JOURNAL OF CRITICAL REVIEWS

ISSN- 2394-5125 VOL 7, ISSUE 14, 2020

RISK ANALYSIS OF CORONAVIRUS CAUSED DEATH BY THE PROBABILITY OF PATIENTS SUFFERING FROM CHRONIC DISEASES - A MACHINE LEARNING PERSPECTIVE

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Received: 14 March 2020 Revised and Accepted: 8 July 2020

ABSTRACT:

The entire world suffering from coronavirus, which declared COVID-19, and it triggered an alarm. WHO (World Health Organization) was alerting the countries that this virus is quickly spreading outburst an epidemic, and most of the countries are facing an intensification in confirmed cases? The patient who is suffering from COVID-19 and pre-existing chronic diseases like cardiac issues, kidney diseases, diabetes, and cancer have the complexity of severe disease leads to death. In the present scenario, many cases of fatality based on these chronic diseases. In this work, we are predicting the risk of chronic disease patients who have affected coronavirus by using a machine learning algorithm, such as approximating the occurrence and severity of diseases. These probabilistic methods simulated epidemics signifies a widespread of probable situations. Modelling can also improve interpretation for changing demographics, and unstable travel patterns and also providing recommendations to prevent the epidemic. Though COVID-19 contains insignificant infections between the majority of the public, the risk of death adults with underlying comorbidities is a higher rate, which requires additional care.

KEYWORDS: corona, virus, death, chronic, disease, machine learning, predictive

I. INTRODUCTION

Today, the whole world is lockdown due to the novel coronavirus and popularly known as COVID-19, which is originated in Wuhan and has rapidly spread across worldwide. Almost 202 countries are suffering from a novel coronavirus. According to WHO (World Health Organization), a total of 15+ lakhs patients are suffering from COVID, and 90k patients have died. The fatality rate of the coronavirus is about 6% of total patients. In India, above six thousand people are suffering from this pandemic, and the fatality rate is 3%. This virus is to be a pandemic declared by WHO. There is a substantial clinical trial going to the investigation. No vaccine is available for this virus; the only solution is social distancing, as it is the only solution to control for its mitigation [1]. Coronavirus identified as a new pathogen of (SARS-Cov) [2]. It mainly spread as a person-to-person transferrable virus that contaminates suspicious people through globule spread [3]. The patient is infecting by droplets; he/she does not know that they infected till 14 days. Once infected, persistent undergo a 2-to-10-day development period before distinctive symptoms such as fever, cough, and body aches seem. In this incubation stage, the enduring is infectious to neighbouring people [4]. Recent studies of ICMR says that one coronavirus patient can transmit the infection to nearly 406 persons. Throughout the, world no vaccine for this pandemic, no consistent indicative test, and no proper diagnosis, which leads to the necessity for enhancement of community health safety to be operative [5,6].

2019-nCoV is transmitted to all age people, including infants also. The people who are suffering from chronic diseases such as kidney diseases, asthma, diabetes, heart disease seem to be more susceptible to fetching brutally ill with the COVID-19. The healthcare providers and WHO recommends the public of all ages from the infant to old age to take necessary precautions from the virus, for instance, frequently washing hands, cover the nose, mouth and good respiratory hygiene as well as clean the circumstances. The significant risk for older people and people who are suffering from chronic diseases are [7] severely ill from the communicable virus. The old age of people's immunity endures slowly down its capability due to other health issues, which causes to mount a response to the virus robustly as it.

The patient who is suffering from chronic diseases as these patients suffering over long periods leads to a higher risk of life. In this work, try to analyse the probability of the COVID-19 patient's fatality rate, those who are suffering from chronic diseases such as cardiac arrest, diabetes, kidney diseases, and cancer. Therefore,

coronavirus patients behaving more frustration those who underlying from several health illness. The existing medicines and injections are not avoiding chronic diseases as these medicines exhibit no signs of any disease. People with older changes and long-lasting ailment remains a more common phenomenon. Throughout the worldwide, one of the severe problems in healthcare is a chronic disease, such as diabetes, cardiac arrest, chronic kidney diseases, and several types of cancer [8]. Conferring to the standard healthcare report, the main reason for deaths are due to chronic diseases.

Furthermore, these chronic diseases [9] are non-infectious and do not a transmission from one patient to another. COVID 19 patients with chronic diseases [10] and severe risk features, including diabetes, blood pressure, heart-related, brain-related, chronic kidney-related, and smoking, for death. According to the reports and reviews of COVID19, the male death rate, as well as confirmed cases, are almost 71% than a female who is only 27%. From all these reports concluding that coronavirus has more fatality and illness in aged people and persons with chronic conditions. Patients with pre-existing diseases [11] having suffered from chronic diseases experienced a higher than average fatality rate.

Healthy people experience a severe procedure of pneumonia, cough, and fatigue after being infect by the coronavirus. In this work, the reason for investigated as try to learn more about this COVID 19 and predicting the probability of risk factors of the fatality rate of patients with chronic diseases.

II. RELATED WORK

People infected by the new coronavirus [12] are probably to decease if their age is above 50 or confirmation signs of cardiac or diabetes. According to reviews, a few individuals infected with the COVID-19 infectious disease from the verdict to quarantine release or death. The origin of the virus is in Wuhan, China to be treat coronavirus infected people in two hospitals until 1 February, patients treated within other hospitals transferred to one of these two hospitals. The average age of this death was 56, and 62 % were men, and among these patients, more than half had underlying pre-existing health conditions, usually diabetes and cardiovascular diseases.

Many researchers investigated the association between pre-existing chronic diseases and severe COVID-19. One such method is an analysis of 1,527 patients with COVID-19 observed the frequency of chronic diseases such as blood pressure, cardiac and brain-related, and diabetes Miletus 17.1%, cardiac related 16.4%, and blood pressure 9.7%, correspondingly [13]. Persistent with these comorbidities require to treat in ICU (intensive care unit) when compared with healthy patients. The fatality rate increased by 2.3% when compared with previous investigations above 45k checked COVID-19 cases in patients with heart-related (10.5%), diabetes (7.3%), blood pressure (6.0). Numerous investigations also demonstrated that the same consequences are more risk for coronavirus patients with chronic diseases. Data from Italy to be submit comparable fatality rates and a raised risk for decease in enduring comorbidities [15]. As an epidemic outbreak, comprehensive data become accessible. An investigation from multinational units can support update risk lamination for chronic disease, particularly for patients with former Cardiovascular.

The fatality rate of COVID 19 patients, who is having a pre-existing cardiovascular disease is 10.5%. Patients with diabetes reduce immunity and become rigid to fight against the virus. People with elevated blood sugar levels of diabetes may gradually provide an environment for infections to flourish. People with chronic respiratory diseases such as asthma and lung disease are also having a higher risk if they infected by COVID 19.

Though people may not know the risk aspects of COVID-19, numerous investigations developed that a substantial percentage of enduring had pre-existing health conditions. In [17], SARS-Cov pneumonia exhibits that 50.5% (n Z 51) of enduring had chronic health conditions, precisely heart issues, and brain-related (40.4%). SARS-CoV-2 patients of 1099, among them 23.2% (n Z 255) had at least one pre-existing disorder, and hypertension (14.9%), diabetes (7.4%). Also, COVID 19 patients were likely to have comorbidities when compare with non-severe diseases. Similarly, out of 138 SARS-CoV-2 patients with pneumonia, wherein 47% had comorbidities.

Diabetes patients infected by COVID-19 can require specialized medical care [18]. In the "public health emergency," situation, several medications have been trying in the cure for COVID-19 that be made up of antimalarial drug which is known chloroquine and it is derived HCQ (hydroxychloroquine), accompanied by another antiviral medicines. This HCQ approved in the diagnosis of diabetes type 2 in India as a third- or fourth-line drug, and it is fascinating to look into its effect in patients with diabetes, tainted with COVID-19.

III. METHODOLOGY

Currently, at least 20% of patients of COVID-19 cases are suffering from chronic diseases. The white blood cells in diabetes patients become weaken, which in turn, the immunity of such patients to fight infectious disease, as well as the virus, elevated quickly in lung disease patients. Initial deaths in the U.S. and South Korea show similar demographic patterns. The massive outbreak of deaths in Italy, due to old aging people and the percentage of

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fatality rate is 5% analysed by healthcare providers. In South Korea, the fatality rate is higher than the general people in a massive epidemic. The fatality rate in Italy and China have high due to older age people with smoking habits.

The healthcare providers advise older age people who are underlying chronic diseases better to stop traveling and protect themselves by taking necessary precautions to avoid the virus.

In this work, mainly try to analyse the fatality rate of coronavirus patient who is underlying chronic diseases like diabetes, cancer, blood pressure, kidney diseases and heart-related patients in five countries those are India, USA, Spain, UK, and Italy. The common chronicle diseases in all countries such as joint pains, cardiac arrest and stroke, different types of tumors, diabetes mellitus, gloominess, confiscations, overweight, and various health problems.

1. Coronary disease consists of plasma related disease, e.g., coronary vein disease, coronary beat problems. There are many heart-related diseases [19], including coronary vein disease, coronary rhythm issues, and genetic heart faults among infants. There is no cure for heart disease, only controlling the disease.
2. Diabetes mellitus symptoms are higher sugar levels in blood with recurrent urination, amplified thirstiness, and appetite in short period of time. Diabetes not appropriately diagnosed, then some significant complications arise, those are high osmolarity without significant ketoacidosis, or death. It is also one of the impended chronic illness and lasting illness controlled by treatment. If the proper diagnosis is not taking by diabetes, patients can lead to kidney, heart-related, blindness, and many more health conditions.
3. Cancer is the abnormal cells increased relinquishment in any part of the body. Numerous types of cancers are there, such as breast, brain, gynic, lung, thyroid, pancreas, prostate, kidney, and many more cancers. It is a leading cause of death worldwide.
4. Blood pressure, also known as hypertension, is a dangerous disease as it makes the coronary stiffer push blood out from the body, which leads to joint pains, brain stroke, kidney disease, and cardiac arrest.
5. Kidney diseases: One of the significant parts of the human body is a kidney, which filters waste and excess fluid in the blood. Once kidneys fail and cannot filter as well. The kidney diagnosis contains kidney replacement or dialysis, acute kidney injury, kidney stones, kidney infections, and kidney cancer.

The main aim of this work is to analyse the risk prediction model of the fatality rate in coronavirus patients who had underlying different chronic diseases. Knowledge-based risk factors like to influence more data features to elevate the model prediction performance and detecting new risk factors from data insights. The following result is to choose from world meter [20-22]

Table 1: Coronavirus fatality based on age factor

AGE in Years	Fatality rate of confirmed cases	Fatality rate of all cases
80+	**21.9%**	**14.8%**
70-79		**8.0%**
60-69		**3.6%**
50-59		**1.3%**
40-49		**0.4%**
30-39		**0.2%**
20-29		**0.2%**
10-19		**0.2%**
0-9		**no fatalities**

Here, the probability of fatality infected by coronavirus patient percentage calculated by using formula

***fatality Rat**e = (the number of deaths / number of cases)

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Table 2: Gender wise fatality rate of COVID-19

GENDER	Fatality rate of confirmed cases	Fatality rate of all cases
Male	**4.7%**	**2.8%**
Female	**2.8%**	**1.7%**

Table 3: The Fatality rate of COVID 19 patients with underlying comorbidities

PRE-EXISTING MEDICAL illness	Fatality rate of confirmed cases	Fatality rate of all cases
Heart-related diseases	**13.2%**	**10.5%**
Diabetes mellitus	**9.2%**	**7.3%**
Long-lasting respiratory disease	**8.0%**	**6.3%**
Blood pressure	**8.4%**	**6.0%**
Tumor related diseases (cancer)	**7.6%**	**5.6%**
***H**ealthy people*		**0.9%**

IV. IMPLEMENTATION RESULTS

The data used in this, taking from the world meter. Mortality taken from 6 countries due to premedical history first diabetes bp, cardiac, hypertension, diabetes and rest with cancer kidney failure respiratory

While CHINA observed first with cardiac, Italy with hypertension and diabetes next, India with diabetes as well as kidney failure, Spain, UK, US as per data took by us are due to diabetes and mostly multiple pre-existing medical conditions

While respiratory-related diseases mostly observed in CHINA and not much in any other taken country.

Almost all the nation's death rates are high with age above 50 and only a few with below 50 that too due to extreme pre-existing medical conditions

While the UK observed with deaths to the Child's below 10 years compared with other nations.

As per data in India, the deaths are mostly due to the disease is not aware of the people and admitted with high severity cases with multiple pre-existing medical conditions.

India recorded with kidney failure related deaths than other nations comparatively with the particular premedical condition.

Table 4: The Sample of data set

Patient ID	Country	Gender	Age	Premedical history	Number of days	Result	Date
2020001	USA	F	42	no	5	1	28032020
2020002	USA	M	67	Diabetes and bp		1	22032020
2020003	USA	M	77	diabetes		1	22032020
2020004	USA	M	90	Diabetes and bp		1	22032020
2020005	USA	M	83	no		1	22032020
2020006	USA	F	71	diabetes		1	18032020

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2020007	USA	M	64	Diabetes, bp and cardiac		1	13032020
2020008	USA	F	76	cardiac		1	19032020
2020009	USA	M	72	bp		1	
2020010	USA	M	76	Diabetes and bp		1	
2020011	SPAIN	M	82	no		1	
2020012	SPAIN	M	69	no		1	
2020013	SPAIN	M	21	cancer		1	
2020014	SPAIN	F	82	Diabetes and bp		1	
2020015	SPAIN	M	81	diabetes		1	
2020016	SPAIN	M	87	bp		1	
2020017	SPAIN	F	88	Diabetes and bp		1	
2020018	SPAIN	M	76	cardiac		1	
2020019	SPAIN	F	80	Diabetes and bp		1	

Coefficients:

(Intercept)	Age	Country INDIA	Country ITALY	Country SPAIN
4.63918	-0.02958	17.21368	-1.20454	0.17002
Country UK	Country USA	Gender M		
0.31843	0.25570	-0.65851		

Degrees of Freedom: 89 Total (i.e. Null); 82 Residual

Null Deviance: 70.68

Residual Deviance: 56.74 AIC: 72.74

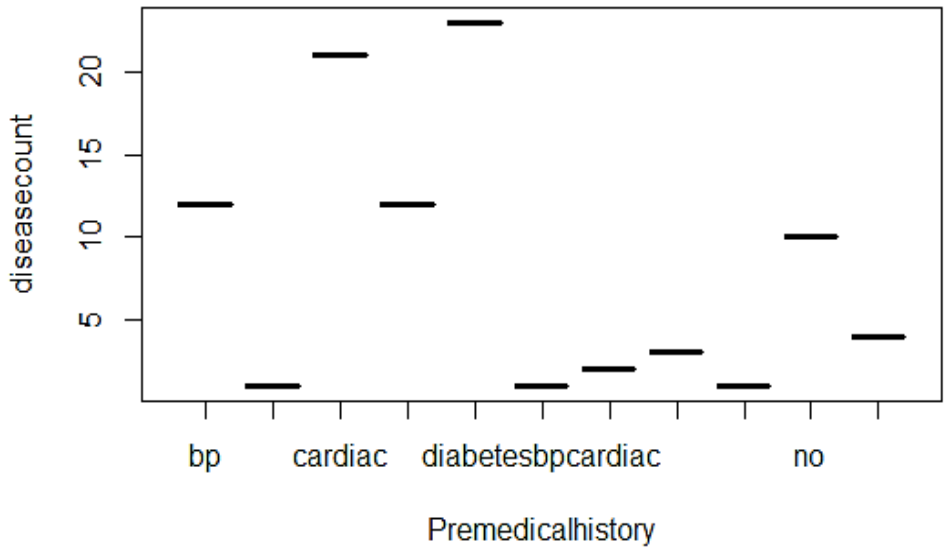

Fig 1: Premedical history patients of the coronavirus disease count

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Table 5: The data set contain different pre-existing disease count.

S.No.	Premedical history	Disease count
1	bp	12
2	cancer	1
3	cardiac	21
4	diabetes	12
5	Diabetes and bp	23
6	Diabetes, bp and cardiac	2
7	Diabetes and cardiac	1
8	Kidney failure 3	3
9	Kidney and liver	1
10	no (Healthy people infected by virus)	10
11	respiratory 4	4

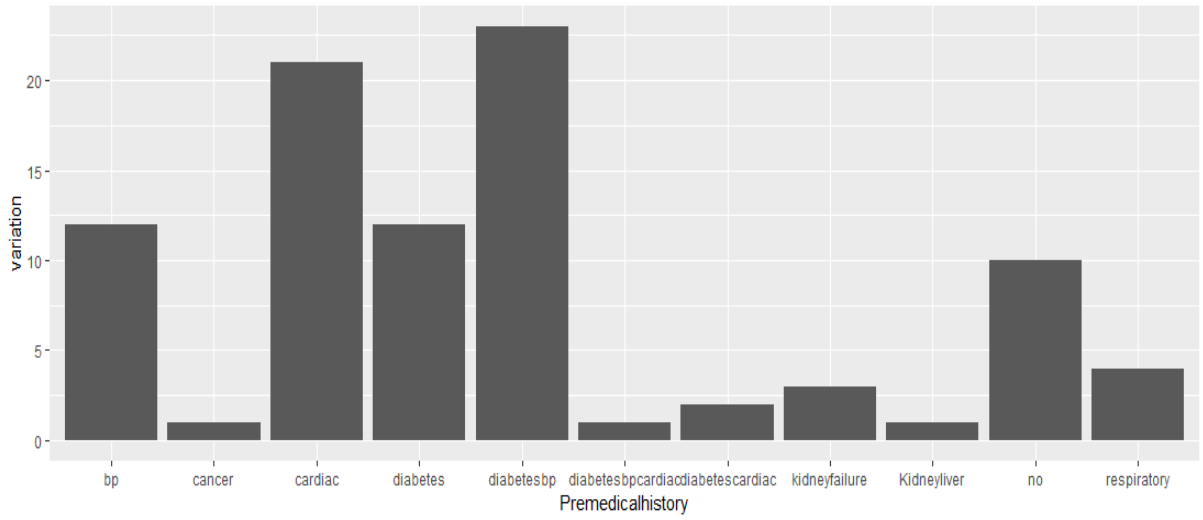

Fig1: The fatality rate of coronavirus patients with different underlying chronic diseases.

In the above figure, no bar represents the coronavirus deaths of healthy people. The following table represents the results of the chronic disease count of coronavirus patients. There are a more significant number of rows there; here few presented.

Table 6: The summary of COVID 19 patients with pre-existing medical conditions

S.No.	Premedical history	Country	Disease count
1	BP	CHINA	2
2	BP	ITALY	7
3	BP	SPAIN	1
4	BP	UK	1
5	BP	USA	1
6	CANCER	SPAIN	1
7	CARDIAC	CHINA	7
8	CARDIAC	INDIA	5
9	CARDIAC	ITALY	5
10	CARDIAC	Spain	1

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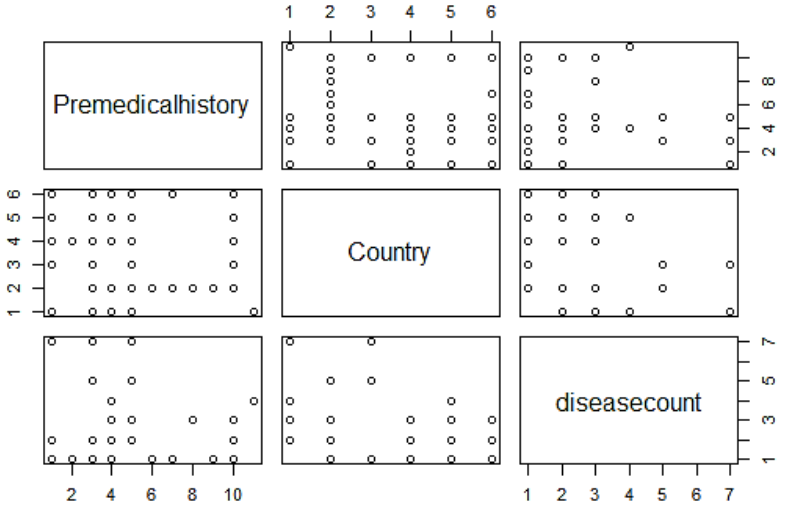

Fig 3: Country-wise chronic disease deaths variation.

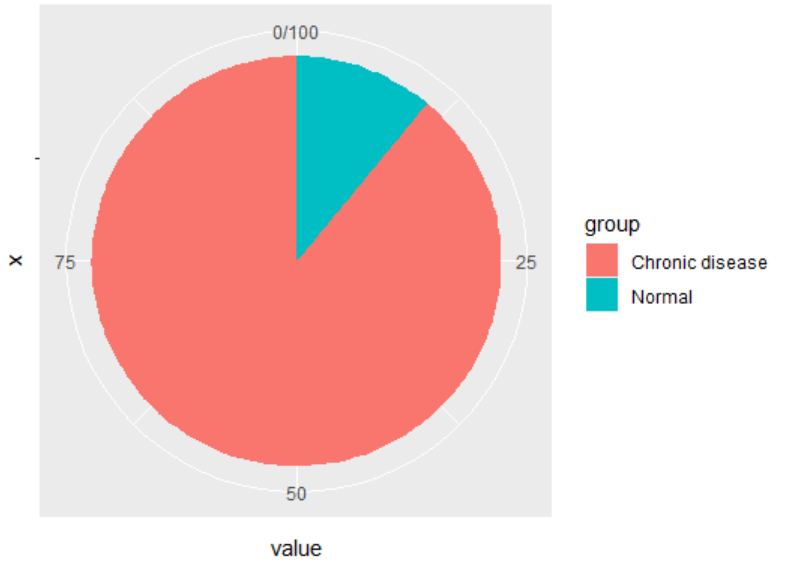

Fig 4. Proposed method retrieved the results chronic disease patients versus healthy patients of coronavirus fatality

V. CONCLUSION

In this case study, our experiments exhibit those coronavirus patients with chronic disease high risk and also higher fatality. The implementation results validate the probability of a higher risk of older age as well as patients who are suffering from chronic diseases. The proposed approach COVID 19 patients who are suffering from chronic disease consists of cataloguing and the probability approach of the machine learning algorithms. Chronic diseases such as Heart-related, Diabetes, kidney-related, blood pressure, and cancer patient data of COVID 19 used in the implementation. The fatality rate of these disease patients infected by the virus compared with the regular health people's fatality rate. The results demonstrate that these patients having higher risk. These implemented results help healthcare providers to take more precautions and care for COVID 19 patients, who suffered from severe illness.

VI. FUTURE ENHANCEMENT

The community infection of COVID 19 is more crucial in the coming days and require lots of quarantine and require to identify early recognition of virus affected people to stop the virus. In the coming days, more investigations needed for evaluating new vaccine or treatment is vital to dealing with this virus. In the future, applying privacy-preserving methods to protect a patient who suffers from coronavirus and also analysing the behaviour analysis of these patients.

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