INTRODUCTION

Corona Virus Disease 2019 (COVID-19) is the pandemic world crisis that causes the most dangerous health and economic disaster since the second world war. The world health organization (WHO), in February 2020 has announced about the new epidemic disease caused by 2019-nCoV: 2019 Coronavirus Disease (COVID-19). Several health problems were associated with COVID-19 infection including; dry cough, fever, fatigue, headache, haemoptysis, diarrhoea, dyspnoea, and lymphopenia. COVID-19 infection was associated with death especially among older patients. Coronaviruses can infect bone marrow cells leading to abnormal blood production and synthesis (haematopoiesis). Thus, several changes have been reported in haematological parameters among COVID-19 patients. Yet, the mechanisms by which this virus delays and inhibit the hematopoietic system are not clear. This review was aimed to focus on the most common laboratory changes within the haematological parameters including; white blood cells, lymphocytes, platelets and other.

Key Words: COVID-19, Haematological parameters, WBCs, Lymphocytes, Thrombocytopenia

ABSTRACT

Corona Virus Disease 2019 (COVID-19) is the pandemic world crisis that causes the most dangerous health and economic disaster since the second world war. The world health organization (WHO), in February 2020 has announced about the new epidemic disease caused by 2019-nCoV: 2019 Coronavirus Disease (COVID-19). Several health problems were associated with COVID-19 infection including; dry cough, fever, fatigue, headache, haemoptysis, diarrhoea, dyspnoea, and lymphopenia. COVID-19 infection was associated with death especially among older patients. Coronaviruses can infect bone marrow cells leading to abnormal blood production and synthesis (haematopoiesis). Thus, several changes have been reported in haematological parameters among COVID-19 patients. Yet, the mechanisms by which this virus delays and inhibit the hematopoietic system are not clear. This review was aimed to focus on the most common laboratory changes within the haematological parameters including; white blood cells, lymphocytes, platelets and other.

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level of white blood cells among 20% of patients. Within the same study, an increase in lymphocytes in 18.75% of patients was reported. Another study done to investigate the level of WBCs among hospital admitted patients with COVID-19 and showed that leukopenia developed in 20% of patients. A more recent study in Hanchuan City People’s Hospital showed decreased WBCs account among the vast majority (99%) of COVID-19 infected patients.

**Coronavirus and lymphocytes level**

Regarding the level of lymphocytes in COVID-19 infected patients, normal or slightly low level was reported among patients during the incubation time. However, low level of lymphocytes was detected in 83.2% of hospital admitted patients. A significant association between low lymphocytes count and requirement of intensive care unit (ICU) admission was reported by Wu and his colleagues. In Washington state, decreased level of lymphocytes was highly reported with seriously ill COVID-19 patients in ICU. Also, low lymphocytes count was more commonly reported in ICU patients compared to the non-ICU patients. Thus, low lymphocytes level might be considered as an important indicator for early admission for supportive ICU care. Neutrophils are one of the immune cells which, protecting human bodies during bacterial or fungal infections by phagocytosis. Huang et al. highlighted an increased level in neutrophils in patients with COVID-19 who is admitted in ICU. High risk of development of acute respiratory distress syndrome (ARDS) and the mortality rate was significantly (P < .001) associated with high neutrophils level.

**Coronavirus and thrombocytes level**

In Beijing, 72.5% of COVID-19 patients developed thrombocytopenia among 13 patients from three hospitals, however, the reduction on platelet count did not reach to the level at which bleeding happens. Low platelets level (thrombocytopenia) was noted among COVID-19 patients on admission and ICU patients in 552 hospitals in 30 different provinces in China. On the other hand, another study reported non-significant differences in platelets level between ICU patients and non-ICU patients. Similarly, no significant changes in platelets level between COVID-19 patients with ARDS and patients without ARDS as reported in Wu’s study. Xu and colleagues were reported three hypothesized mechanisms causing thrombocytopenia. The first mechanism by causing direct viral infection of bone marrow cells and impairing of platelet synthesis. Also, the decrease of platelet synthesis indirectly as a result of lung injury. The second mechanism is through the body’s immune system. The third hypothesized mechanism is by aggregation of platelet in the lungs, leading to platelet consumption and microthrombi.

**Coronavirus and coagulation parameters**

Other common alterations in haematological parameters in patients with COVID-19 are including; prolonged activated partial thromboplastin time (APTPT) as well as elevated D-dimer levels. Such coagulation parameters were markedly higher among COVID-19 patients compared with healthy controls individuals. On the other hand, the majority of patients with COVID-19 infection were investigated with normal prothrombin time (PT). Several studies have been reported abnormality in D-dimer levels. It has been shown that 28.6% of COVID-19 patients investigated with high D-dimer levels in the University of Hong Kong-Shenzhen Hospital. Additionally, the complications and severity of the disease among patients with community-acquired pneumonia was significantly associated with D-dimer elevated levels. Thus, higher D-dimers level is associated with patients WHO requiring ICU treatment and more severe cases.

**CONCLUSION**

In conclusion, since the World Health Organization announced virus Corona is a global pandemic the virus is still spreading strongly affecting and killing thousands of people around the World. Currently, scientific information about the disease and the nature of its spread is still not well known. Thus understanding pathophysiology of the disease to develop an effective treatment for the virus is still a challenge for the human being. Laboratory tests are an important factor in the diagnosis and treatment of the disease. According to the literature review, haematological parameters are changeable according to the course of COVID-19 infection and that some of them can be a sign of poor outcomes that may lead to death. Leukopenia, thrombocytopenia, lymphopenia, and coagulation abnormalities are the most notable haematological manifestations. However, this review article has some limitations. Because COVID-19 is considered a recent pandemic.

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