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Risk Factor Analysis of Covid-19

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ABSTRACT

Background: Coronavirus is an unpredicted anti-human biological calamity. This virus questions the entire globe on its state and characteristics, which lead physicians, virology practitioners to give conditional statements and fearful myths.

Objective: This analysis aims to provide a probability to get infected with Covid-19 for patients with various health complications.

Methods: Data set from Mexican government contains 566,602 Covid-19 test samples. Data analytics adhere to 16 parameters of habitual and health constraints on this data set are evaluated using R software.

Results: 7 out of 16 parameters exhibited Extreme Severity in getting infected with Covid-19, while other 6 and 3 are categorised into moderate and less severity respectively.

Conclusion: Risk factor analysis alerts the persons with these 16 parameters to take necessary precautions and preparedness for Covid-19.

Key Words: Coronavirus, COVID-19, Risk factor analysis

INTRODUCTION

As of now, there are seven types of coronavirus in humans that exhibit similar symptoms that cause disease. Four in this list are more often with symptoms of a cold. OC43 and 229E type coronavirus grounds common cold. HUK1 and NL63 are serotype coronaviruses that are also related to the common cold. These four viruses rarely effect on respiratory system in infants, aged, and less immune. But, another three of seven types of infections are more extreme and cause a noticeable impact on the respiratory system in humans.[1,2] Middle East Respiratory Syndrome (MERS) is one of a severe type of coronavirus which first emerged in Saudi Arabia. Later prominently it is transmitted to the Middle East, Asia, Africa, and Europe.[7] Severe Acute Respiratory Syndrome (SARS) is another type of coronavirus came into sight in china in 2002. Fortunately, there is no further notice of SARS cases identified. These types of coronaviruses are zoonotic that cause severe infections in the respiratory system, which originates from infected animals to humans.[8]

Now, in late 2019, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is another type of coronavirus outbreak in China and soon transmitted all over the world. International Committee on Taxonomy of Viruses (ICTV) nomenclate novel coronavirus as COVID-19. This infection affects the respiratory system. Upper respiratory tract like nose, throat, and sinuses or lower respiratory like windpipe and lungs are severely damaged and leads to shortness of breath. Similar to other coronaviruses, it is prone to get transmitted from person to person. Infected patients have to undergo treatment identical to the procedure for Cold.[9]

The key symptoms of Covid-19 patients include Fever, Cough, Sore throat, Breathing problem (Shortness of breath or trouble breathing), Shivering, Body pains, Headache, Fatigue, Loss of smell or taste, vomiting, Diarrhea. Covid-19, in its extreme, leads to pneumonia, respiratory system failure, and death due to the release of cytokine which affects the immune system by making bloodstream with inflammatory proteins results in killing tissues.[2]

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MATERIALS AND METHODS

Dataset is collected from the official website of the General Directorate of Epidemiology, Mexican government which includes an enormous number of anonymised patient-related information.[5]

Dataset

Total 566,602 tests conducted on the subjects who exhibit preliminary symptoms of COVID-19 given by WHO. 499,692 test results are declared, and 66,910 tests are waiting for the results. The study is performed on 499,692 test results and studies the risk factor associated with COVID-19 cases. 220,657 tests of 499,692, i.e. 44.15% results are tested positive with Covid-19. Now the study carried on data of 499,692 tests, and the percentage of risk associated with each risk factor is analyzed.

Risk Factor Analysis

Risk factors are parameters in Covid-19 infected patients that lead to severe illness if the patient shows COVID-19 symptoms along with abnormal health conditions. 16 prominent risk factors are identified from the dataset to estimate their percentage of positive cases in total positive cases and total tests. All analyses were executed using the R programming software, version 3.3.1.

RESULTS

The impact of each risk factor on the total positively tested samples is analyzed and tabulated their percentages in different perceptions in Table 1.

Table 1: Risk Factors Analysis

S.No	Risk Factor	No. of Risk Factor patients in Total Tests	Positive Cases	Percentage of positive cases		
				In Risk Factor	In Total Tests	In Total Positive Cases
1	Pneumonia	78716	53031	67.37	10.61	24.03
2	Diabetes	62349	36187	58.04	7.24	16.40
3	Age >60	80035	45087	56.33	9.02	20.43
4	Age<60	419657	175570	41.84	35.14	79.57
5	Other COVID Contact	196966	74280	37.71	14.87	33.66
6	Obesity	81929	43241	52.78	8.65	19.60
7	COPD	8276	3877	46.85	0.78	1.76
8	Asthma	16214	6063	37.39	1.21	2.75
9	Hypertension	81340	44297	54.46	8.86	20.08
10	Hypertension in Age>60	35202	20608	58.54	4.12	9.34
11	Hypertension in Age<60	46138	23689	51.34	4.74	10.74
12	Other Disease	15392	6283	40.82	1.26	2.85
13	Cardiovascular	11419	5162	45.21	1.03	2.34
14	Renal Chronic	10019	4789	47.80	0.96	2.17
15	Tobacco	42955	17109	39.83	3.42	7.75
16	Immunosuppression	8071	3016	37.37	0.60	1.37

Pneumonia: This risk factor has a drastic outsized impact on resulted in positive cases; more than 67% of Pneumonia patients are tested positive. It took the share >10% in 499,692 tests performed and nearly 25% in total 220,657 positive cases.

Diabetes: This is another risk factor that leads to severe illness along with Covid-19. Nearly 60% of diabetics are very much prone to infection and an increase in fatal rate. 7.24% of total tests and >16% of positive cases are associated with this risk factor.

Age >60: The dataset is subdivided with a threshold of 60 years in patients age. Analysing the tests of senior citizens who are above the threshold and infected with this novel corona virus, more than 56% of this age group is tested positive, and > 20% in total positive cases are with this risk factor. It took nearly 10% of the share highlighting risk factors in 499,692 samples of tests.

Age<60: lower threshold test samples show better immunity than a higher age group. But, it is also clear that Covid-19 also affects all age groups as >41% of age below 60 years are tested positive.

Other Covid-19 Contact: This is the crucial source of transmitting coronavirus from person to person. Nearly 38% of infected patients have primary or secondary contact with other Covid-19 infected patients. More than 14% in total testes and >33% in total positive cases are infected from another Covid-19 contact.

Obesity: More than 52% of tests resulted in positive for the patients with this risk factor. It shows that nearly 9% of total tests and 20% of positive cases are with this risk factor. Almost 13% of adults in the world and 39% in the USA are obese, steals one of the prominent seats among risk factors.

Chronic Obstructive Pulmonary Disease (COPD): Troubled Breathing is a preliminary symptom of Covid-19. Along with risk factor, a positively tested patient has to face severe problem in taking a breath and probably need to be intubated. More than 46% of COPD patients are tested positive with Covid-19. 0.78 % of 499,692 tests and 1.76% of 220657 positive cases are with the risk factor.

Asthma: More than 37% of Asthma patients are tested positive may lead to severe illness. 1.21% of total tests and 2.75% of total positive cases are with this risk factor.

Hypertension: This is another extreme health complication towards Covid-19. More than 54% of Hypertension patients tested positive. >8% of total tests and 20.08 % of total positive cases are with this risk factor. Many studies prove that Hypertension varies with age. To justify that dataset is subdivided with a threshold age of 60 years and analyzed.

Hypertension in Age>60: More than 58% of patients with more than 60 years of age are prone to Covid-19. Nearly 4% of total tests and 9.34% of positive cases are with this risk factor.

Hypertension in Age<60: As Hypertension is proportional to Age, Hypertension in the lower age group is considerably less. Nearly 51% of Hypertension patients with age less than 60 are infected. 4.74% of total tests and 10.74% of total positive cases are with this age group and risk factor.

Other Disease: More than 40% of patients, who has other diseases are tested positive. In this risk factor, 1.26% of total tests and 2.85% of total positive cases are tested positive with Covid-19.

Cardiovascular: This risk factor challenges the availability of physicians and treatment facilities. 45.21% of cardiovascular patients are tested positive. More than 1.03% of total tests and 2.34% of total positive cases with this risk factor get infected.

Renal Chronic: Regular dialysis and continuous monitoring of physicians may also be required. More than 47% of renal chronic/CKD patients tested positive. 0.96% of total tests and 2.17% of total positive cases with renal complexity are infected with Covid-19.

Tobacco: Regular Smoking results in breathing problems that create a significant impact on the positive tested cases. Nearly 40% of tobacco consumers are tested positive. 3.42% in total tests and 7.75% in 220,657 positive cases are with this habitual complication.

Immunosuppression: Infecting with Covid-19 depends on the efficiency of the immune system, which dominates other risk factors. 37.37% of low immune patients are infected with the virus and shows complexity in getting better. More than 0.60% of total tests and 1.37% of total positive cases didn't resist the novel coronavirus.

For better interpretation, percentage of positively tested samples is charted in various perceptions and risk factors in Figure 1 and Figure 2 respectively.

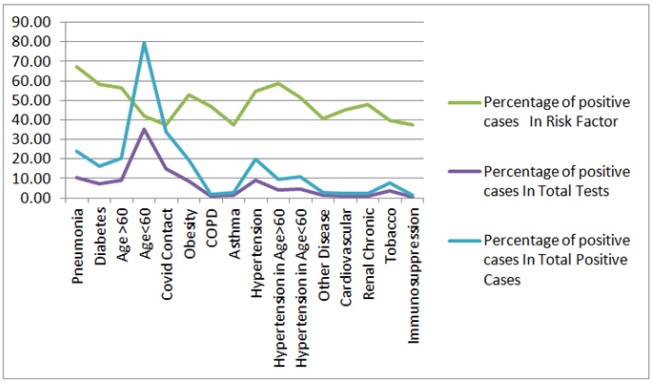

Figure 1: Percentage of positive cases in various perceptions.

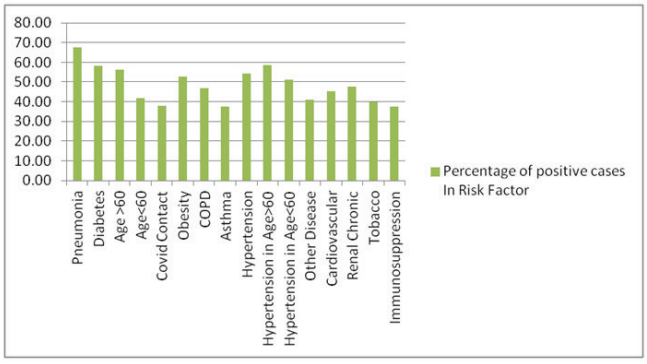

Figure 2: Percentage of positive cases in risk factors.

DISCUSSION

Based on the Results, these risk factors are categorized into three levels, i.e. Extreme, Moderate and Less. Risk factor

which shows more than 50% of total positive cases may lead to a severe illness considered as an 'Extreme' category. 40-50% of positive cases for each risk factor falls into the 'Moderate' category and less than 40% of positive cases framed into the 'Less' category.[4-6]

Extreme: Pneumonia, Diabetes, Age>60, Obesity, Hypertension in all ages

Moderate: Age<60, COPD, Patients with other diseases, Cardiovascular problems, Renal Complexity, Tobacco Consumption

Less: Other Covid-19 contacts, Asthma, Immunosuppression.[7,8]

CONCLUSION

Total 499,692 results of Covid-19 test samples analyzed from the dataset. Risk factor analysis executed on targeting patients with different parameters of habitual and health complications. RFA divides its parameters into three categories estimating the severity of illness based on the percentage of positive cases in each risk factor. Upon increasing the tests; Physicians, Government, and Hospitals suggested follow the percentage scale obtained from the analysis and need to be prepared with necessary medical facilities to deal with their risk factors based on their severity.

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REFERENCES

1. Coronavirus disease (COVID-19) – World Health Organization. 2020 [cited 9 September 2020]. Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019
2. Coronavirus and COVID-19: What You Should Know. 2020 [cited 18 August 2020]. Available from: https://www.webmd.com/lung/coronavirus
3. Novel coronavirus: What we know so far? Medicalnewstoday.com. 2020 [cited 1 September 2020]. Available from: https://www.medicalnewstoday.com/articles/novel-coronavirus-your-questions-answered
4. Module 1: Virology, Coronaviruses, and COVID-19. Johns Hopkins Coronavirus Resource Center. 2020 [cited 9 November 2020]. Available from: https://coronavirus.jhu.edu/covid-19-basics/understanding-covid-19/module-1-virology-coronaviruses-and-covid-19
5. COVID-19 patient pre-condition dataset [Internet]. Kaggle.com. 2020 [cited 16 September 2020]. Available from: https://www.kaggle.com/tanmoyx/covid19-patient-precondition-dataset
6. Park S. Epidemiology, virology, and clinical features of severe acute respiratory syndrome -coronavirus-2 (SARS-CoV-2; Coronavirus Disease-19). Clin Exp Pediatr 2020;63(4):119-124.
7. Phillips J. Middle East Respiratory Syndrome (MERS). Workplace Health & Safety. 2014;62(7):308-308.
8. Dorathy U, Bassey E. Coronavirus: COVID-19-Epidemiology, Treatment, Prevention and Control. J Adv Microbiol 2020;23:46-51.