Review Article

Complete Blood Count and saliva parameters as an indicator for infected patients with coronavirus covid-19

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Abstract: Background: Coronavirus, which causes respiratory illness, has been a public health issue in recent decades. Because the clinical symptoms of infection are not always specific, it is difficult to expose all suspects to qualitative testing in order to confirm or rule out infection as a test. Methods: According to the scientific studies and investigations, seventy-three results of scientific articles and research were obtained using PubMed, Medline, Research gate and Google Scholar. The research keywords used were COVID-19, coronavirus, blood parameters, and saliva. Results: This review provides a report on the changes in the blood and saliva tests of those who are infected with the COVID-19.COVID-19 is a systemic infection that has a substantial influence on the hematological system and hemostasis, thus deviations from normal levels of laboratory tests, including the blood and saliva test show that specific testing for detecting COVID-19 infection is required. Conclusions: The blood and saliva tests aid in the clinical monitoring of the patient's health. It has advantages such as the following: it has non-invasive properties, low cost, and good stability, addition to minimum risk of infection transport.

Key words: Coronavirus. Blood parameters, Saliva, COVID-19.

Introduction

An SARS-CoV-2-related pneumonia outbreak that started in Wuhan in December 2019 has quickly spread across China and even the rest of the globe. On February 11, 2020, the WHO officially designated this SARS-CoV-2 disease as coronavirus disease (COVID-19) [(1)]. WHO reports that as of 20 June 2022, there have been 539,893,858 verified cases, with 6,324,112 deaths. [(2)]. Patients with COVID-19 infections may experience moderate or serious acute respiratory infections, with milder instances exhibiting symptoms like temperature, dry cough, and fatigue. Additionally, some patients may also have aberrant lung CT results along with stomach symptoms like diarrhea, nausea, and vomiting, in addition to ocular or cutaneous symptoms, in addition to olfactory and gustatory dysfunctions [(3)]. Acute respiratory distress syndrome (ARDS), acute hypoxemic respiratory failure, sepsis and septic shock, thromboembolism, and/or multi-organ failure, including acute kidney injury and cardiac injury, are among the complications that can occur in people with COVID-19. The majority of patients with COVID-19, roughly 40% of patients, only experience mild or moderate disease [(4,5)]. Reverse transcription-polymerase chain reaction (RT-PCR) is used to make the diagnosis, along with medical imaging such as X-ray and computed tomography (CT) features of asymptomatic infections [(6,7,8,9,10)], Because the viral load of SARS-CoV-2 RNA in the upper respiratory tract was significantly higher during the first week[(11,12)], as well as nasopharyngeal and oropharyngeal swabs [(13,14,15)]. The illness has become a significant global health problem and has reached pandemic status, infecting people in nearly every country on the planet, the treatment must be taken, and hence, The doctors demand additional diagnostic procedures, such a complete blood count (CBC) and saliva parameters, during this time.

Complete Blood Count (CBC):

A complete blood count is a blood test that examines a number of factors, including hemoglobin, white blood cells, platelets, lymphocytes, and red blood cells. (HGB). Hematocrit (HCT or PCV), Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin Concentration (MCHC), Lymphocyte Count, and other variables. A CBC test is used to help with the working diagnosis of a number of illnesses, such as anemia, acute infections, hemorrhagic states, allergic disorders, cancers, and immune disorders, as well as to assist medical professionals in assessing any symptoms, such as weakness and fatigue; for instance, a low hematocrit was once believed to be a sign of breast cancer patients, as well as leucopoenia and thrombocytopenia [16].

Several systemic inflammatory biomarkers have recently become accessible as part of the extended CBC, these CBC-based biomarkers are being studied in a variety of fields because they are simple and inexpensive, making them accessible to a wide range of physicians, as well as they require just a little quantity of patient blood. Hence, the hematological laboratory, according to COVID-19 research, plays a key role in providing numerous helpful prognostic indicators [17]. As a result, the goal of this review is to highlight certain COVID-19 hematologic results and give recommendations for early prevention and treatment.

White Blood Cells or Leukocytes (WBCs)

According to the scientific evidence, white blood cells (including granulocytes that refer to neutrophils, eosinophils, and basophils and granulocytes that refer to lymphocytes and monocytes) protect the body against infection, particularly lymphocytes which increase in number in situations of inflammation, especially when a virus is present.

The majority of viral illnesses, including those caused by the hepatitis C virus (HCV), hepatitis B virus (HBV), and human immunodeficiency virus (HIV) disease, are characterized by elevated white blood cell (WBC) numbers, especially lymphocyte counts [18,19]

Lymphocytes

Generally, most viruses lead to relative lymphocytosis [20] .Lymphocytosis mean an increase in the count of lymphocyte to more than 4000 lymphocytes/µl in adult patients,[21]while only a few viruses such as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) cause a decrease in lymphocytes in infected patients that called lymphopenia. [18, 22,23,24].

Lymphopenia can be brought on by a number of factors, including the virus' direct impact on lymphocytes, which can result in lysis of those cells, or the virus' induction of inflammatory cytokines, which can prevent T cells from expanding, and which, as a result, can cause immune-mediated apoptosis of lymphocytes, which is thought to be a good predictor of severity and mortality in COVID-19 infections [25,26,27,28]

Monocytes

The normal count of monocytes about 200-800 cells per µl of blood in a healthy human is (2-8% of WBCs count). Monocytes play important role in the innate immune system against microbial pathogens, inflammatory and anti- inflammatory, as well as assisting in the pathophysiology and development of illnesses such tumor metastasis, liver fibrosis, atherosclerosis, and multiple sclerosis. In Alzheimer's disease, liver fibrosis regresses, muscles regenerate, and -amyloid plaques are cleared by monocytes and monocyte-derived macrophages. [29,30].

Patients with moderate COVID-19 who have circulating monocytes in their blood who have an inflammatory viral infection cause these circulating monocytes to migrate to the lung under the guidance of pro-inflammatory cytokines, which increases the amount of defending mononuclear phagocytes and intensifies inflammation[31]Biamonte et al [32] found that lymphocyte/monocyte counts at admission and during the hospital stay, can predict clinical progression in COVID-19; another study suggested that mean

neutrophil/lymphocyte ratio (NLR) and neutrophil/monocytes ratio (NMR) was higher in patients with COVID-19 particularly in diabetic patients[33]

Eosinophils

The normal count of eosinophils is less than 500 cells per μl, they are involved in the fight against multicellular parasites, proinflammatory effects in a variety of diseases, allergy, and asthma regulation mechanisms. In covid-19, some studies discovered a decrease in eosinophil's, which might suggest that the patient is in the early stages of illness or that the result is positive [23] or that eosinopenia (decrease in the number of eosinophil's) is linked to rapid respiratory impairment following a severe COVID-19 infection [33,34]. As a result, eosinopenia in combination with lymphopenia may be a useful indication for individuals with covid-19 [35].

Basophils

The normal count of basophils is about 0-300 cells per μl of blood and less than 3% of WBCs, it contains heparin, hence it prevents blood clotting, mediates allergic reactions, and acts as anti-parasitic protective immunity. Basophils seem to have an active role in the immune response to SARS-CoV-2 [36].

Several investigations noted that basophils were found in lower count in COVID-19 patients [37, 38,39], while the others reported that basophils were also found in lower count in the first days of infection but they return to the normal value or increase during recovery [40,41].

Neutrophil

The majority of circulating leukocytes are neutrophils, which take part in a variety of immunological and inflammatory processes through phagocytosis, particle formation, cytokine release, and other mechanisms. Patients with COVID-19 may have a bad prognosis because of elevated nytrophil/lymphocyte ratio (NLR) values and low lymphocyte/C reactive protein ratio (LCR) levels that imply an intensified inflammatory process[42]

Additionally, the assessed neutrophil or neutrophil-to-lymphocyte ratio (NLR) is thought to be the primary marker of cytokine storms, especially in individuals who are older and have a chronic illness [43,44] .However, the NLR may be related to the severity of the disease, and frequent use of these parameters may help in the assessment of the condition [45].

In the special study of Lu and Wang [46] for dynamic change in WBC of patients during hospitalization, they noted that the value of WBCs in continuous changing, On the second day of admission, the number of neutrophils, lymphocytes, monocytes, and eosinophils decreased; however, from the eighth to the fourteenth day of admission, the number of WBCs, neutrophils, monocytes, and eosinophils gradually rose and peaked on the fourteenth day of COVID-19 infection. The ratio may help differentiate patients with severe diseases from those with less severe diseases, in addition to the change in lymphocytes and NLR [47].

Red Blood Cells (RBCs) and Hemoglobin

A normal RBC counts in men about 4.7 to 6.1 million cells/μl and in women about 4.2 to 5.4 million cells/μl. Because the RBCs were generated from hematopoietic stem cells in the bone marrow, there was a decrease in variations in RBCs that can be linked to the hematopoietic system. Additionally, the high doses of drugs, long-term treatment, and the route of administration have an impact on this system.

The study of Nader *et al* [48] showed that patients with COVID-19 had higher blood viscosity despite having reduced hematocrits (HCT; HCT is the ratio of RBC volume to total blood volume), as well as higher RBC aggregation, than healthy individuals. This indicates a positive correlation between clot firmness and duration of hospitalization and a negative correlation with clot formation time, particularly in patients receiving oxygen supplementation and those with pulmonary lesions that increased coagulation. While Urbano et al.'s [44]

research revealed that erythrocytes and cell hemoglobin concentration mean (CHCM) are both decreased and separately linked to COVID-19 patients' mortality.

Data results of Anani *et al* [49] revealed lower hemoglobin (Hb) and hematocrit (HCT) in COVID-19 survivors, but higher red cell distribution width. (RDW).

Red blood cells typically have a biconcave shape, are nucleated, and lack organelles; however, in individuals with COVID-19, RBCs take on an abnormal mushroom shape. This alteration in erythrocyte morphophysiology may be connected to the unbalanced redox status observed during COVID-19, which affects the genetics and dynamics of erythrocytes and results in multiple organ failure syndrome and death by non-homeostatic function of the cardiovascular, respiratory, and renal systems.(50,51)Contrary to what was previously known, the study claimed that erythrocytes and cell hemoglobin concentration mean (CHCM) are independently related to mortality in SARS-COV-2 positive patients [44].

Because COVID-19 may be to blame for the reduced RBC circulation that maintains hypoxemia and prevents tissue oxygenation, which is already difficult in patients with acute COVID-19 respiratory syndrome, as well as a decrease in HB level that results in anemia, changes in iron metabolism are related to hypoxemia in COVID-19 patients [52,53,54].

Platelets

Platelets are responsible about blood clotting or called thrombus, normal account of platelets about 150.000-450.000/µl, and platelets less than is called thrompocytopenia.

Thrombocytopenia linked with chronic hepatitis C virus (HCV) The virus attacks platelet surface antigens, causing a drop in platelet count, which can be brought on by a number of processes, including an autoimmune reaction, viral-induced bone marrow suppression, and autoantibodies aimed at the virus. Both covid-19 and this virus, which is transmitted similarly, have the ability to cause thrombocytopenia. [55]. In COVID-19 patients, mild thrombocytopenia or a low platelet count are linked to a higher chance of serious illness and mortality, or, less frequently, thrombocytosis in others [56].

In north India and with the second wave of COVID-19, some studies showed thrombocytopenia is most common in patients, especially those who will need intensive care unit because the virus is thought to inhibit bone marrow hematopoiesis through certain receptors resulting in thrombocytopenia with lymphopenia [57,58].

Finally, medications and viral complications can interact with blood components and trigger an inflammatory response, resulting in increased or decreased immune system activity and altered hematologic factors such as blood cell count.

Other factors, such as the early and late stages of the disease, the length of therapy, and the intensity of symptoms, all have a part in limiting the number of blood cells. Because CBC is impacted by various parameters such as age, gender, and patient immunity, some discrepancies in hematological findings were seen. As a result, these hematological indicators can be beneficial to the COVID-19.

Saliva

Salivary glands secrete an extracellular fluid in the mouth known as saliva that has many function. Reports have revealed that saliva can harbor COVID-19 and can be used to monitor viral loads and diagnose infection. [59, 60]

Where it has been proven that saliva samples are inexpensive, easy to collect, and do not require equipment to collect them, they are stable for a long time and reduce the risks of interactions between people and health care workers, as well as, it can reduce the need for equipment personal prophylaxis [61,62].

Among 31 COVID-19 patients, Chen *et al* show that 46.3% who suffer from dry mouth and 47.2% have amblygeusia, hence the study of this group decided that these symptoms can be considered as initial symptoms of COVID-19 infection [63].

Liu *et al* [64] They found that patients with severe COVID-19 tend to have a high viral load and a lengthy virus-shedding period, suggesting that disease severity and immune status are positively correlated with viral load. In a different research by Silva *et al*. [65], the viral loads in the nasopharynx and saliva were examined, and it was found that cases with COVID-19 risk markers had significantly higher viral loads in the saliva (e.g. male gender, older age, specific respiratory, cardiovascular, oncologic, and other systemic and immune-suppressive conditions). Data of Huang *et al* [66] showed that the oral cavity is a significant site for SARS-CoV-2 infection, implicating saliva as a possible means of transmission. The viral load in saliva was correlated with COVID-19 symptoms, including taste changes or loss. According to information from another study, saliva, including its cellular components and mechanisms, contains viral particles and aids in COVID-19 transmission [67].

Even though SARS-CoV-2 may enter through the mouth, additional elements, such as salivary protease inhibitors that prevent viral entrance, should be taken into account[68].

In a study by Sasikala *et al.* [69], 3018 outpatients (with symptoms and without symptoms) were used to compare saliva samples and nasopharyngeal swabs to identify the virus. The researchers informed the patients as soon as the symptoms began that the maximum detection in saliva was discovered on day 3 after the beginning of symptoms. Researchers came to the conclusion that saliva, which is easier to gather than nasopharyngeal swabs, is a reliable alternative to identify SARS-COV-2 in symptomatic patients at the early stage of onset of symptoms. Furthermore, 12.8% of hospitalized patients only tested positive for saliva. However, despite having a lower sensitivity in asyptomatic patients, saliva is still a crucial tool for mass-screening for COVID-19, according to some study. Additionally, saliva demonstrated high sensitivity for the detection of SARS-CoV-2 in symptomatic patients, making it a suitable specimen for the initial diagnosis of COVID-19 in that patient group, especially in the absence of swabs. Additionally, saliva is essential for the COVID-19 screening of asymptomatic individuals [70].

However, according to various studies' recommendations for sampling techniques, the concentration of RNA can be increased by fasting for up to overnight before collecting saliva. Additionally, rinsing the subject's mouth with water rather than antiseptic mouthwash is advised [71,72].

Last but not least, There are several advantages to using saliva samples as specimens for the diagnosis of SARS-CoV-2, including the collection being non-invasive in contrast to the collection of nasopharyngeal swabs, which is typically thought to be uncomfortable and when nasopharyngeal swabs are collected by healthcare professionals, protective gear is required, whereas the saliva samples collection can be easily performed by the individual themselves if they are properly prepared because it is non-invasive. Saliva collection is therefore a desirable substitute for nasopharyngeal swabs [73].

Conclusion

A complete blood count is reliable and low-cost. The quick reading test aids in the screening of patients suspected of having COVID -19 infections, and it is one of the first filters that may be used in decision-making. Depending on the clinical characteristic and the results of additional lab tests, saliva plays an important role in diagnosing infection, but it is linked to the viral load, as it has sensitivity equal to or higher than nasopharyngeal swab in people who show symptoms of the disease.

However, the hematological and saliva criteria are still used to predict hospitalization, serious illness, and prognosis and may aid medical professionals in making the right therapeutic decisions, as well as understand the physiological mechanism of viral infection and human immunity.

References

1. Yanxiang, Z ., Xuejie, H., Meijiao, H., et al. Hydroxychloroquine use and progression or prognosis of COVID-19: a systematic review and meta-analysis. Naunyn Schmiedebergs. Arch Pharmacol. 2021; 394: 782-774.

2. WHO,Coronavirus (COVID-19) Dashbord.

3. Jin, Y.H., Zhan, Q. Y., Peng, Z.Y., et al. Chemoprophylaxis, diagnosis, treatments, and discharge management of COVID-19: An evidence-based clinical practice guideline (updated version). Mil.Med Res. 2020; 7: 41.

4. Gibson, P.G., Qin, L., Puah, SH. COVID-19 acute respiratory distress syndrome (ARDS): clinical features and differences from typical pre- COVID-19 ARDS. Med J Aust. 2020; 213: 54-56.

5. Legrand, M., Bell, S., Forni, L., et al. Pathophysiology of COVID-19-associated acute kidney injury. Nat Rev Nephrol. 2021; 17: 751-764.

6. Shi, F., Wang, J., Shi, J., et al. Review of artificial intelligence techniques in imaging data acquisition, segmentation, and diagnosis for COVID-19. IEEE Rev Biomed Eng. 2021; 14:4-15.

7. Ai, T., Yang, Z., Hou, H., et al. Correlation of chest CT and RT-PCR testing in coronavirus disease 2019 (COVID-19) in China: A report of 1014 cases. Radiol. 2020; 296: E32-E40.

8. Kanne, J.P. Chest CT findings in 2019 novel coronavirus (2019-nCoV) infections from Wuhan, China: Key points for the radiologist. Radiol. 2020; 295: 16–17.

9. Xie, X., Zhong, Z., Zhao, W., et al. Chest CT for typical Coronavirus disease 2019(COVID-19) pneumonia: Relationship to negative RT-PCR testing. Radiol. 2020; 296: E41-E45.

10. Inui S, Fujikawa A, Jitsu M, et al. Chest CT findings in cases from the cruise ship diamond princess with coronavirus disease (COVID-19). Radiol Cardiothorac Imaging. 2020; 7: e204002.

11. Zou, l., Ruan, F., Huang, M., et al . SARS-CoV-2 Viral Load in Upper Respiratory Specimens of Infected Patients. N Engl J Med. 2020; 382: 1177-9.

12. Azman, M., Genden, H.S., Lum, S.G., et al. Upper respiratory tract sampling in COVID-19. Malasysian J Patho. 2020; 42: 23-35.

13. Lagerqvist, N., Maleki, K.T., Verner-Carlsson, J, et al. Evaluation of 11 SARS-COV-2 antibody tests by using samples from patients with defined IgG antibody titers. Sci Rep. 2021; 11: 7614.

14. Almeida, S.M., Spalanzani, R.N., Nogueira, M.B., et al. Rapid serological tests for SARS-COV-2: Diagnostic performance of 4 commercial assays. Med Princ Pract. 2021; 30: 385-394.

15. 15.Kundu, D., Gautam, P., Dayanand, D., et al. The role and diagnostic accuracy of serology for COVID-19.BMC Infectious Diseases. 2022; 22: 390.

16. Ali, L.O. Study effect of breast cancer on some hematological and biological parameters in Babylon province, Iraq J Pharm Biolo Sci. 2014; 9: 20-24.

17. Frater, J., Zini, G., Onofrio, G., et al. COVID-19 and the clinical hematology laboratory. Int J Lab Hematol. 2020; 42: 11–18.

18. Zhu, Y., Cao, X., Xu, D. Detection of morphological changes in peripheral mononuclear cells in hepatitis B virus infection using the Beckman coulter LH 750. Lab Hematolo. 2011; 1: 22-26.

19. Zaghloul, H., El-Sherbiny, W. Detection of occult hepatitis C and hepatitis B virus infection from peripheral blood mononuclear cells. Immunol Invest. 2010: 284-291.

20. Henry, B., Cheruiyot I., Vikse J., et al. Lymphopenia and neutrophilia at admission predicts severity and mortality in patients with COVID-19: A meta-analysis. Acta Bio Med Atenei Parm. 2020; 91: e2020008.

21. Boes, K.M., Durham, A.C . Bone marrow, Blood cells, and the lymphatic system. Pathologic Basis Veterinary Disease. 2017 : 724–804.e2.

22. Al-Tawfiq, J.A., Hinedi, K., Abbasi, S., et al. Hematologic, hepatic, and renal function changes in hospitalized patients with Middle East respiratory syndrome coronavirus. Int J Lab Hematol 2017; 39: 272-278.

23. Yan,H., Sun, Z ., Wu, J., et al. Laboratory data analysis of novel coronavirus (COVID-19) screening in 2510 patients. Clin Chim Acta. 2020; 507: 94-97.

24. Liu, X., Zhang, R., He, G. Hematological findings coronavirus disease 2019: indications of progression of disease. Annals of Hematology. 2020; 99: 1421-1428.

25. Abdulla, A.K., Salman, OA., Mahmood, AA. Study of some hematological and biochemical parameters in patients with SARS-COV-2 in Kirkuk city/Iraq.Sys Rev Pharm. 2020; 11: 515-522.

26. Tavakolpour, S., Rakhshandehroo, T., Wei, X., et al. Lymphopenia during the COID-19 infection: What it shows and what can be learned. Immunol Lett. 2020; 225: 31-32.

27. Toori, K.U., Qureshi, M.A., Chaudhry, A . Lymphopenia: Ausefule predictor of COVID-19 disease severity and mortality. Pak J Med Sci. 2021; 37: 1984-1988.

28. Tan L., Wang, Q., Zhang, D., et al. Lymphopenia predicts disease severity of COVID-19: a descriptive and predictive study. Signal Transduct Target Ther. 2020; 5: 33.

29. Karimark, K.R., Tacke, F., Dunay, L.R. Monocytes in health and disease-minireview. Eur J Microbiol Immunol. 2012; 2: 97-102.

30. Espinoza, V.E., Emmady, P.D. Histology, Monocytes. Bookshelf, Ntional Center for Biotechnology of Medicin, StatPearls Publishing 2022.

31. Knoll, R., Schultze, JL ., Schrepping, JS. Monocytes and macrophage in COVID-19. Front immunol. 2021; 12: 720109.

32. 32.Biamonte, F., Botta, C., Mazzitelli, M., et al. Combined lymphocyte/monocyte count, D- dimer and iron status predict COVID-19 course and outcome in a long-term care facility. J Translational Med. 2021; 19: 79.

33. 33.Anurag, A., Jha, P.K., Kumar, A . Differential White Blood Cells count in the COVID-19: A cross-sectional study of 148 patents. Diabetes Metab Syndr. 2020; 14: 2099-2102.

34. Lindsly, A.W., Schwartz, J.T., Rothenberg, M.E. Eosinophill responces during COVID-19 infections and coronavirus vaccination. J Allergy Clin Immunol. 2020; 146(1): 1-7.

35. 35.Zhang, J.J., Dong, X., Cao,Y.Y., et al. Clinical characteristics of 140 patients infected with SARS-COV-2 in Whan, China. Allergy. 2020; 75(7): 1730-1741.

36. Murdaca, G., Gioacchino, M., Greco, M., et al. Basophils and mast cells in COVID-19 pathogenesis. Cells. 2021; 10(10): 2754.

37. 37.Ten-Caten, F., Gonzalez-Dias, P., Castro, I., et al. In-depth analysis of laboratory parameters reveals the interplay between sex, age, and systemic inflammation in individuals with COVID-19. Int J Infect Dis. 2021; 105: 579–587.

38. Kazancioglu, S., Bastug, A., Ozbay, BO., et al . The role of haematological parameters in patients withCOVID-19 and influenza virus infection. Epidemiol Infect. 2020; 148: 1–16.

39. 39.Qin, C., Zhou, L., Hu, Z., et al. Dysregulation of Immune Response in Patients With Coronavirus 2019 (COVID-19) in Wuhan, China. Clin Infect Dis. 2020; 71: 762–768.

40. 40.Rodriguez, L., Pekkarinen, P., Lakshmikanth, T., et al. Systems-Level Immunomonitoring from Acute to Recovery Phase of Severe COVID-19. Cell Rep Med. 2020; 1: 100078.

41. Mao, J., Dai, R., Du, RC., et al. Hematologic changes predict clinical outcome in recovered patients with COVID-19. Ann Hematol. 2021; 100: 675–689.

42. Lagunas-Rangel, FL. Neutrophil-to-lymphocyte ratio and lymphocyte-to-C-reactive protein ratio in patients with severe coronavirus disease 2019(COVID-19): A meta-analysis. J Med Virol. 2020; 92: 1733-1734.

43. Mahmood, Z.S., Fadhil, H.Y., Adhiah, AH . Estimation of hematological parameters of disease severity in Iraq patients with COVID-19. Iraqi J Sci. 2021; 62(10): 3487-3496.

44. Urbano, M., Costa, E., Geraldes, C . Hematological changes in SARS-COV-2 positive patients. Hematol Transfusion Cell Therapy. 2021; 44: 218-224

45. Ok, F., Erdogan, O., Durmus, E., et al. Predictive values of blood urea nitrogen/creatinine ratio and other routine blood parameters on disease severity and survival of COVID-19 Ptients. J Med Virol. 2021; 93(2): 786-793.

46. Lu,G., Wang, J .Dynemic chang in routine blood parameters of severe COVID-19.Clin Chim Acta. 2020,508: 98-102.

47. Yang, H., Xu, Y., Li, Z., et al. The clinical implication of dynamic hematological parameters in COVID-19: a restrospetive study in Chongqing, China. Int J Gener Med. 2021; 14: 4073-4080.

48. 48.Nader, E., Nougier, C., Boisson, C., et al. Increased blood viscosity and red blood cells aggregation in patients with COVID-19. Am J Hematol. 2022; 97: 283-292.

49. Anani, M., Amer, S.A., Kishk, R.M., et al. Evalution of blood and biochemical parameters of COVID-19 patients in Sues canal University Hospital; A retrospective study. J Infec Develo Count. 2022; 16(4): 592-599.

50. Gerard, D., Brahim, S.B., Lesesve, J.F., et al. Are mushroom-shaped erythrocytes an indicator of COVID-19?. Br J Haematol. 2021; 192: 230

51. 51.Mendonca, M., Cruz, K., Pinheiro, D., et al. Dysregulation in erythrocyte dynamic caused by SARS-CoV-2 infection: possible role in shuffling the homestatic puzzle during COVID-19. Hematol Transfusion Cell Therapy. 2022; 44: 235-245.

52. Mancilha, E.M., Oliveira, J.S. SARS-CoV-2 association with hemoglobin and iron metabolism. Rev Assoc Med Bras. 2021; 67: 1349–135252.

53. Shah, A., Frost, JN., Aaron, L., et al. Systemic hypoferremia and severity of hypoxemic respiratory failure in COVID-19. Cri Care. 2020; 24: 320

54. Russo, A., Tellone, E., Barreca, D., et al. Implication of COVID-19 on erythrocytes functionality: redblood cell biochemical implications and morpho-functional aspects. Int J Mol Sci. 2022; 23: 2171.

55. Rawi, S., Wu, G.Y. Pathological of thrombocytopenia in chronic HCV infection: A review. J.Clin. translational hepatology. 2020; 8(2): 184-191.

56. Lippi, G., Plebani, M., Henry, MM. Thrombocytopenia is associated with sever coronavirus disease2019(COVID-19) infections: Ameta analysis. Clin Chim Acta. 2020; 506: 145-148.

57. Kasinathan, G., Sathar, J. Haematological manifestations,mechanisms of thrombosis and anti-coagulation in COVID-19 disease;A review. Ann Med Surg. 2020; 56:173-177.

58. Singh, A., Verma, S.P., Kushwaha, R., et al. Haematological canges in the second wave of SARS-CoV-2 in north India. Cureus. 2022,; 14: e23495.

59. 59.Valentine-Graves, M., Hall, E., Guest, J.L., et al. At-home self-collection of saliva, oropharyngeal swabs and dried blood spots for SARS-CoV-2 diagnosis and serology: post-collection acceptability of specimen collection process and patient confidence in specimens. PloS One. 2020; 15: e0236775.

60. To K.K., Tsang, O.T., Yip, C.C., et al. Consistent detection of 2019 novel coronavirus in saliva. Clin Infect Dis. 2020; 71: 841–843.

61. 61.Berenger, B.M., Conly, J.M., Fonseca, K., et al. Saliva collected in universal transport media is an effective, simple and high-volume amenable method to detect SARS-CoV-2. Clin Microbiol Infect. 2020; 27: 656–657.

62. Matic, N., Stefanovic, A., Leung, V., et al. Practical challenges to the clinical implementation of saliva for SARS-CoV-2 detection. Eur J Clin Microbiol Infect Dis. 2020; 40: 1–4

63. 63.Chen, L., Zhao, J., Peng, J., et al. Detection of SARS-CoV-2 in saliva and characterization of oral symptoms in COVID-19 patients. Cell Prolif. 2020; 53: e12923.

64. Liu, Y., Yan, L.M., Wan, L., et al. Viral dynamics in mild and severe cases of COVID-19.Lancet Infect Dis 2020; 20: 656–657.

65. 65.Silva, J., Lucas, C., Sundaram, M., et al. Saliva viral load is a dynamic unifying correlate of COVID-19 severity and mortality. Med Rxiv, preprint 2021 doi: 10.1101/2021.01.04.21249236.

66. 66.Huang, N., Kato, T., Mikami, Y., et al. SARS-CoV-2 infection of the oral cavity and saliva. Nat Med. 2021; 27: 892-903.

67. 67.Drozdzik, A., Drozdzik, M. Oral pathology in COVID-19 and SARS-CoV-2 infection-molecular aspects. Int J Mol Sci. 2022; 23: 1431.

68. Sakaguchi, W., Kubota, N., Shimizu, T., et al. Existence of SARS-CoV-2 Entry molecules in the oral cavity. Int J Mol Sci. 2020; 21: 6000.

69. Sasikala, M., Sadhana, Y., Vijayasarathy, K., et al. Comparison of saliva with healthcare worker-and patient-collected swabs in the diagnosis of COVID-19 in the a large cohort. BMC Infect Dis. 2021; 21: 648

70. Alkhateeb, K.J., Cahill, M.N., Ross, S.A., et al. The reliability of saliva for the detection of SARS-CoV-2 in symptomatic and asymptomatic patients: Insights on the diagnostic performance and utility for COVID-19 screening. Diagn Microbiol Infect Dis. 2021; 101(3): 115450.

71. Goode, MR., Cheong, SY., Li, N., et al. Collection and extraction of saliva DNA for next generation sequencing. J Vis Exp. 2014; 4: 253.

72. Ishikawa, S., Sugimoto, M., Kitabatake, K., et al. Identification of salivary metabolomic biomarkers for oral cancer screening. Sci Rep. 2016; 6: 31520.

73. Erupean Center Disease Prevention and Control (ECDC),Technical report. Considration for the use of saliva as sample material for COVID-19 testing. 2021,Stockholm.

العنوان: معايير اللعاب وتعداد الدم الكامل كمؤشر على اصابة المرضى بفايرس المتلازمة التنفسية-2019

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المستخلص

الخلفية:تعتبرفيروسات كورونا والتي تسبب أمراض الجهاز التنفسي مشكلة صحية عامة في العقود الأخيرة. نظرًا لأن الأعراض السريرية للعدوى ليست دائمًا محددة ، فمن الصعب تعريض جميع المشتبه بهم للاختبار النوعي من أجل تأكيد أو استبعاد العدوى كاختبار.

الطرق: وفقًا للدراسات والتحقيقات العلمية ، ثلاث وسبعون من المقالات والنتائج البحثية حصلت عن طريق Pub Medو Medlineوبوابة الباحث Research gateو Google scholar.

الكلمات المفتاحية المستخدمة للبحث هي : كورونا فايرس ،معايير الدم واللعاب و COVVID-19.

النتائج: وفرت المقالة تقرير عن التغيرات في اختبارات الدم واللعاب للمصابين بفايرس . COVID-19 هو عدوى جهازية لها تأثير كبير على نظام الدم والإرقاء ، وبالتالي فإن الانحرافات عن المستويات الطبيعية للاختبارات المعملية ، بما في ذلك اختبار الدم واللعاب تشير إلى أن الاختبارات المحددة للكشف عن عدوى COVID-19 مطلوبة.
الاستنتاجات: تساعد اختبارات الدم في المراقبة السريرية لصحة المريض. ، حيث يتمتع بالمزايا التالية مثل: خصائصه غير الغازية ، والتكلفة المنخفضة ، والاستقرار الجيد ، بالإضافة إلى الحد الأدنى من مخاطر انتقال العدوى.
الكلمات المفتاحية: فيروس كورونا ، بارامترات الدم ، اللعاب ، كوفيد -19.