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Can we Differentiate COVID-19 with Influenza Virus and Bacterial Pneumonia only from the Clinical Manifestation?

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Abstract: ***Corona virus disease 2019 is very contagious and has been spread worldwide. It can cause a fatal and severe respiratory syndromes, also affect many aspect in human life, such as economic and mental health. The clinical manifestation of this disease is similar with influenza virus and bacterial pneumonia. Thus, the aim of this article is to know whether we can differentiate COVID-19 with influenza virus and bacterial pneumonia, only from the clinical manifestation. Frequent symptoms of COVID-19 are fever, cough and shortness of breath. Influenza virus often has cough and pharyngalgia with fever, headache and myalgia while bacterial pneumonia usually has fever, cough with mucopurulent sputum. It can be concluded that even though there are several differences of the symptoms between COVID-19, influenza virus and bacterial pneumonia, it is still difficult to differentiate only from the clinical manifestation.***

Keywords: COVID-19, influenza virus, bacterial pneumonia, clinical manifestation

1. Introduction

Nowadays there is a pandemic of corona virus disease 2019 (COVID-19) all around the world. Many people death due to this. Mortality rate caused by this virus is 11% in China and this number were still increasing.[1] Even though this virus has similarity with severe acute respiratory syndrome coronavirus (SARS) and Middle East respiratory syndrome coronavirus (MERS) virus, it spread more quickly and cause severe and fatal respiratory syndrome.[1-3] This has worried the world and many people became panic when they have cough or isolated during this pandemic.[4] It affects not only physical health but also economic all over the world and psychological of the infected and family.[4-6]

The incubation period of the COVID-19, is 14 days before the symptoms occurred.[4] Symptom of the illness due to COVID-19 is similar with those causes by influenza virus and other pneumonia.[7] Therefore it is very difficult to differentiate it with other respiratory tract syndrome due to influenza virus, SARS, MERS or bacterial pneumonia.

Early detection help to prevent the spread and give the proper therapy, also reduce the cost of the healthcare.[8,9] So, it is important to know whether we can differentiate clinical manifestation between influenza virus, bacterial pneumonia and COVID-19 which turn out to be the goal of this article.

Corona Virus disease 2019

Corona virus disease 2019 (COVID-19), first known in Wuhan, Hubei Province, China at the end of December 2019. Initially, this disease is called severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) or 2019 novel coronavirus (2019-nCoV).[1,10]

Actually, corona virus has been known in 2002 which lead to SARS and MERS in 2009. Other coronaviruses are HCoV-OC43, HCoV-229E, HCoV-NL63, and HCoV-HKU1.[1] Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a long single stranded RNA, member of the *Betacoronavirus*.[7] This virus particularly attack respiratory tract in human and multiple systems in various types of animal. The first two (SARS and MERS) generate severe infection of the upper respiratory tract while others raise mild infection.[1]

Although SARS and MERS were originated from bats, COVID-19 still has unknown origin.[1] Risk factor of COVID-19 are age (older people and infant), gender (male), chronic disease, smoke, obese, pregnant and immune-supressive drug.[1] This virus is transmitted human to human through droplets drop when talk, sneeze or even cough. Symptoms do not occur until 14 days of the incubation period. [4]

The clinical manifestation can be fever, cough, shortness of breath, muscle pain, disorientation, headache, septic throat, rhinorrhoea, diarrhea, chest pain, nausea and vomiting. The most frequent is fever (83%) then followed by cough and shortness of breath (82% and 31%). Pneumonia appearance with rontgen is shown in 75% patient, others were multiple mottling with ground glass opacity and pneumothorax (14% and 1%). Some of the patient will raised acute respiratory distress syndrome got worse afterward 11 % pass away due to many organ failure.[1]

Sometimes, there is coinfection with virus, bacteria and fungi such as influenza virus, *A baumannii*, *K pneumoniae*, *A flavus*, *C glabrata*, and *C albicans*.[1,2] Severe coinfection is depends on the host immunity, virulence of the virus and environment.[1]

Prevalention of COVID-19 with influenza virus is about 4.35%, included influenza A and B. This patient has fever, cough, and shortness of breath as much as 100%, nasal tampon and pharyngalgia (60%), also myalgia, fatigue, headache, and expectoration in 40% patients. Some has

acute liver injury (60%), diarrhea (40%) and acute respiratory distress syndrome (ARDS) (20%). On laboratory, there was a decrease in lymphocytes but increase in liver function test and C-reactive protein.[2]

Personal hygiene (wash hand with soap or use hand sanitizer, mask usage and so on), social distancing, keep off close contact is the most effective and efficient prevention to COVID-19.[4] Antiviral therapy, oxygen and antibiotics was given to treat the patient.[2] Until now, therapy for COVID-19 is under research.

Influenza Virus

Influenza virus has many types and subtypes. There are type A, B and subtypes A(H1N1, H1N1p, H3N2) and its derivative (Victoria and Yamagata).[9] This virus usually become pathogen in cold weather and can develop into pneumonia.[2]

Clinical manifestations of influenza are not spesific and common, that are fever (83%), malaise, cough (58%), dyspnoe (25%), pharyngalgia and rhinorrhea (18%), vomitting and diarrhea (17%), hoarseness (8%), headache and seizure (6%), red eye (4%). There was also enlargement of the lymp nodes (18%) and dygestive symptoms (17%).[9,11] Usually, this disease last for three to five days and rarely become breathless. Severe manifestation commonly occur in people with low immune system, such as older people and or has chronic diseases (cardiovascular disease, diabetes, cancer). It also depends on the type and subtype of the virus. Dyspnoe were more frequent caused by subtype Victoria and Yamagata.[9] Myalgia and digestive symptoms was common in type B.[11] Although Influenza virus type A(H3N2) usually cause severe respiratory tract infection but pneumonia was more often in type A(H1N1).[9]

On laboratory, there were leukopenia (32%), thrombocytopenia (22%), anemia (17%), neutropenia (16%) and leucocytosis (7%), paracardiac infiltration (32%), increased aeration (7%), ground glass appearance (4%) in lung and pleural effusion (1%).[11]

This diseases was self-limiting but it can lead to pneumonia, high morbidity and mortality rate, particularly depends on age, the underlying disease, types and subtypes of the virus.[9,11,12]

Bacterial Pneumonia

Pneumonia was first phrase by Hypocrates in 460-370 BC then represent by Laennec in 1819, based on the clinical and pathological characteristic.[13,14] It is an acute inflammation of the lung parenchyma or lower respiratory tract (except bronchiolitis), due to several bacterias (11%), viruses (23%), other pathogens (fungi, parasites) or coinfections (3%).[12-14] Viruses are the most frequent cause in children less than five years but the most common etiology of pneumonia in adults is bacteria *Streptococcus pneumonia*.[12,15]

This disease has become health problem in all over the world due to its high mortality rate.[8,12] Mortality rate of the pneumonia in children is about 70%, particularly in the developing countries such as Africa and South East Asia.[8]

Pneumonia can be distinguished into lobar and bronchopneumonia in 1842 by Rokitansky.[13] It can also classified into community acquired, hospital acquired, healthcare associated, and ventilator associated pneumonia. Based on the etiology, bacterial pneumonia can be divided into typical (can be seen on gram stain) and atypical organisms.[14]

Similar with COVID-19 and influenza virus, the risk factor of pneumonia is elderly up to 65 years, children below two years, smoke habit, immuno-supressed system and has underlying diseases.[12,15]

Early diagnosis can help in giving the effective treatment of pneumonia.[8] Diagnosis was built based on clinical manifestation, physical examination, laboratorium and rontgen. Symptoms of this disease usually are fever with tachycardia and or chills or sweats, wet cough (with mucopurulent sputum), breathless, chest pain, fatigue and confusion, headache, myalgia and arthralgia.[14,15] However, if it is caused by intracellular pathogens (in 1% - 7% cases), than the symptom can be atypical, such as low fever and dry cough.[12]

Prevention of the pneumonia is similar with COVID-19, especially personal hygiene is the most effective way. Besides, vaccines also can be use to. Treatment is depends on the causes, such as antibiotics for bacterial pneumonia. As for viruses, usually self limitted.[15]

2. Conclusion

Influenza virus are commonly featured by cough and pharyngalgia, accompanied by fever, headache and muscle pain. It is different from COVID-19, which usually has fever, cough and shortness of breath. COVID-19 can be distinguished from bacterial pneumonia from the type of the cough, which usually has sputum in bacterial pneumonia while COVID-19 none. Although there are several differences of the symptoms of COVID-19, influenza virus and bacterial pneumonia, it is still difficult to differentiate without laboratory and X-ray examination. Better to seek for doctor when there are fever, cough and shortness of breath so early diagnosis and appropriate treatment can be elaborated as soon as posible.

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