

Prevalence of Comorbidities in COVID-19 Patients: A Meta-Analysis

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Abstract:- Outbreak of SARS-CoV-2 (Severe acute respirator syndrome coronavirus 2) emerged from China, which has endangered human lives. COVID-19 is presented with pneumonia with mild or severe symptoms. Patients with underlying diseases like diabetes, hypertension, cardiovascular disease, and other comorbidities could have life threatening issues. SARS-CoV-2 uses ACE-2 receptors found at the surface of the host cell to get into inside of the cell. We conducted review and meta-analysis on research paper associated with covid-19 patients and comorbidities associated. We searched google scholar, PubMed and science direct, Elsevier. We reviewed some papers describing the association of comorbidities in COVID-19.

I. INTRODUCTION

Outbreak of pneumonia is reported by an unknown source in China, in Dec 2019. The virus that caused the outbreak is identified as beta coronavirus similar to MERS (Middle East Respiratory Syndrome) and SARS (Severe Acute Respiratory Syndrome). It is named as COVID-19 or SARS-CoV-2. WHO (World Health Organization) had declared public emergency in January 2020. Comparative homology analysis, and identified that COVID-19 is closely associated with SARS which is bat derived, and it is similar to SARS for about only 79% and 50% similar to MERS [1]. As of the date while writing this article there are 54M global cases and 1.3 M deaths all over the world reported by John Hopkins University & Medicine.

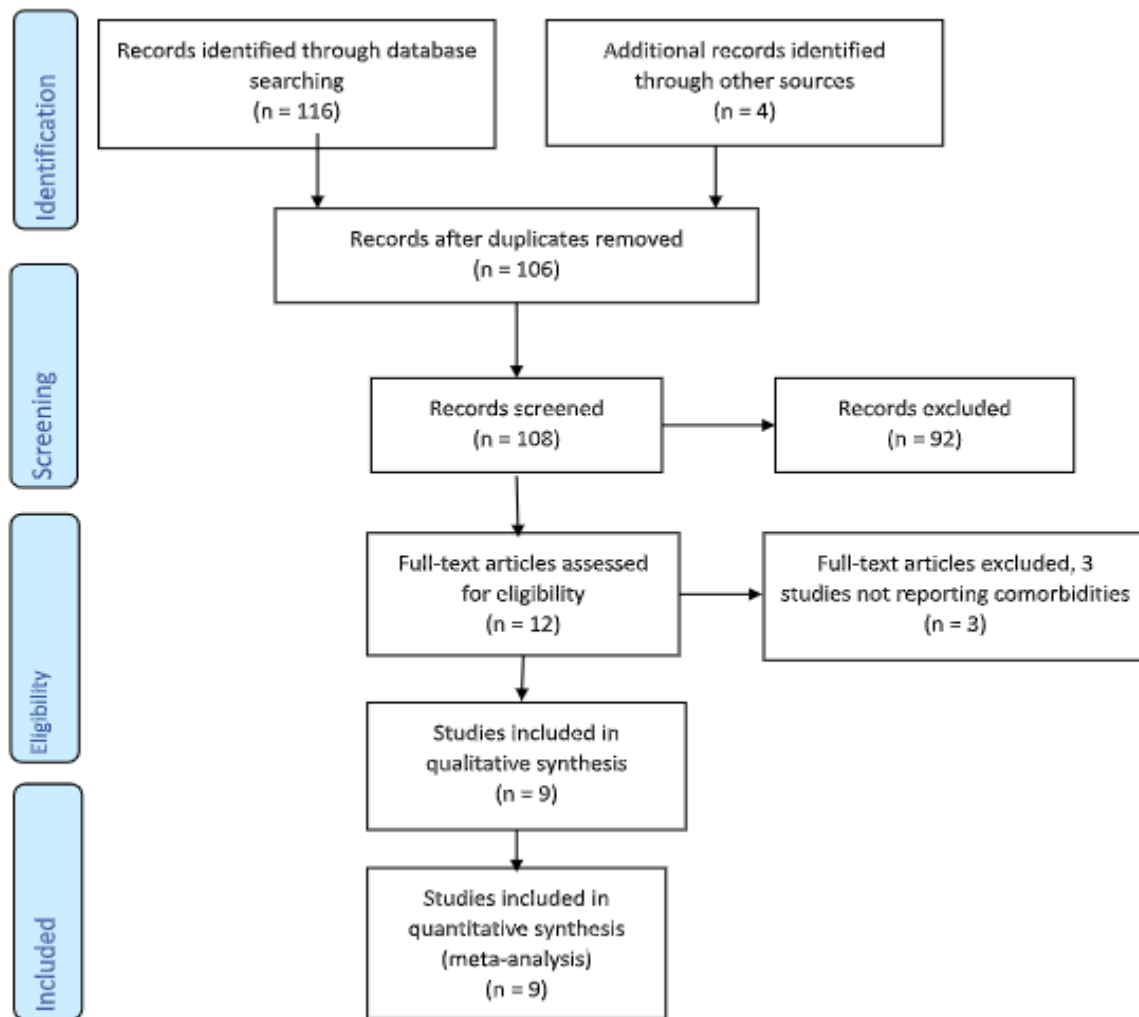
Morbidity and Mortality associated with COVID-19 has been growing wide in number, and so it is very important to determine possible factors associated with exacerbation of the disease. Studies and clinical experiments determine that some patients who have certain comorbidities are more prone to COVID-19 infection, and some comorbidities are still in question. It is very important to determine the comorbidities associated with a patient, first to treat the patients to ensure that it would not go severe, and secondly for the government to modify public health recommendations to ensure most vulnerable population is safe and also further effort to keep the ones who require the most intense care out of hospitals. Also in addition to that if we know all the comorbidities associated with COVID-19 the research to understand the pathophysiology of SARS-CoV-2 infection can be effectively done.

II. METHODS

➤ Search strategy:

We searched PubMed, Google Scholar, Research Gate and gathered some research articles with studies made on patients infected with COVID-19 and excluded some articles from those which are related to just SARS and MERS.

We have searched initially 118 articles, after removing duplicates by checking title, abstract and by reviewing full text, we took 9 articles into consideration, and prepared analysis on these articles.



III. REVIEW AND DISCUSSION

The articles that are included in this review included SARS-CoV-2 positive confirmed cases, and majority of the articles are based on adult patients and very few based on children and the remaining on both. We will discuss about each article first and then compare them with each other. [2] did a study on patients tested positive with Coronavirus, the cohort size taken was 140 out of them 71 patients were male and 69 were female, with a median age of 57. The comorbidities that are observed in these groups of patients mainly are Fever (91.7% of the people has fever), Cough (75% of the patients had cough), Fatigue in 75% of the people, Dyspnea in 36.7% of the people, and 30% of the people had Hypertension, 12.1% of the people had Diabetes, 5% with Cardiovascular and 1.4% with respiratory issues. As we can see most of the patients had fever, cough and fatigue as common symptoms.

[3] Had conducted a study on 41 patients of which 30 patients were male and 11 were female with a median age of 49 years. Comorbidities seen in this group of people are most of the patients for about 98% had fever, and 76% of them had cough, and 44% had Fatigue, and 55% had Dyspnea, and 15% had Hypertension, 20% had diabetes, 15% had Cardiovascular issues.

[4] had conducted study on a cohort size of 12 patients who are tested positive for COVID-19, out of them 8 were male and 4 were female and comorbidities observed among them are majorly 83% of the patients had Fever, 91.7% of the patients had cough and 25% had Hypertension, 16.7% had Diabetes, 33.3% of the patients had Cardiovascular disease, and 1.5% had Respiratory system disease. This team also conducted another study on a group of 137 people out of which 61 were male and comorbidities observed in them are 81.8% had Fever, 48.2% had Cough, 32.1% had Fatigue, 19% had Dyspnea, 9.5% had Hypertension, 7.3% had Cardiovascular diseases, and 10.2 had Diabetes.

[8] This is another study they did on a group of 9 people out of which 5 people are male and 4 are female, the comorbidities seen in these patients are 88.9% of the patients had Fever, 55.6% of the patients had Cough, 44.4% of the patients had Fatigue, 11.1% of the patients had Diabetes, and surprisingly none of the patients had any symptoms of Hypertension, Respiratory system disease or Cardiovascular diseases, unlike other studies we have reviewed above.

[5] had conducted their study on a cohort size of a very large group of people which is 1099 patients affected with COVID-19. Out of which 640 are males, with an average age of 47 years. 87.9% of the patients had Fever, 67.7% had Cough, 38.1% had Fatigue, 18.6% had Dyspnea, 14.9% had Hypertension and 2.5% of the patient had Cardiovascular disease.

[6] Wang et al, conducted a study on cohort size of 138 patients, and 75 of them were male with median age of 56 years. 98.6% of the patients had Fever, 59.4% of the patients had Cough, 69.6% of the patients had Fatigue, 31.2% had Dyspnea, 31.2% had Hypertension, 101% had Diabetes, 2.9% had Respiratory disease, and 7.3 Cardiovascular Disease.

COVID-19 infection is associated with uncontrolled blood pressure and also high case fatality rate (CFR). 23% of cases who has hypertension reported about 6% CFR, and the numbers has been going up due to anxiety in China [13]. In patients suffering from Hypertension ACE-2 inhibitors are used mostly for treatment purposes. These inhibitors, when used in a high amount, upregulate expression of the ACE-2 receptor, thereby leading to increased susceptibility to SARS-CoV-2 infection [14]. Experimental studies suggest that ACE-2 is a potent anti-inflammatory agent ACE-2 can protect against respiratory distress syndrome, kidney injury, and lung injury which are the common severe complications in COVID-19.

The results from the meta-analysis showed that the most common symptoms among the patients was fever, followed by cough, Fatigue and Dyspnea. Hypertension, Diabetes, respiratory system disease, and cardiovascular disease are also included in the comorbidities. Another review article has reviewed effects of COVID-19 on cardiovascular system of the body [7]. And people with already underlying cardiovascular issues, and if they are affected by COVID-19, they tend to have much serious issues like death. So people with Heart issues should take Coronavirus seriously. From the results from above observed studies, it was noticed that males are in a larger number than female. Data from the studies of MERS-CoV and SARS CoV studies also proved that coronavirus infects male more than females. [10,11]. It is customary to think females are less affected than males, partly because of their more robust innate and adaptive immune responses [12]. Patients of older age and severity are more susceptible to SARS-CoV-2, which may be associated with a higher frequency of comorbidities [2].

Analysis of the comorbidities suggested that approximately 21.1% of the patients had Hypertension, Cardiovascular disease for 8.4% of the patients, Diabetes 9.7% and respiratory system issues for 1.5% of the cases. Another study on influenza illness suggested that the risk of death is higher in patients who had chronic obstructive pulmonary disease, and in those who had Hypertension, cardiovascular disease [12]. MERS affected patients also had similar comorbidities like respiratory illness.

IV. CONCLUSION

As there is no effective antiviral medication or SARS-CoV-2 vaccine is not available to treat a COVID-19 patient, it is a major challenge for health care staff and also patients. Comorbidities in patients affected with COVID-19 led to morbidity and mortality. Most of the COVID-19 infected patients develop only mild disease, but 20% of the patients need hospitalization and about 6% develop severe symptoms and need intensive care unit admission [15]. ICU admissions of patients depends on various factors like age and clinical practice conditions etc., China had ICU administration rate as 7 to 26% and in Italy it was 5-12% and highest is recorded in USA 81% [16,17,18]. Underlying disease such as CVD, Hypertension, malignancy, asthma and diabetes are reported as risk factors for severe disease and also increased mortality rate in COVID-19 affected patients. So proper management and better treatment and care must be given to these patients. Mostly the mortality in COVID-19 patients is due to preexisting comorbidity.

All the patients should be divided into two different groups one with comorbidity and without, and special care should be given to them based on the category [19]. Vigorous hand washing, social distancing and personal hygiene will prevent the spread of the COVID-19.

REFERENCES

- [1]. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding *Lancet*, 395 (2020), pp. 565-574
- [2]. J.J. Zhang, X. Dong, Y.Y. Cao, Y.D. Yuan, Y.B. Yang, Y.Q. Yan, et al. Clinical characteristics of 140 patients infected by SARS-CoV-2 in Wuhan, China *Allergy*, 0 (2020), pp. 1-12
- [3]. C. Huang, Y. Wang, X. Li, L. Ren, J. Zhao, Y. Hu, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China *Lancet*, 395 (2020), pp. 497-506
- [4]. M. Liu, S.W. Liu, L.J. Wang, Y.M. Bai, X.Y. Zeng, H. B. Guo, et al. Burden of diabetes, hyperglycaemia in China from 1990 to 2016: findings from the 1990 to 2016, global burden of disease study *Diabetes Metab*, 45 (2019), pp. 286-293
- [5]. W.J. Guan, Z.Y. Ni, Y. Hu, W.H. Liang, C.Q. Ou, J.X. He, et al. Clinical Characteristics of Coronavirus Disease 2019 in China *N Engl J Med* (2020)
- [6]. D. Wang, B. Hu, C. Hu, F. Zhu, X. Liu, J. Zhang, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China *Jama*, 323 (2020), pp. 1061-1069
- [7]. Ravi Manne, Snigdha Kantheti. "Coronavirus Impact on Cardiovascular System of Body - Review". *International Journal for Research in Applied Science and Engineering Technology (IJRASET)* 2020;8(11):276-280, <https://doi.org/10.22214/ijraset.2020.32118>
- [8]. M.Q. Zhang, X.H. Wang, Y.L. Chen, K.L. Zhao, Y.Q. Cai, C.L. An, et al. Clinical features of 2019 novel coronavirus pneumonia in the early stage from a fever

- clinic in Beijing *Zhonghua jie he he hu xi za zhi*, 43 (2020), p. E013
- [9]. The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19)-China, 2020 *China CDC Wkly*, 2 (2020), pp. 113-122
- [10]. A. Badawi, S.G. Ryoo Prevalence of comorbidities in the Middle East respiratory syndrome coronavirus (MERS-CoV): a systematic review and meta-analysis *Int J Infect Dis*, 49 (2016), pp. 129-133
- [11]. R. Channappanavar, C. Fett, M. Mack, P.P. Ten Eyck, D.K. Meyerholz, S. Perlman Sex-based differences in susceptibility to severe acute respiratory syndrome coronavirus infection *J Immunol*, 198 (2017), pp. 4046-4053 [CrossRef Google Scholar](#)
- [12]. D. Mertz, T.H. Kim, J. Johnstone, P.P. Lam, M. Science, S.P. Kuster, et al. Populations at risk for severe or complicated influenza illness: systematic review and meta-analysis *BMJ*, 347 (2013), p. f5061 [CrossRef Google Scholar](#)
- [13]. W.W. Chen, R.L. Gao, L.S. Liu, M.L. Zhu, W. Wang, Y.J. Wang, et al. China cardiovascular diseases report 2018: an updated summary *J Geriatr Cardiol*, 17 (1) (2020), pp. 1-8
- [14]. L. Fang, G. Karakiulakis, M. Roth Are patients with hypertension and diabetes mellitus at increased risk for COVID-19 infection? *Lancet Respir Med*, 8 (4) (2020), p. e21
- [15]. Z. Wu, J.M. McGoogan Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention *JAMA*, 323 (13) (2020), pp. 1239-1242
- [16]. M. Arentz, E. Yim, L. Klaff, S. Lokhandwala, F.X. Riedo, M. Chong, et al. Characteristics and outcomes of 21 critically ill patients with COVID-19 in Washington State *JAMA*, 323 (16) (2020), pp. 1612-1614
- [17]. E. Livingston, K. Bucher Coronavirus disease 2019 (COVID-19) in Italy *JAMA*, 323 (14) (2020), p. 1335
- [18]. P. Zhou, X.-L. Yang, X.-G. Wang, B. Hu, L. Zhang, W. Zhang, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin *Nature*, 579 (7798) (2020), pp. 270-273
- [19]. T. Wang, Z. Du, F. Zhu, Z. Cao, Y. An, Y. Gao, et al. Comorbidities and multi-organ injuries in the treatment of COVID-19 *Lancet*, 395 (10228) (2020), p. e52