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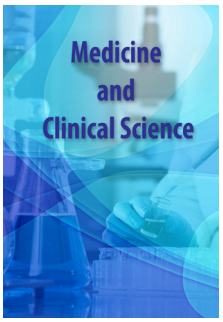

Can Leukoerythroblastic Activation Indicate Coronavirus Infection?

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Abstract

The complete blood counting (CBC) parameters can, to a considerable extend, indicate health status of any patient. The blood parameters of 22 Coronavirus male pandemic victims are compared with their counterpart of male healthy individuals using unequal ANOVA biostatistics software. A significant drop ($p \leq 0.002$) in the number of WBC and an insignificant decrease ($p \leq 0.06$) in the hemoglobin percentage (Hb%) were detected in the Coronavirus victims in comparison with the healthy individuals. Simultaneously, the total numbers of RBC showed a significant increase ($p \leq 0.05$) representing leukoerythroblastic activation, while the blood platelets (PLT) were significantly ($p \leq 0.001$) dropped, respectively in comparison with counterpart control and those of international controls. These variations and fluctuation in the blood parameters above or below the normal ranges would indicate a clear health disorders in the coronavirus victims. It is concluded that CBC could well be utilized as a prognostic tool in the clinical laboratories prior sophisticated and costly measurements i.e. Biochemical, PCR and immunological testes.

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Keywords

Blood parameters, Complete Blood Counting (CBC), coronavirus, covid-19, prognosis, blood disorder.

Introduction

The earlier diagnosed corona-viruses infected human called 229E and OC43, have caused similar to the common cold- very mild infections. It was not until the outbreaks of SARS (Severe Acute Respiratory Syndrome) followed by MERS (Middle Eastern Respiratory Syndrome or camel flu) which cause serious human infections too. These two infections are thought to have generated from bats via civet cats and camels [1]. Corona-viruses, a group of related RNA viruses that cause diseases in mammals, particularly in bats, are susceptible to mutation and recombination and therefore are highly diverse i.e. about 40 different varieties and they mainly infect human and non-human mammals and birds [2]. In humans, these viruses cause infections to the respiratory tract that can range from mild to lethal by closing the alveoli passages leading to blockage of gaseous exchanges. Similar symptoms in other species vary i.e. in chickens, as they cause an upper respiratory tract disease (URT), while in cows and pigs they cause diarrhea [3]. The URT organs e.g. sinuses, nose, and throat as well as the lower respiratory tract (LRT) are the organs most affected by COVID-19 because the virus accesses host cells via the receptor for the enzyme angiotensin-converting enzyme-2 (ACE2), that are most abundant on the surface of type-II alveolar cells (pneumonocyte-2) of the lungs [4,5]. The virus uses a special surface glycoprotein "spike" to connect to the ACE2 receptor and enter the host cell [6]. Mild illnesses include some cases of the common cold (may also be caused by other viruses, predominantly rhinoviruses), however, SARS, MERS, and COVID-19 could sometimes be lethal which has been experienced in some Iraqi cities. No genuine vaccines neither antiviral medications had developed to prevent or treat human coronavirus infections by the Western media nor they stopped their pro-campaign. Three major different vaccine companies e.g. Astra Zenenca, Pfizer and Moderna, yet, have been competing in testing their products on people worldwide on an unveiled trial while the FDA is still working with USA government, including Center of Disease Control and prevention (CDC), and international partners to address the pandemic has not approved any vaccination for public use. These companies are accused for making fortunes on the account of victims health worldwide via production of false vaccines which approve to be ineffective. Curing from coronavirus infection may occur via autoimmune defense system within a minimum of two weeks if the patients takes right health measurements via clearing upper respiratory tracts during coughing to wipe out mucus that had blocked the respiratory ducts.

The diverse of varieties in Covid-19 strains have already created enough diagnostic

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difficulties amongst the scientists and physicians who are still searching for a specific way to stop their spread never mind in finding a most suitable vaccination to remedy the infection. However, the most common methodology adopted in detection viral RNA is by polymerase chain reaction (PCR, or quantitative PCR, qPCR) where the virus's single-stranded RNA is converted to its complementary DNA by reverse transcriptase; specific regions of the DNA, marked by so-called primers, are then amplified. Occasional false negatives have been reported which exerts an extra risk to the public health than the virus itself. An immunoassay has also been described, but it has a high false omission; biochemical reports may include Titre tests for IgM and IgG too. Efforts are currently being made to develop and implement an immunoassay for antiviral antibodies to determine whether or not infection has previously occurred. All these tests require absolute accuracy to diagnose the virus which may be otherwise. Due to the risk of viral infection to the human beings, health authorities as well as states do panick to use rather expensive tests to diagnose the infection while ignoring the prognostic methods via CBC and other blood tests.

Justification

It is anticipated that any subtle changes in blood of the Corona virus's victims, via accurately measured CBC indices may benefit as an inexpensive pro-diagnostic measurement to assess the health status of the victims prior use of PCR or biochemical or immunoassays measurements. Only the main parameters are considered in this humble study i.e. WBC, Hb%, RBC and PLT.

Materials and methods

Blood samples were collected using routine way from brachial vein of twenty two already confirmed coronavirus victims diagnosed at Azadi hospital, Kerkuk, Iraq. The blood parameters are measured by the state hospital as appropriate using Automated Blood counter machine linked to a printer and monitor [7]. Due to the health confidentiality, other data i.e. patients history, collected directly from Quarantine at Kerkuk Province, Southern Kerkuk, Hay Al-Sinaee are not disclosed. A total of fifteen blood samples of healthy male individuals, used as control, were subjected to CBC analysis using the same method. The blood parameters are analyzed using unequal ANOVA biostatistics via XL software.

Results

The biostatisticial details driven from blood parameters of the coronavirus male victims are compared with those of the healthy people using unequal ANOVA have shown significant drops detected in the total number of WBC ($p \leq 0.002$) and in the hemoglobin percentage (Hb%) ($p \leq 0.06$) respectively. The counts of RBC showed a significant increase ($p \leq 0.05$) as an immature erythroid and immature myeloid cells seen circulating in the peripheral blood, while the blood platelets (PLT) showed a significant ($p \leq 0.001$) decrease in comparison with those of control.

Discussion

All collected data including patients history involved in this work, as well as other personal information were undisclosed to public according to international code of conduct. To avoid any biased interpretation of the results only those patients with no other medical complications are involved in this research. Clinically any significant outcome of blood parameters above or below the normal ranges on a complete blood count (CBC) would indicate a health disorder in one way or another [8]. Once the virus attacks the pulmonary cells it may soon invade the circulatory system causing severe damages to the blood cells in general if it is not contained by the immune system represented by WBCs. Whenever, blood is contaminated then it could distribute the microbes to all parts of body organs via circulation. A significant decrease in number of WBC has been detected in coronavirus patients in comparison with the control. Leukopenia is almost always related to a decrease in a certain type of white blood cell (neutrophil) while the definition of low white blood cell count varies from one medical practice to another [9]. Such a drop in WBC count may occasionally refer to leukopenia which indicate a medical condition, i.e. an autoimmune disorder that destroys WBCs, bone marrow problems or cancer [10]. The significantly lower count of WBC in comparison with the control indicates the impact of the coronavirus in destroying the immune defense in the victims as the WBC represent a part of immune system in the human [11]. Despite certain medications that could also cause drop in WBC counts however, it is likely that coronavirus has capable to destroy certain WBC particularly the well trained lymphocytes (T-lymophocyte) too causing defect in immune system of the body. The decreased WBC seems to be on the account of increase in RBC count which attributes to increase the possibility of expected stroke [12,13].

The international hematocrit measurement of both volume and counts of RBC ranges around 4.35x106-5.65x106/µL of blood in normal adults men, the function of RBCs is restricted to gas exchange between the lungs to tissues throughout the body [14]. A high RBC count can result from a condition that limits oxygen supply or a condition that directly increases RBC production. In coronavirus patients, the interpretation of a high RBC count found might be interpreted as an increase in need to oxygen-carrying cells in the bloodstream due to the closure of gas exchange alveoli in the lungs. It could also result from a condition that limits the oxygen supply or a condition that lead directly to increases RBC production. Therefore, an increase in RBC production to compensate for any condition that results

Table 1. *Main blood parameters collected from 22 male Coronavirus victims compared to control counterparts taken from 15 healthy male individuals at Azadi Hospital; (10^6/uL): millions per microliter.*

Blood Parameters	Arithmetic Means±SD		Probability test values
	Male Patients	Healthy male	
WBC (m/µL)	6.22±2.3	9.39±2.5	p≤0.002**
RBC (m/µL)	4.97±1.22	3.2±0.2	p≤0.05*
HB% (g/dL)	12.69±2.02	13.50±3.1	p≤0.06
PLT (103/µL)	217.7±128	449±72	p≤0.001**

in low oxygen levels, e.g. Leukoerythroblastic blood which is typically seen in disorders associated with bone marrow fibrosis including myelofibrosis; other myelo-proliferative disorders and cancers with metastatic disease to the bone marrow; however, it can rarely be seen in viral infections such as parvovirus [15,16]. In other words, the significantly increased RBC population may also indicate a direct response to compensate hypoxia these patients had suffered due to the closure of their pneumonia tissues. The increase in RBC is concomitant with a slight drop in HB% being measured in these coronavirus patients. Such an insignificant drop in Hb% yet refers to drop in capacity of oxygen carrying capacity of RBC and a consequent impact on respiration level in the patients. A similar condition present at birth that reduces the oxygen-carrying capacity of red blood cells [17].

Platelets (PLT) are tiny fragments of cells that are essential for normal blood clotting formed from megakaryocytes in the bone marrow are released into the blood to circulate, with a range of 150x103-450x103/µL in adult human. Determining the number of PLT in a given sample of blood helps to screen for, diagnose, or monitor some health conditions i.e. bleeding disorder, a bone marrow disease, or other underlying condition [18]. Platelets survive in the circulation about 8-10 days, meanwhile the bone marrow must continually produce new platelets to replace the degraded or those used up, or are lost through bleeding. The abnormal lower PLT count, thrombocytopenia, may refer to a sign of an underlying medical condition, or to a side effect of a medication being used. In normal conditions could be mild and the platelet count is only slightly low, it may not require any treatment while if it is caused by a drug, where the healthcare provider may switch the patient to a different one. In this study, the count of PLT was significantly lower than the international [19] in comparison with the control. Such a significantly low counts may be due to the medication these patients have taken during the treatment against coronavirus that may also indicate development of hemophilia where blood has lost ability to clout when bleeding. The significantly low PLT count could also be attributed to an autoimmune disorder, which requires suppression of the immune system by the healthcare practitioner via a suppresser medications [20]. Accordingly, patients with low count PLT could well be at risk for excessive bleeding and should be referred to consultant to determine the underlying cause that may require a platelet transfusion. No cases of bleeding has yet been seriously considered so far for Coronavirus survivors to tackle this signs. All these symptoms are strong indicative signs of infection with coronavirus in those individuals which could help for diagnosis purposes. This work deems necessary to be further explored via collection of extra data of more victims of coronavirus for precise trustable results considered by World health organization (WHO).

Conclusion

Having all other symptoms of flue i.e. coughing, temperature, been considered some changes in the blood parameters may indicate a suspected coronavirus patients prior advanced checkup i.e. PCR, biochemical and hormonal analysis to confirm the Covid-19 infection.

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