



A mathematical model of corona virus infection disease

Dileep Singh¹, Dr. A.K. Yadav², Dr. Sushil kumar³
Dr. Rashami Chaudhary⁴, DR. Vishwajeet Goswami⁵

1. Research Scholar , Shri J. J. T. U. Jhunjhunu (Raj.)
2. Department of Mathematics govt. K.R.P.G. College Gwalior
3. Department of Mathematics C.C.S. P.G. College Heonra, Etawah U.P
4. Department of Geography K.R.G. P.G. College Gwalior M.P.
5. Department of Mathematics J.J.T.U Jhunjhunu (Raj.)

Abstract

Presented herein are in the studies of infection of corona virus disease. The model taken in account of special characteristic to awareness about infection of corona virus disease. All over the world person have been affected by corona virus. The symptom logy of these patients, including fever, malaise, dry cough and dyspena was diagnosed. It has been observed that the chain of infected person increases with increase of time. It also has been observed that the number of infected person increases with the increase of chain of infected person.

Keywords: Pandemic, plague, small pox , quarantine, resources.

Introduction

In entire human history pandemic was an outbreak. Pandemic has decimated societies and wiped out entire population in human history. The plague was a global outbreak originated in China and arrived in Europe by trading route². The Spanish Flu plague was first true global pandemic.

Smallpox skin eruption disease and having thirty percent mortality. The virus can be transmitted directly from person to person.

HIV/AIDS have high mortality among gay population. HIV affected .79 percent people globally. Spanish flu infected 10 percent of the global population. Swine flu was lower death rate. This virus is spread organ of a person with infection. Ebola virus pandemic was respire central and West Africa within fruits bats. Zika virus was found in rhesus monkey in Uganda. The virus identified in Brazilin.

In a corona virus quarantine have much important for human health. The first quarantine was enacted in Ragusa. The first corona virus was avian infectious bronchitis virus. Corona viruses have some previous outbreaks such as SARS, MERS etc. were also a part of corona virus family.

Corona viruses break inside cell and disturb the body function. Corona virus has been spread in air travel so above one Lakh people are dying by corona virus in all over the world.

The novel corona virus disease covid – 19 has spread Wuhan city in Decmber. 2019 and spread all over the world. China has faced enormous, pressure from Chinese people from around the globe to the end use of wild

life as a resource. China Government ban on the trade and food of animal on Feb 24, 2020. The trade of wild animals use for medicine in china. The WHO said that some medicine pain reliever and cough syrup can treat some of the system in this disease.

Corona viruses have originated in wild animals in Wuhan city of China. Although the market is officially a seafood market, other dead and living animals were being sold there, including wolf cubs, salamanders, snakes, peacocks, porcupines and camel meat.

In the presence of virus infection patient with fever, dry cough, headache, hypoxemia and dyspnea's^{1,4}. Death may be result for failure of respiratory system⁵. This infection transmitted from person to person quickly. That time this infection has spread all over the world by china⁶. According to WHO report approximately four percent infected people have been died and death may be result of progressive from failure, of respiratory system⁶. Infected person chain decreases much important factor of this covid-19 disease⁷.

The purpose of this paper is to develop a mathematical model to know about the infected person and chain of infected person of this disease.

Method: Covid-19 was collected for the publish literature. We introduce the general approach of modeling is important tools for decision that can be useful for human diseases.

formulation of the problem

The detail some of the model outputs will be performed. This model is of relevance studies particularly in the real world.

In this model only chain of infected person covid-19 spread the disease and number of infected person chain increases exponentially with time.

The basic equation of the model is;

$$\frac{dS}{dt} = -\alpha CS + \beta I \quad (1)$$

$$\frac{dI}{dt} = \alpha CS - \beta I \quad (2)$$

and

$$\frac{dC}{dt} = \gamma C \quad (3)$$

Where

S = susceptible person

I = infected person

C = chain of infected person

With boundary condition

$$\left. \begin{aligned} S &= S_0, & \text{at } t &= 0 \\ I &= I_0, & \text{at } t &= 0 \\ C &= C_0, & \text{at } t &= 0 \end{aligned} \right\} \quad (4)$$

And

$$S + I = S_0 + I_0 = N \quad (5)$$

Solution of the problem

Integrating equation (3) with boundary condition (4), we get

$$C = C_0 e^{\gamma t} \quad (6)$$

Using equation (5) and (6) in equation (2), we get

$$\frac{dI}{dt} + (\alpha C_0 e^{\gamma t} + \beta)I = N\alpha C_0 e^{\gamma t} \quad (7)$$

Equation (7) is linear differential equation,

Then solution of equation (7) is

$$I e^{\left(\frac{\alpha C_0}{\gamma} e^{\gamma t} + \beta t\right)} = \int N\alpha C_0 e^{\gamma t} e^{\left(\frac{\alpha C_0}{\gamma} e^{\gamma t} + \beta t\right)} dt + D \quad (8)$$

Applying the boundary condition (4), we get

$$D = I_0 e^{\frac{\alpha C_0}{\gamma}} \quad (9)$$

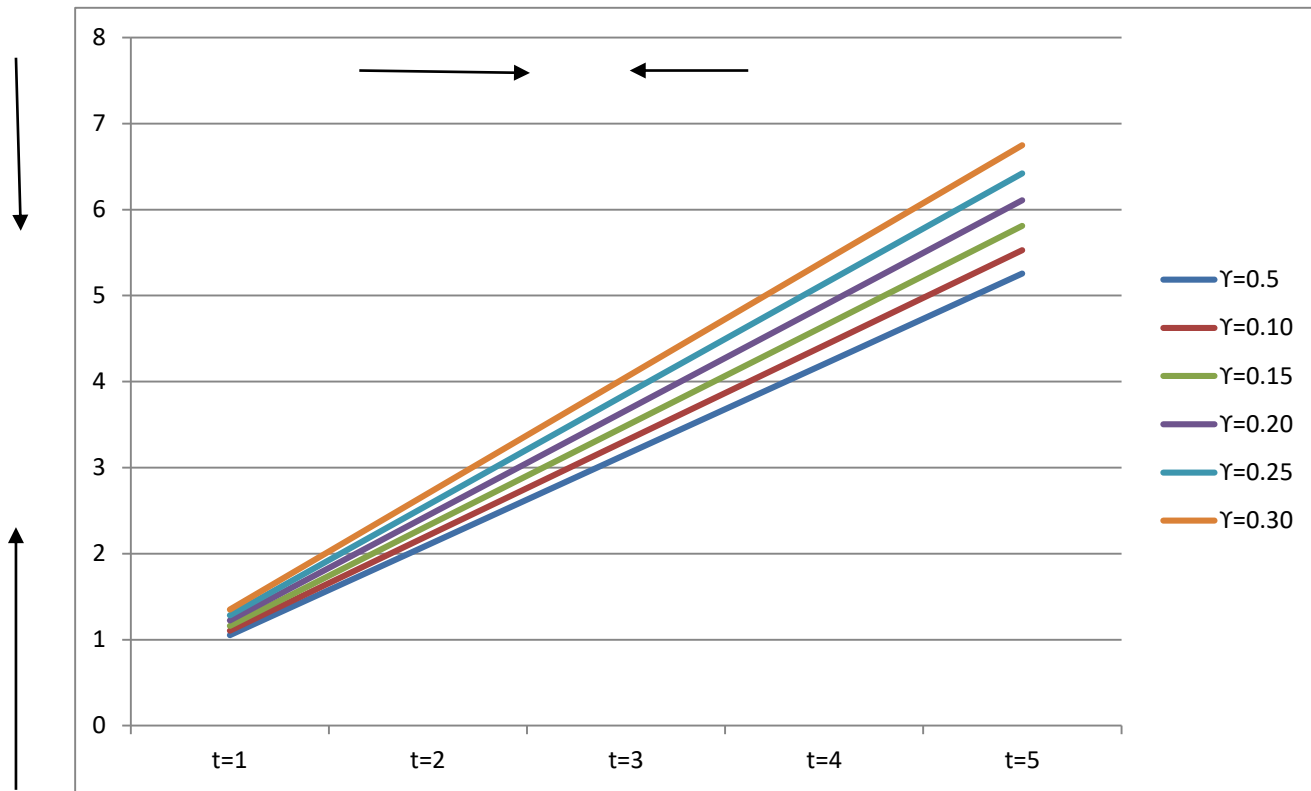
From equation (8) and (9) we get;

$$I = \frac{\int N\alpha C_0 e^{\gamma t} e^{\left(\frac{\alpha C_0}{\gamma} e^{\gamma t} + \beta t\right)} dt + I_0 e^{\frac{\alpha C_0}{\gamma}}}{e^{\left(\frac{\alpha C_0}{\gamma} e^{\gamma t} + \beta t\right)}} \quad (10)$$

Result

The present paper proposes a realistic model for explaining infected person and chain of infected person from corona virus. The result of chain of infected person and infected person has been examined for different values of parameter. It has been observed that the chain of infected person increases rapidly with increase of time. It has also been observed that the number of infected person increases with the increase of chain of infected person. Again we observed that the number of infected person depend upon the chain of infected person.

Discussion: From the graph of world it has been observed that the chain of infected person decide the infected person of the country. Total infected person and chain of infected person graph is very high. Which is very dangerous of the humanity. It is clear that chain of infected person broken by social distance. When chain of infected person is not broken then corona virus problem is much higher in the world.



Day (t)

Variation of chain of infected person(C) for different values of γ & t at $C_0 = 1$ Fig. (1)

Reference

1. Acute respiratory syndrome china wkly Epidemiol Rec. 2003:78, 73-76.
2. Antonovics J.Hood M E,Baker CH, Molecular virology; was the 1918 flu avian in origin Nature ,400E9A,MPID 16641950.
3. Baize S, Pannetier D, Oestereich L, Rieger T, Koivogui L et.al.2014. Emergence of Znaire Ebola virus disease in Guinea. N Engl J Med **371**:1418–1425.
4. Commutative number of reported case serve acute respiratory syndrome Geneva; WHO 2003.
5. R Li, S Pei, B chen, Y song, T zhang, W yang and J. Sharma (2020). Substantial undo cumented infection facilities the rapid dissemination of novel corona virus science.
6. Severe acute respiratory syndrome wkly epidemiol rec: (2003):78, p 81-85
7. Trangkw, HOPL, OOIGC et al (2003); A clusted cases of serve acute respiratory syndrome in Hong Kong Eng .J. mod.348, 1975 – 1983.
8. Yadav A.K. , Kumar S. , Chaudhary R. (2020): Mathematical analysis of corona virus diseases , IJTSRD, Vol.4 , issue-4 June 2020.