

COVID-19: Emerging Confections between COVID-19 and Tropical Pathogens

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ABSTRACT

Various factors including comorbidities, risk of hospital acquired infections, use of immunosuppressive therapy; alterations of immune system by COVID-19 may be responsible for coinfections. Coronavirus infected individuals are at higher risk for having coinfections with other tropical pathogens. Care facilities to the patient suffering from coinfections with Coronavirus and other tropical are given. Patients can have coinfections with one or more pathogens along with COVID emerging simultaneously. Bacterial coinfections are the most common including *Staphylococcus aureus* and *klebsiella pneumoniae*. Human Rhinovirus and human Adenovirus are most commonly known viral infections coexist with COVID pathogens. Coinfection with *Mycobacterium tuberculosis* is also well known infection coexist with COVID-19. Identification and timely management of patient with coinfection can contribute to improved health of COVID-19. Coinfections can potentially increase the morbidities and mortalities in patients during ongoing pandemic. Highest coinfection rates were from blood borne viruses. Many studies showed respiratory virus coinfection with COVID-19. From total cases of COVID-19 in Wuhan near about 5.8% cases were infected with other types of respiratory pathogens. According to information provided about the type of pathogen and viral coinfection prevalence, it is easier for health workers to make diagnosis and give appropriate management to treat the coinfection. Secondary infections and bacterial coinfections are most commonly seen in severe influenza. Undiagnosed coinfections may have severe clinical progression associated with increased risk of hospitalization and approach management criteria and mortalities. Hence the case report provides the investigations for implications of viral and bacterial and other tropical pathogens coinfections in COVID-19 outcomes clinically.

Key words: Comorbidities, Immunosuppressive therapy, Undiagnosed coinfections, Hospitalization

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INTRODUCTION

The virus was firstly observed in Wuhan, China. Most commonly patient suffer from cough, cold, joint pain, loss of taste and smell and patient eventually becomes immunologically weak and fails to fight against various other tropical pathogens which leads to emerging confections between COVID-19 and other tropical pathogens.

With already existing various endemic diseases in various regions of the world, the spread of diseases occurs due to various conditions such as migrating people and change in weather, immunity against the various pathogens, which can be seen in dengue or other airborne diseases, gives the idea of emerging confections between COVID-19 and other tropical pathogens.

The reason for rapidly spreading COVID-19 was the close person to person contact, the surface infected with virus, not taking any preventive measures such as not covering the nose and mouth by mask, not using the hand sanitizers, not washing the hands properly. The spread of COVID-19 can be majorly prevented by taking these measures into consideration.

Each and every country faced the major problem of pandemic this was the deadly rampage of Coronavirus, socioeconomic disruptions and disease burden. Apart from China, Thailand was the first country outside china to discover this deadly virus, due to its most popular travel destination for tourists across the world, most commonly from China and major popular migrate across the border which possess major threat to the localite through transmission of Coronavirus. Increasing cases were also discovered from Bhutan and Indonesia. India ranks second in cumulative cases and was the hardest hit country and third in term of cumulative deaths.

On the survey, the vital information about severity in COVID-19 and other pathogens such as tuberculosis

bacteria, malaria and dengue shows the interaction between the COVID-19 and such tropical pathogens.

- Prevention of the severity by managing the overlapping infections.
- Radio diagnosis of the condition.
- To plan wide range of effective treatment to treat the condition.

LITERATURE REVIEW

COVID-19 and mucormycosis

As the disease can be transmitted through air, directly through droplets by person to person contact. The confection occurs due to interaction of fungal spore with already infected cells in respiratory pathway through which it enters into blood vessels and causes the spread of the infection. With underlying conditions such as diabetes the host's immune system further experiences comprehension and leads to severely inflected conditions. The viruses were firstly observed in Wuhan, china [1].

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As the mucormycosis is one of the most fatal and highly morbid condition, perhaps it has caused by the environmental moulds that we respire all the time, this usually doesn't cause any problem but when the patient experiences immunodeficiency conditions this leads to invasion of inhaled fungal spores.

Fungal spores germinate to form hyphae and then it enters into blood stream and adjacent tissue n block the blood stream and eventually leads to death of the surrounding tissue [4].

Clinical features includes one sided facial swelling, pain, fever, blindness and black lesions, nasal congestion, nasal discharge and sinus pain.

According to survey, total 40,845 cases of mucormycosis have registered. Out of these total numbers nearly 34,940 patients had history of COVID-19.

Mucormycosis is very aggressively progressing, angio invading fungal disease by the fungus of order *Mucorales*. Immuno compromised individuals are at higher risk of having mucormycosis and its most complex complications are cerebral and orbital involvement and more commonly in patients with diabetic ketoacidosis. Report of patients developing mucormycosis during their COVID treatment have been registered [5].

On investigations of patients who are having mucormycosis, CT of chest with all the protocol according to COVID-19 revealed multifocal patchy areas with haziness which suggests the COVID infection.

Extensive use of monoclonal antibodies, steroids, broad spectrum antibiotics, which are used in the treatment of COVID-19, can cause the development or exacerbation of pre-existing fungal condition.

Complex interactions between factors including previous respiratory pathology, diabetes mellitus, and hospital acquired infections; use of immunosuppressive therapy may lead to secondary infections [6].

There are pathophysiologic characteristics of COVID-19 that allows secondary infections, including probability to cause extensive pulmonary disease and alveolo interstitial pathology which causes the increased risk of invading fungal infections and the immunological dysregulation of COVID-19 with reduced count of CD4+T, CD8+T, T lymphocytes may alter innate immunity.

Confection of COVID-19 and Choclo orthohantavirus

Coronavirus emergencies begun in November 2019 and it was on peak during March 2020, the first ever fatality due to COVID were observed on 10th March and the government declared the Coronavirus pandemic in March.

According to the survey the case of 45 years patient presented at the health centre with difficulty in breathing, five days after the first fatality due to COVID-19 and it has also discovered that she was living in area where pulmonary syndrome cases caused by *Choclo orthohantavirus* was highly prevalent. After all the investigations done to differentiate the disease caused by CHOV or the COVID-19. The final diagnosis describes the first coinfection between CHOV and COVID-19. Both the viruses during initial stages of the disease were discovered through PCR [7].

In the panama, high occurrence of Hantavirus pulmonary syndrome has discovered which is caused by CHOV, which has discovered in late 2000. Mode of transmission of the virus is through aerosols which contaminated by rodent's waste, after the transmission of the virus, after the incubation period for about 2 to 6 weeks the patient develops the symptoms such as cough, fever, dyspnoea which leads to respiratory failure. The development of

progressive disease is the challenging to diagnose through the clinical point of view.

First ever case was reported in panama which has co-infection between COVID-19 and *Orthohantavirus*. Some areas of the country considered to be the most prevalent area for *Orthohantavirus* infection. Till the date for about 250 cases reported with infection having fatality ratio of 17%. The clinical suspect belong from the region which has high occurrence rate gives the first idea about HPS to the clinicians. The initial history is relevant to the HPS including urine reports as the urinary tract infection is common during the prodromal phase of COVID-19 as well as HPS. The patient also had progressive and acute development of respiratory failure in CHOV and the common history can also be discovered by COVID-19 patients.

It was difficult to consider the COVID-19 and CHOV as the differential diagnosis in this patient using molecular biology.

COVID-19 virus shows more rapid humoral response than the CHOV. In Hantavirus infection the IgM is generated progressively in acute stage and slow rise of IgG titre occurs in convalescent phase. In that patient IgM antibodies were not discovered against CHOV whereas the IgG antibodies were discovered after one month of the onset. And on the other hand neutralizing antibodies were discovered against COVID-19 after 11 days of beginning of infection; their antibody titre discovered to be low after 30 days of infection and again became high after 12 month of infection. 50% of the patient develops decreased neutralizing activity after 30 days but neutralizing activity can be remained till 6 months.

For Coronavirus and CHOV antibody response can remain detected for about one year which shows extended humoral response.

COVID-19 and tuberculous bacteria

Coronavirus and *tuberculosis* are highly infectious disease which is now became threats to the public health and their coinfection makes this condition even more worst.

Signs and symptoms of novel Coronavirus are mostly similar to the tuberculosis and influenza in initial states. According to the survey, evidence suggests that transmission of COVID-19 and TB occurs through the droplet infection and lungs are most commonly affected in both conditions [8].

COVID TB shows the symptoms such as dyspnoea, weight loss, fatigue, fever, cough, expectoration whereas most common CT finding shows ground glass opacities, fibrosis, nodule, pleural effusion, bilateral lesion, infiltrates, cavities. On the other hand the CT imaging of COVID patients shows mixed ground glass opacities and consolidation, peripheral distribution, vascular thickening. Therefore the coinfection between COVID and TB should keep in mind while diagnosing the patient.

On analysis COVID TB patients were 2.21 and 2.27 are at higher rate of developing severe COVID-19 respectively. COVID-19 pandemic coincides with many public health emergencies and impact of Coronavirus may be decreased if the accurate measures by health care services taken. COVID TB infection needs more attention in highly prevalent countries and COVID-19: Lessons from the past viral outbreaks and possible future outcomes. Radu Crisan Dabija, Cristina Grigorescu, Cristina Alice Pavel, Bogdan Artene, Iolanda Valentina Popa, Andrei Cernomaz, Alexandru Burlacu Canadian respiratory journal 2020, 2020.

The danger of contagious infections disease is evolving as explosion in demography, globalization and tremendous change in lifestyles of human race increase the threat of spreading infections pathogens, leads to increased changes in disease landscape. Main interest is the superimposing viral epidemics over long standing disease, like tuberculosis, which is the significant disease for human health worldwide and especially in emerging economies.

COVID-19 and chagas disease

Chagas disease is related to the cardiac conditions in approximately 75% of infected patients. Cardiovascular disease causes the premature mortality and costly health care management. Patients having cardiovascular condition face rapidly changing health condition which demands for accurate knowledge and effective treatment.

COVID-19 has been discovered with myocardial injury in approximately 40% of the cases admitted to the hospital. Various conditions such as acute coronary syndrome, myocarditis, sudden cardiac death, including chronic heart failure [9].

Despite of pulmonary pathologies COVID-19 poses various numbers of extrapulmonary pathologies which includes cardiovascular, gastrointestinal, renal, neurological disease. In recent research discovers that dysfunction of endothelium in COVID-19 may exacerbate these deleterious events by inciting microvascular and thrombotic inflammatory processes. Endothelial cell damage occurs through SARS-CoV-2 binds to the angiotensin converting enzyme 2 cellular receptor using viral spike protein. SARS-CoV-2 may replicate in the cardiac microvascular endothelial cells apart from primary human lung (Figure 1).

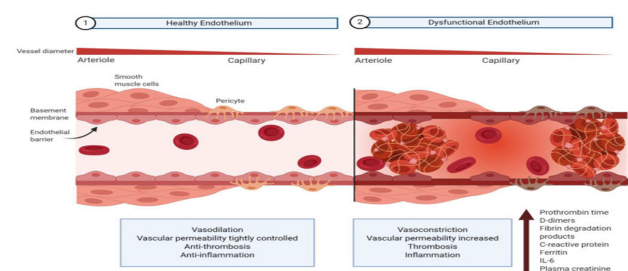


Figure 1: The cardiac micro vascular endothelial cells.

DISCUSSION

COVID-19 and dengue

Most common arboviral disease in tropical regions of world is dengue. During the ongoing pandemic the dengue endemic areas have faced the additional socioeconomic and public health impact of COVID-19 disease. Reportedly the coinfection between COVID-19 and dengue has complicated patient management and difficulty in care requirements. Aim of this review is to collate the current knowledge on outcome of COVID-19 and dengue virus coinfection [10].

Annually, there are reportedly 96 million dengue infections with 21,000 deaths across the world. Globally the incidence of dengue has increased 30 folds. Most common symptoms of dengue are fever, arthromyalgia, retro orbital pain, headache and rash. Rarely plasma leakage and severe bleeding, severe organ impairment occurs.

Due to overlapping clinical and laboratory features this coinfection has social concern. Despite of similar laboratory characteristics and symptoms, management of the diseases are different from each other. Diagnostically RT-PCR and ELISA are most commonly used. This coinfection has associated with higher morbidities and the information about coinfection is crucial for effective management. In this coinfection fever is most common clinical finding while thrombocytopenia was most common laboratory finding.

Thrombocytopenia in the coinfection has occurred from decreased platelet production due to suppression of bone marrow which was virus induced and immune mediated clearance of platelets. Immune complexes and antibodies produced in response to Coronavirus and dengue coinfection destroy platelets [11-16].

Latin America, have the most extensive dengue cases over past few years. Contribution of Brazil is around 55% of the disease cases and Brazil is also worstly affected by COVID-19 disease pandemic. Latin America is most likely to have the co-infection between COVID and dengue and is most important threat [17-22].

COVID-19 can be prevented by stopping the spread of Coronavirus through the direct contact with the help of face mask. Face mask and face shield made a tremendous effect in lowering the risk of spreading Coronavirus [23-28].

CONCLUSION

By studying the emerging coinfections between various pathogens and COVID-19 gives the idea. Coinfection of COVID and other tropical pathogens is associated with mortality and morbidity. Clinical features and laboratory features of each infection gives us a challenge in proper diagnosis and management of cases. Delayed diagnosis of this infection can get into serious complications with

poor outcomes. Review helps to get proper diagnosis and management of the coinfection.

Research highlights the need of screening for emerging coinfections with COVID-19 patients with other tropical pathogens, which can be the most common cause of disease severity and mortalities.

High prevalence of tropical pathogens coinfection in our study, increased education in society for taking COVID vaccination to stop the transmission of Coronavirus during ongoing pandemic and reduce risk of mortality and morbidity. Encouragement in population to get COVID vaccination has become the utmost important priority to stop the highly spreading pandemic.

All the preventive measures should be taken carefully and termination of the spread of infection can be carried out through small contribution from each and every individual. COVID-19 can be prevented by stopping the spread of Coronavirus through the direct contact with the help of face mask. Face mask and face shield made a tremendous effect in lowering the risk of spreading Coronavirus.

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