.337677 against Significance $F = 0.06697$] data. The establishing fact, the virus play some role in morbidity that finally leads to death. Regression analysis thus revealed that there is strong positive linear correlation ($r = 0.9973$) between infection and the death (Fig. 3). The coefficient of determination ($R^2 = 0.9946$) discloses that 99% of the data fit the regression model, indicating a good fit of the data.

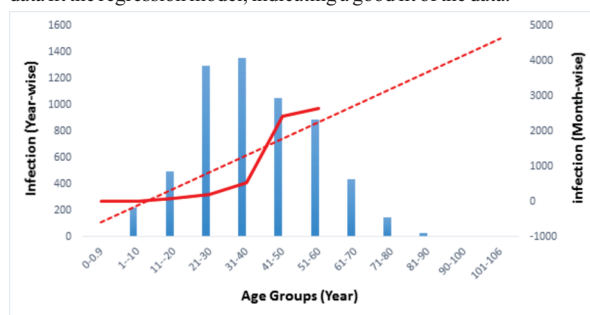


Fig. 1 Bar and line diagram showing number of infected person in different age groups and in months.

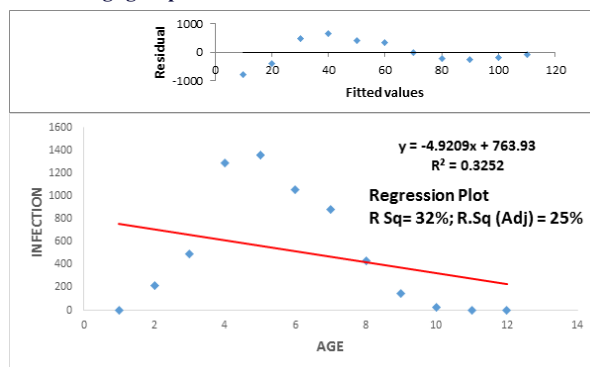


Fig. 2 Regression line, plot and residuals between age and number of infected person.

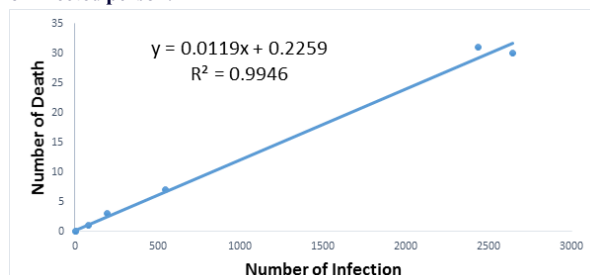
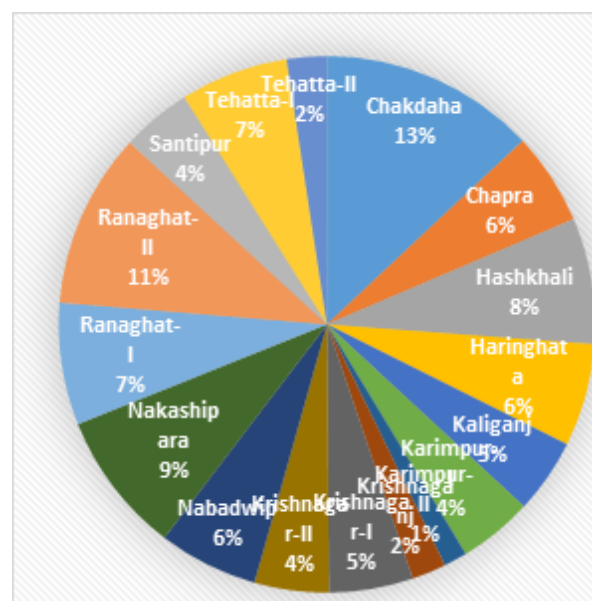


Fig.3. Regression lines showing correlation with infection and the death

The particular district have seventeen blocks (rural), ten municipalities (urban) and one notified area (both rural and urban). So, possibility of infection through social contact is unquestionable. And this way the disease dispersed vigorously during unlock period. Block-wise, the most affected blocks are Chakdaha (13%) followed by Ranaghat-II (11%) (Fig. 4 A) suggesting mixing of the population in these two blocks, as both are in close proximity of the capital of West Bengal. Chakdaha, municipality-wise are also qualified as a highest affected population (22%), followed by Kalyani (16%) (Fig. 4 B). It is obvious that a significant role played by the migratory workers especially from Maharashtra and also from abroad creating a hazard of such outbreak in this area. Still, the stimulatory story of the incident is the lower mortality rate (1.22 %) compared to the gross mortality of the country (1.63%).

A



B

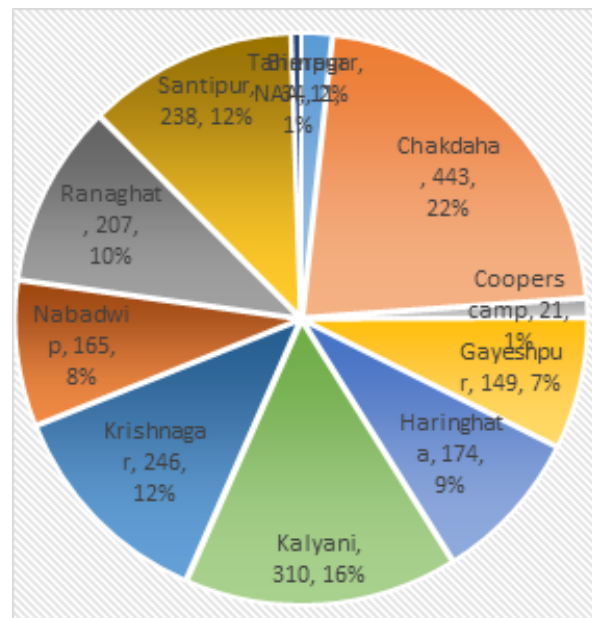


Fig. 4 Pie chart showing block-wise (A) and municipality-wise (B) distribution of COVID patients

Wang et al. (2020) statistically assessed the relationship between COVID-19 transmission and the temperature/humidity using different regulatory factors. We have not studied the relationship between the temperature and the COVID transmission in this district and it is

beyond our scope to formulate a relationship of the two variables. But, under this circumstances it may be stated that so far as Nadia district in question the climatic condition as well as health care and policy factors may influence the death rate in a diminishing rate as compared to Indian scenario (1.63%). Likassa (2020) evaluated the impacts of covariates on spatial distribution of COVID-19 and their results showed a statistically significant relationship on age and population density variation with deaths due to COVID-19 and also a statistical significant difference between male and female being affected by this COVID-19. The result of the present study also pointed out a statistical significant difference between male and female being affected by this COVID-19.

In conclusion, it may be stated that the contagion fatality ratio within 0-9 years is almost none; while for patients above 50 years is comparatively an agony for Nadia District as evident from the result. As the unlock period is in progress, public health intervention such as social distancing is crucial to block the transmission of COVID-19 even in the coming days.

REFERENCES

1. China CDC weekly (2020). The epidemiological characteristics of an outbreak of 2019 Novel coronavirus disease (COVID-19)-China. (<http://weekly.chinacdc.cn>).
2. Drosten C et.al (2003). Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *N. Engl. J. Med.* 348:1967–1976.
3. Gubalenya AE et al (2020). The species severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2. *Nature Microbiology*: 1-9.
4. Giacomo G et al (2020). Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy Region, Italy. *Journal of the American Medical Association*. 323 (16): 1574-1581.
5. Ksiazek T. et.al (2003). A novel coronavirus associated with severe acute respiratory syndrome. *N. Engl. J. Med.* 348:1953–1966.
6. Likassa H (2020). The Impacts of Covariates on Spatial Distribution of Corona Virus 2019 (COVID-19): What Do the Data Show through ANCOVA and MANCOVA? *Eurasian journal of Medicine and oncology*, 4(2): 141-148
7. Peiris JSST. et.al, (2003). Coronavirus as a possible cause of severe acute respiratory syndrome. *Lancet* 361:1319 -1325
8. Wang J. et.al, (2020). High Temperature and High Humidity Reduce the Transmission of COVID-19 (<https://ssrn.com>)
9. World Health Organization (2020a). Surveillance case definitions for human infection with novel coronavirus (nCoV): interim guidance v1, (Report) ([https:// apps. who. int/ iris/handle](https://apps.who.int/iris/handle))
10. World Health Organization (2020b). Coronavirus disease (COVID-19) pandemic (<http://www.who.int/emergencies/disease/novel-coronavirus-20>)