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Original Research Article

Evaluation of Complete Blood Count and D. Dimer in Patients with COVID-19 Infection in Shendi Town

Hamza Ahmed Hassan[1], Elfatih Mohammed Abdalla Ali[1], Eltayeb Ahmed Motasim alnger[1], Eslam Abdalla M. Ahmed[1], Alaa Babiker H. Alkab[1], Ghanem Mohammed Mahjaf[2], Mosab Nouraldein Mohammed Hamad[3*]

[1]Department of Haematology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan
[2]Department of Medical Microbiology, Faculty of Medical Laboratory Sciences, Shendi University, Sudan
[3]Head of Parasitology Department, College of Health and Allied Sciences, St. Joseph University In Tanzania, Dar Es Salaam, Tanzania

***Corresponding Author:** Mosab Nouraldein Mohammed Hamad
Head of Parasitology Department, College of Health and Allied Sciences, St. Joseph University In Tanzania, Dar Es Salaam, Tanzania

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Abstract: ***Background***: Covid-19 can Cause Various Conditions Including respiratory, enteric, and neurological diseases, and led to a pandemic that has affected millions worldwide. ***Methods***: This is a cross-sectional descriptive study conducted at Shendi teaching hospital which is located in Shendi town in Sudan to evaluate Haematological parameters and D. Dimer in patients with Covid-19 Infection in the period between May to September 2021. The study included (50) patients who were diagnosed with Covid-19 Infection and the study groups were compared with (50) healthy volunteers as a control group. 50 venous blood samples as case and 50 as control transferred into Tri sodium citrate and EDTA anticoagulant. Data was collected using a questionnaire and the (SPSS) version (22) program was used for data analysis. ***Results:*** The study revealed that the Covid-19 Infection patients were; (60%) males and (40) females. Complete blood count (CBC) indicated the mean values of Hb, PCV, RBCs, MCV, MCH, MCHC, in case group were (12.5 g/dl), (38.9%), (4.5x1012/l), (86.7 fl), (27.7 pg) and (32.0 g/dl) respectively. Also prevailed the mean of TWBCs, Neutrophil, lymphocyte, MID, Absolute Neutrophil, Absolute lymphocyte, Absolute MID, were (13.09x 109 /l), (79.27%), (11.79%), (8.77%), (10.38), (1.54), and (1.16) respectively. The study revealed the mean of platelet, D.dimer (296.63x 109 /l), (6.07ug/ml), respectively. ***Conclusions:*** Covid-19 Infection is responsible for significant changes in hemoglobin, mean corpuscular hemoglobin, and mean corpuscular hemoglobin concentration, total white blood cells count differential and absolute neutrophils count and differential and absolute lymphocytes count and D. dimer.

Keywords: Covid-19, Coronavirus, CBC, D.dimer, SARS-CoV-2, Shendi, Sudan.

INTRODUCTION

Coronavirus Disease (COVID-19), since its emergence in Wuhan province, China in December 2019, now spreading to 213 countries worldwide, forcing the World health organization to declare this outbreak a global pandemic on 11 March 2020 [1]. COVID-19 is caused by highly infectious, severe acute respiratory syndrome coronavirus (SARS-CoV-2), infecting more than 36 million individuals, with 1,060,563 reported deaths as of 8 October 2020 [2]. The understanding of this novel virus and disease evolves sequentially over the past seven months. Initially, thought to transmit by droplets or aerosols causing fever as classical clinical symptoms, mainly in old age or immune-compromised individuals. However, the dynamics of COVID-19 keep on evolving with the emergence of different SARS-CoV-2 strains. Evidence of airborne mode of SARS-CoV-2 transmission [3], asymptomatic clinical presentations along with extra-pulmonary manifestations [4] is the real concern. SARS-CoV-2 is a single-stranded, positive-sense RNA virus having an envelope, glycoprotein, and spike

protein. Being a respiratory virus, SARS-CoV-2 enters inside the human body and infects the lungs as a primary and predominant organ [5]. The entry is mediated by the binding of the receptor-binding domain (RBD) of the S1 subunit of the viral spike protein with the host angiotensin-converting enzyme 2, (ACE2) receptor primarily expressed in the type II pneumocytes, serving as a viral reservoir [6, 7]. Usually, COVID-19 presented with fever, sore throat, dry cough, and shortness of breath as common clinical manifestations [8], however asymptomatic cases are also being reported which are more critical to diagnose. ACE2 is also found to be expressed in the oral, nasal mucosa, epithelial cells of lungs, kidney, and heart, enterocytes of the small intestine, and the endothelial cells of blood vessels [9]. The SARS-COV-2 associated extra-pulmonary manifestations are encephalitis, rashes on the skin, meningitis, conjunctivitis, and acute hepatic, and renal injury. Surprisingly, autopsies of COVID-19 patients have revealed clots in the small vessels of the lungs, heart, liver, and kidney which are responsible for strokes and heart attacks [10]. More than 33% of critical COVID-19 patients' are reported with critically high levels of blood clotting. Also, there are numerous hematologic findings as a change in the hematological parameter in patients with COVID-19 that guide early prevention and management.

MATERIALS AND METHODS

Study design

This is a cross-sectional descriptive study that aimed to evaluate Haematological parameters and D. Dimer in patients with Covid-19 Infection.

Study Area

This study was conducted at Shendi teaching hospital which located in Shendi town in Sudan.

Study Duration

This study was carryout in May to September 2021.

Study Population

Patients with covid -19 infection.

Study Sample

Blood sample.

Sample Size

Hundred samples.Fifty samples as the study group & Fifty samples as the control.

Data Collection Tools

The primary data was collected by using a questionnaire.

Sample Processing

5.0 ml of venous blood was taken from the patient and transferred into Trisodium citrate and EDTA. The sample was then sent as early as possible for analysis. Hematological parameters and D.Dimer was done by the automated method.

CBC was done by using the Mindray Haematology Analyzer (Mindray bc-3000):

Blood cells can be broadly divided into three categories .red blood cells, White blood cells, and platelets. The analyzer measures the number of cells and distinguishes between their types according to size using sheath flow DC detection. Electrical current is passed through a solution; this method measures the changes in electrical resistance that occurs when blood cells pass through the detection aperture. This instrument performs haematology analyses according to the RF/DC detection method, Hydro-Dynamic Focusing (DC Detection), and sodium lauryl sulphate (SLS) hemoglobin method.The radio frequencies and direct current (RF/DC detection method) detect the volume of blood cells by changes in direct-current resistance. RBCs count, Hct, Hb concentration, haematimetric indices (MCV, MCH, and MCHC) RDW, WBCS,and platelets counts were measured by using an automatic blood cell counter (Mindray-3000 analyzers). The assay was performed according to the instructions provided by the manufacturer. The analyzer was controlled by normal control, abnormally high, and abnormal low. the EDTA blood samples were aspirated into the analyzer through a sample probe, and the counting was started automatically The results were displayed on the screen within (20) seconds.

D. Dimer was done by using an automated immunoassay analyzer (TOSOH AIA. 360):

Fluorescence enzyme immunoassay which is performed entirely in the AIA –PACK. D.dimer present in the test sample is bound with a monoclonal antibody immobilized on a magnetic bead and enzyme-labeled monoclonal antibody in AIA-PACK. The magnetic bead was washed to remove unbounded materials and then incubated with the fluorogenic substrate. The amount of enzyme-labeled monoclonal antibodies that bind to the bead is directly proportional to the D. dimer concentration in the test sample. Assay requests are registered automatically using the combination of an internal barcode reader and cup reader. The AIA -360 is equipped with a camera capable of reading analyte name and lot number, enabling distinction between specimen types and selecting the appropriate assay operation, as soon as specimens and reagent cups are loaded into a carousel.

Data Analysis and Presentation

Data collected in this study were analyzed using SPSS version 22, Chi-squire test will be used to assess the enter group's significance. Other variable and outlier values will be calculated and will be presented in form of figures and tables.

Ethical Considerations

The procedure of venous blood sampling was

explained to patients undergoing the test. All participants were informed about the research objectives and procedures during the interview period. Written valid consent was obtained from all participants. All result was with high privacy and confidentiality.

RESULTS

A total of (50) blood samples were collected from COVID-19 patients and (50) samples were collected as control from healthy individuals including frequency of sex was 30 males (60%) and 20 females (40%) (Table 1). The mean values of Hb, PCV, RBCs, MCV, MCH, MCHC, in case group were (12.5 g/dl), (38.9%), (4.5x10^{12}/l), (86.7 fl), (27.7 pg) and (32.0 g/dl) respectively and in control group the mean values of Hb, PCV, RBCs, MCV, MCH, MCHC, were (13.5 g/dl), (40.8%), (47 x10^{12}/l), (87.3 fl), (28.9 pg) and (33.1 g/dl) respectively (Table 2). The mean of TWBCs, Neutrophil, lymphocyte, MID , A Neutrophil, Alymphocyte, A MID, were (13.09x 10^{9} /l), (79.27%), (11.79%), (8.77%), (10.38), (1.54), and (1.16) respectively. the mean of TWBCs, Neutrophil, lymphocyte, MID, A Neutrophil, A lymphocyte,A MID, in control were (6.16x 10^{9} /l), (53.85%), (35.95%), (10.05%), (3.37), (2.18%), and (0.71) respectively (Table 3). The mean of platelet, D.dimer in case group were (296.63x 109 /l), (6.07ug/ml), respectively. The mean of platelet, D.dimer in control group were (290.95x 109 /l), (0.330ug/ml), respectively (Table 4).

Table 1: Distribution of study population according to sex

Characteristic		***Frequency***	***Percent %***
Study groups	Case	50	50%
	Control	50	50%
Sex	Male	30	60%
	Female	20	40%

Table2: Comparison between case and control in Hb, RBCs, RBCs indices

Groups		***No***	***Mean***	***SD***	***P. value***
Hb g/dl	Case	50	12.5	1.84	0.022
	Control	50	13.5	0.88	
RBCsx10^{9}	Case	50	4.5	0.6444	0.247
	Control	50	4.7	0.3911	
PCV %	Case	50	38.9	5.47	0.151
	Control	50	40.8	2.66	
MCV fl	Case	50	86.7	6.11	0.696
	Control	50	87.3	4.58	
MCH pg	Case	50	27.7	2.19	0.027
	Control	50	28.9	1.36	
MCHCg/dl	Case	50	32.0	1.12	0.000
	Control	50	33.1	0.626	

Table 3: Relationship between case and control in WBCs count and their subtype

Group		*No*	*Mean*	*SD*	*P. value*
WBCsx10^{9}	Case	50	13.09	6.67	0.000
	Control	50	6.16	1.93	
Neutrophil %	Case	50	79.27	6.89	
	Control	50	53.85	5.65	0.000
Lymphocyt%	Case	50	11.79	4.58	
	Control	50	35.95	4.82	0.000
MID %	Case	50	8.77	4.03	
	Control	50	10.05	1.90	0.191
Neutrophil #	Case	50	10.38	5.20	
	Control	50	3.37	1.23	0.000
Lymphocyte #	Case	50	1.54	1.21	
	Control	50	2.18	0.59	0.034
MID #	Case	50	1.16	0.93	
	Control	50	0.71	0.49	0.055

Table 4: Comparison between case and control in platelet and D. dimer

Group		***No***	***Mean***	***SD***	***P. value***
Plateletx10^9	Case	50	296.63	116.63	
	Control	50	290.95	66.98	0.845
D.dimer	Case	50	6.07	5.56	
	Control	50	0.330	0.40	0.000

DISCUSSION

Our study demonstrates a significant decrease in Hb, MCH count and MCHC compared to the control (*P-value* <0.05). Results of this current study agree when compared to a study done by Harvard Medical School, Boston in America The results of this research confirmed an increase in the mean of WBCs & differential and absolute neutrophils count and a decrease in differential and absolute lymphocytes. (*P-value* 0.000), Results of this current study agree when compared to a study done by Harvard Medical School, Boston America. The outcome of the results obtained revealed an increase in the mean of D. dimer compared to the control group (*P-value* 0.000). There was an effective significant statistical difference estimated among the study population. Results of this current study agree when compared to the study done by Aretaieio Hospital, School of Medicine, National and Kapodistrian University of Athens, Athens, Greece.

CONCLUSION

Hb, MCH, and MCHC were lower in Covid -19 patients when compared to healthy individuals in the control group. An increase in the of WBCs & differential and absolute neutrophils count and a decrease in differential and absolute lymphocytes count in Covid -19 patients when compared to healthy individuals in the control group. Plasma D.dimer was higher in Covid -19 patients when compared to healthy individuals in the control group.

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