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CLINICAL, LABORATORY, AND IMAGING FEATURES OF COVID-19; A SYSTEMATIC REVIEW AND META-ANALYSIS

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ABSTRACT

Coronavirus, Covid-19 (SARS-CoV-2), is a chronic respiratory syndrome. The first case of the corona was found in Wuhan city of China. This pathogen affects humans severely and leads to life-threatening conditions which require specialized treatments, and in some severe cases, patients will be treated in intensive care units. In this study total of 300 articles were retrieved, including 40 case reports. For complete text assessment, 40 articles were selected based on the screening using title and abstract; due to lack of molecular Diagnosis, five themes were excluded from this, and 35 were included for the study. A further seven were used for quantitative meta-analysis and 28 case reports for descriptive analysis. It was found that Patients with several comorbid conditions or chronic disease morbidity will be the vital parameter to consider during COVID-19 infections. Most patient with breathing difficulty in case of this infection needs supportive care in intensive care units. Unfortunately, the availability of the ICU is limited in most developing countries. Like other viral infections, common symptoms of the COVID-19 are fever, cough, and dyspnea, and the disease has fast progression if left untreated. The clinical investigation was leucopenia, increased C reactive protein, leading to ADR progression.

KEYWORDS: COVID-19, ICU, Coronavirus, Systemic review, Meta-analysis.

INTRODUCTION

Coronavirus, Covid-19 (SARS-CoV-2), is a chronic respiratory syndrome. The first case of the corona was found in Wuhan city of China. This pathogen affects humans severely and leads to life-threatening conditions which require specialized treatments, and in some severe cases, patients will be treated in intensive care units. In addition, many countries like China, the Middle East, and Saudi have suffered due to pandemics caused by another Beta coronavirus in the last two decades; it has been found that there are some similarities and differences in epidemiology, symptoms, and treatment of SARS MERS, and COVID.[1-5]

These viruses are spherical or pleomorphic in structure and have enveloped for an outer covering; these envelopes have club-shaped glycoprotein projection. They contain single-strand RNA consisting of a nucleoprotein in a matrix protein capsid.[6-10]

Many case studies have been reported in various medical journals, including answers to many questions related to disease progression, symptoms, Diagnosis, laboratory techniques, and disease management and their outcome.[11-13] In addition, a systematic review and meta-analysis reports give overall knowledge about all the aspects of trials. They consist of randomized control trials, and their main aim is to provide précised summary of the clinical and treatment characteristics of the disease.[14-16]

Most of the time, very few systematic reviews will be available for diseases. In that case, only observational studies will serve as a source of knowledge. Therefore, this is a systematic review and meta-analysis of Clinical, laboratory, and imaging features of COVID-19.

Objectives

- As reported in the observational studies, I am summarizing the topics related to clinical, laboratory, and image features of COVID-19.
- To scrutinize the risk factors, ICU requirements in patients, and fatal outcomes of COVID-19 cases.
- We are assessing the comorbidity prevalence among COVID-19 cases, which are confirmed.

METHODOLOGY

Recommendations by Preferred Reporting Items for Systematic Reviews and Meta-analyses
(PRISMA) the statement is taken in this study it is also reported in the International
Prospective Register of Systematic Reviews (PROSPERO) database

Eligibility criteria

Peer-reviewed articles with case reports of SARS-Cov-2 infections contain all the real-time information regarding clinical laboratory and image features. Clinical and imagining character randomized control trials, cohorts, case reports, and case series are included for laboratory assessment. In addition, observational studies are used for assessing the risk factors and treatment outcomes. Publications from January 1, 2020, to September 31, 2020, were included.

Review articles and articles with incomplete information on all the disease parameters were excluded.

Search strategy

A systematic review was conducted using many sites like Pub Med/Medline; Google scholar was used for searching the articles and included the articles from Scopus indexed journals.

"Novel coronavirus," 'COVID-19", "clinical manifestation of coronavirus," SARS-Cov-2" is used for searching the significant articles which were required for the study.

Data collection process and data items

A data collection form was prepared, which included all the parameters that were supposed to be collected during the study, such as publication details, the country where the paper is published, year, and date of publication. Moreover, in another part, parameters related to the patient such as the total number of the cases which were reported, the nuissuesof issues that needed ICU, all kinds of laboratory investigations like complete blood count, importantly WBC, typical kinds of biochemistry tests, symptoms of the disease specifically prevalent symptoms like dry cough and fever, and all imagining test like X-ray, and complications if any.

Statistical techniques used

Continuous variables are calculated using percentages, means, and standard deviations. Stata version 14.0 is used for baseline data analysis, and Open meta and comprehensive meta-analysis with Stata version are used for meta-analysis study.

RESULTS

After using the search strategy total of 300 articles were retrieved, including 40 case reports. For complete text assessment, 40 articles were selected based on the screening using title and abstract; due to lack of molecular Diagnosis, five themes were excluded from this, and 35 in total were included for the study; a further 7 of them were used for quantitative meta-analysis and 28 case reports for descriptive analysis.

Demographic characteristics and existing comorbid conditions

When the analysis was carried out, it was found that the patients' mean age was found to be 51.85 years old (95% CI). In contrast, males were found to be 52%, and 35.98% of patients were present with comorbid conditions; among the comorbid conditions, prevalent conditions were hypertension (17.12%), Cardiovascular disorders (14.15%), and Diabetes (11.11%). (Table1)

Clinical manifestations and laboratory findings

Clinical manifestations are one of the most crucial parameters in COVID-19; from our study, it was found that the most common symptoms were fever 89.11%), cough (58.12%), and dyspnea (45.8%), among other symptoms. Furthermore, there was a significantly higher fever in adults than in children (93.15%).

After laboratory assessment, it was found that in most of the patients, albumin was decreased (74.95%), lactate dehydrogenase levels were high (56%), and C-reactive proteins were also high (57.33%), erythrocyte sedimentation rates were also hhigh increased(Table 2).

Imaging techniques

Along with the laboratory assessment, imaging techniques also plays a significant role in the Diagnosis of the disease, so after assessing all kind of imaging techniques from a different article, it was found that bilateral pneumonia compromise was predominantly seen in the patient (71.98%), along with ground-glass opacity.

Complications and outcomes

ICU requirement was seen in 20.9% of the patient, and they were present with Acute Respiratory distress syndrome (32.8%) and acute cardiac injury (14.0%), shock (7%), patients who had fatal outcomes were (14.2%). In addition, 97.12% of all the patients had RNAemia (viral RNA detection in the blood), and nasopharyngeal aspirates were also found in patients with ICU requirements.

Table 1: Socio-demographic parameter.

Variables	Prevalence%	CI	P-value
Age	51.85	45.06-56.89	<0.001
Male	52%	50.6-61.1	<0.001
ICU	20.9%	11.0-30.8	<0.001
Co morbid conditions	35.98%	25.3-49.4	<0.001
Hypertension	17.12%	7.8-28.0	<0.001
Cardio vascular disease	14.15%	5.8-23.3	<0.001
Diabetes	11.11	8.9-13.9	<0.001
Chronic obstructive pulmonary disease	1.3	0.7-3.1	0.495

Malignancies	2.2	0.8-4.0	0.183
others	3.1	0.8-5.3	0.690

Table 2: Clinical manifestatiomanifestatio.

Variables	Prevalence%	CI	P-value
Fever	89.11	85.5-93.1	<0.001
Cough	58.12	41.2-74.3	<0.001
Dyspnea	45.8	11.1-80.2	<0.001
Myalgia or fatigue	30.1	19.6-39.5	<0.001
Sputum production	27.9	10.5-46.8	<0.001
Sore throat	11.0	2.8-19.2	<0.001
Headache	9.0	5.8-10.5	0.758
Diarrhea	6.4	2.7-9.8	0.025

Table 3: Imaging results.

Variables	Prevalence%	CI	P-value
Unilateral	25.0	5.5-45.1	<0.001
Bilateral	72.55	58.4-87.6	<0.001
Ground-glass opacity	67.9	52.1-84.9	<0.001

CASE REPORTS

A total of 28 case report articles were reviewed, and it was found that the mean age of the patient was found to be 48.2 years old, among which males were 70%. It was also found that most patients had comorbid conditions like hypertension, respiratory disease, cardiovascular disease, and others, out of which hypertension (11.2%) was a significant comorbid condition.

Fever, cough, and dyspnea were more common symptoms of the disease in adults and children. In laboratory assessment, Lymphopenia was the most common finding, the C reactive protein, and others, Chest X-rays in the patients also showed ground-glass opacity, and 40% of the patient also had bilateral compromise along with ADRs, and 2% of the patient also had a secondary infection, most of the patient required hospitalization and fatality rates were 16.4%.

Case report summary

Table 4: Various parameters that affect the.

Variables	Percentage (%)
Comorbidities	
Hypertension	11.2
Chronic liver disease	5.0
Cardiovascular disease	3.1
Chronic obstructive pulmonary disease	2.1
Malignancy or cancer	0.9

Table 5: Clinical manifestations.

Clinical manifestations	Percentage (%)
Fever	78.1
Cough	56.2
Myalgia	32.2
Dyspnoea	22.3
Sputum production	13.1
Sore throat	11.2
Diarrhea	6.9

Table 6: Lab investigations.

Lab Investigations	Percentage
Lymphopenia	24.1
High C reactive protein	23.2
Heigh AST	8.1
Leukopenia	7.6
High ALT	6.9

Anemia	4.9
Leukocytosis	3.1
Decreased albumin	2.6

DISCUSSION

The COVID-19 pandemic has taught the world to be prepared with a proper health care system with the best equipment and treatment to overcome these pandemics. It is imperative to consider different parameters of the disease, like clinical manifestation. Lab investigation, imaging techniques, and epidemiology to learn about and manage the disease. During the outbreak of this new disease, several facts about the disease were unknown, and very little literature was available; several questions were raised regarding the progress, Diagnosis, Diagnosis, and management.

In this systematic review and meta-analysis, all kinds of clinical data related to COVID-19 are summarized with the help of several articles and case reports; Major clinical manifestation was analyzed in 750 patients and 300 patients for laboratory findings and imaging tests. The study results report that the mean age of the patients was 51.8 years, and most of the patients were male, 20.9% of the total patient required ICU, and most of the patients were also associated with comorbid conditions, most commonly hypertension and cardiovascular disease which is similar to most of the studies.

The most common symptom of COVID-19 was fever, Cough, which also showed statistical significance, and fever rates were higher in adults than in children; other manifestations like dyspnoea and myalgia were also seen in the patient. In imaging techniques, it was found that bilateral pneumonia compromise was widespread in most patients; in assessment and laboratory findings, it was found that Lymphopenia and High-C reactive proteins showed significant elevation in most of the patients. Therefore, it is essential to consider all aspects of the disease for proper management.

CONCLUSION

Patients with several comorbid conditions or chronic disease morbidity will be the critical parameter to consider during COVID-19 infections; most patients with breathing difficulty in case of this infection need supportive care in intensive care units; the availability of the ICU is limited in most of the developing countries. Like other viral infection, common symptoms of the COVID-19 are fever, cough, and dyspnea and the disease have fast progression if left untreated. The clinical investigation was leucopenia, increased C reactive protein, and also leads to the passage of the ADR; isolation precaution, quarantine and travel history collection, and travel restriction must be carried out correctly in the suspected and diagnosed patients properly. In addition, further research must be carried out regarding progression, new clinical manifestations, and treatment of the disease.

REFERENCES

1. Chung M, Bernheim A, Mei X, Zhang N, Huang M, Zeng X, et al. CT imaging features of 2019 novel coronavirus (2019-nCoV). Radiology. 2020: 200230.
2. Chen L, Liu HG, Liu W, Liu J, Liu K, Shang J, et al. [Analysis of clinical features of 29 patients with 2019 novel coronavirus pneumonia]. Zhonghua Jiehe He Huxi Zazhi, 2020; 43: E005.
3. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. J Am Med Assoc 2020. https://doi.org/10.1001/jama.2020.1585.
4. Kui L, Fang YY, Deng Y, Liu W, Wang MF, Ma JP, et al. Clinical characteristics of novel coronavirus cases in tertiary hospitals in Hubei Province. Chin Med J (Engl). 2020. https://doi.org/10.1097/CM9.0000000000000744.
5. Chang-Lin M, Wei L, Xie L, Zhu G, Dela Cruz CS, et al. Epidemiologic and clinical characteristics of novel coronavirus infections involving 13 patients outside Wuhan, China. J Am Med Assoc 2020. https://doi.org/10.1001/jama.2020.1623.
6. To KK, Tsang OT, Chik-Yan Yip C, Chan KH, Wu TC, Chan JMC, et al. Consistent detection of 2019 novel coronavirus in saliva. Clin Infect Dis 2020. https://doi.org/10.1093/cid/ciaa149.
7. COVID-19 National Incident Room Surveillance Team. COVID-19, Australia: epidemiology report 2. 2020.
8. Pan Y, Guan H, Zhou S, Wang Y, Li Q, Zhu T, et al. Initial CT findings and temporal changes in patients with the novel coronavirus pneumonia (2019-Nov): a study of 63 patients in Wuhan, China. Eur Radiol 2020. https://doi.org/10.1007/s00330-020-06731-x.
9. Liu YSL, Zhang D, Tang S, Chen H, Chen L, Xinchun H. The epidemiological and clinical characteristics of 2019 novel coronavirus infection in Changsha, China. China (2/10/2020). SSRN Preprints are available at SSRN, https://ssrncom/abstract-3537093.2020.
10. Pan F, Ye T, Sun P, Gui S, Liang B, Li L, et al. Time course of lung changes on chest CT during recovery from 2019 novel coronavirus (COVID-19) pneumonia. Radiology. 2020: 200370.
11. Feng K, Yun YX, Wang XF, Yang GD, Zheng YJ, Lin CM, et al. [Analysis of CT features of 15 Children with 2019 novel coronavirus infection]. Zhonghua Er Ke Za Zhi, 2020; 58: E007.
12. Wang XF, Yuan J, Zheng YJ, Chen J, Bao YM, Wang YR, et al. [Clinical and epidemiological characteristics of 34 children with 2019 novel coronavirus infection in Shenzhen]. Zhonghua Er Ke Za Zhi, 2020; 58: E008.

13. Yang X, Yu Y, Xu J, Shu H, Xia Ja, Liu H, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. Lancet Respir Med 2020. https://doi.org/10.1016/S2213-2600(20)30079-5.
14. Zhao W, Zhong Z, Xie X, Yu Q, Liu J. Relation between chest CT findings and clinical conditions of coronavirus disease (COVID-19) pneumonia: a multicenter study. AJR Am J Roentgenol, 2020: 1–6.
15. Lee N, Hui D, Wu A, Chan P, Cameron P, Joynt GM, et al. A significant outbreak of severe acute respiratory syndrome in Hong Kong. N Engl J Med, 2003; 348: 1986–94.
16. Tsang KW, Ho PL, Ooi GC, Yee WK, Wang T, Chan-Yeung M, et al. A cluster of severe acute respiratory syndrome cases in Hong Kong. N Engl J Med, 2003; 348: 1977–85.
17. Rodriguez-Morales AJ, MacGregor K, Kanagarajah S, Patel D, Schlagenhauf P. Going global - travel and the 2019 novel coronavirus. Trav Med Infect Dis., 2020; 33: 101578.
18. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature, 2020; 579(7798): 270–3. https://doi.org/10.1038/s41586-020-2012-7.
19. Sun P, Qie S, Liu Z, Ren J, Li K, Xi J. Clinical characteristics of 50466 hospitalized patients with 2019-nCoV infection. J Med Virol 2020. https://doi.org/10.1002/jmv.25735.
20. H, Kobayashi T, Yang Y, Hayashi K, Miyama T, Kinoshita R, et al. The rate of underascertainment of novel coronavirus (2019-nCoV) infection: estimation using Japanese passengers data on evacuation flights. J Clin Med, 2020; 9.
21. Ishikawa H, Shimogawara R. Risk assessment of autochthonous dengue infections in Tokyo during summer, especially during the 2020 Olympic games. Jpn J.
22. Cardona-Ospina JA, Henao-SanMartin V, Acevedo-Mendoza WF, Nasner-Posso KM, Martinez-Pulgarin DF, Restrepo-Lopez A, et al. Fatal Zika virus infection in the Americas: a systematic review. Int J Infect Dis., 2019; 88: 49–59.
23. Rodriguez-Morales AJ, Cardona-Ospina JA, Fernanda Urbano-Garzon S, Sebastian Hurtado-Zapata J. Prevalence of post-chikungunya infection chronic inflammatory arthritis: a systematic review and meta-analysis. Arthritis Care Res. (Hoboken), 2016; 68: 1849–58.
24. Stroup DF, Berlin JA, Morton SC, Olkin I, Williamson GD, Rennie D, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis of Observational Studies in Epidemiology (MOOSE) group. J Am Med Assoc., 2000; 283: 2008–12.
25. THE PRISMA STATEMENT IS THE Moher D, Liberati A, Tetzlaff J, Altman DG; Group P. Preferred reporting items for systematic reviews and meta-analyses. PLoS Med, 2009; 6: e1000097.
26. Institute of Health Economics (IHE). Quality appraisal of case series studies checklist. Edmonton (AB). Institute of Health Economics, 2014.
27. Downes MJ, Brennan ML, Williams HC, Dean RS. Developing a critical appraisal tool to assess the quality of cross-sectional studies (AXIS). BMJ Open, 2016; 6: e011458.
28. Wallace BC, Dahabreh IJ, Trikalinos TA, Lau J, Trow P, Schmid CH. Closing the gap between methodologists and end-users: R as a computational back-end. J Stat Softw, 2012; 49.
29. Viechtbauer W. Conducting meta-analyses in R with the metafor package. J Stat Software, 2010; 36(3): 1–48.
30. Kontopantelis E, Reeves D. Performance of statistical methods for meta-analysis when actual study effects are non-normally distributed: a comparison between DerSimonian-Laird and restricted maximum likelihood. Stat Methods Med Res., 2012; 21: 657–9.
31. Zhang MQ, Wang XH, Chen YL, Zhao KL, Cai YQ, An CL, et al. Clinical features of 2019 novel coronavirus pneumonia in the early stage from a fever clinic in Beijing. Zhonghua Jiehe He Huxi Zazhi, 2020; 43: E013.
32. Bonilla-Aldana DK, Dhama K, Rodriguez-Morales AJ. I am revisiting the one health approach in the context of COVID-19: a look into the ecology of this emerging disease. Adv Anim Vet Sci., 2020; 8: 234–7.
33. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China. N Engl J Med, 2019. https://doi.org/10.1056/ NEJMoa2001017. 2020.
34. Chan JF-W, Yuan S, Kok K-H, To KK-W, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. Lancet 2020. https://doi.org/10.1016/S0140-6736(20)30154-9.
35. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet 2020. https://doi.org/10.1016/S0140-6736 (20)30211-7.