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Albumin, WBC, RBC, Hemoglobin, Platelet, MCV and MCH levels in COVID-19 patients with Mucormycosis opportunistic infection

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Abstract

The coronavirus disease 19 (COVID-19) is a profoundly communicable and pathogenic viral disease brought about by intense respiratory disorder coronavirus 2, which made worldwide pandemic that drove a sensational loss of human existence around the world. Recently, instances of mucormycosis have been described in patients with Coronavirus. Routine laboratory tests especially biochemical and hematological are vital tests in terms of both finding and seriousness of Coronavirus. This study was intended to evaluate albumin, WBC, RBC, hemoglobin, platelet, MCV and MCH levels in COVID-19 patients suffering from mucormycosis. During this study, hospitalized COVID-19 patients with mucormycosis were investigated. Gender, age, hospitalization and recovery were patients recorded information. The laboratory parameters included albumin, WBC, RBC, hemoglobin, platelet, MCV and MCH levels. Finally, data was analyzed by SPSS. At present study, there was no significant difference between albumin, WBC, RBC, hemoglobin, platelet, MCV and MCH levels in COVID-19 patients suffering from mucormycosis levels based on gender, age, hospitalization and recovery parameters. According to results, it is essential to do more researches with a larger scale based on more parameters in patients with mucormycosis.

Keywords: Albumin, WBC, RBC, Hemoglobin, Platelet, MCV, MCH, COVID-19, Mucormycosis.

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INTRODUCTION

Coronaviruses are a massive own family of viruses, which purpose excessive respiratory infections which include Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) [1]. COVID-19 is a lately defined infectious sickness because of Severe Acute Respiratory Syndrome coronavirus 2 (SARS-CoV 2) [2,3]. _ENREF_2 COVID-19 patients show typically an extensive variety of appearances from fever to death and recently, mucormycosis infection has been identified as secondary problem of COVID-19 patients, particularly in the patients with severe condition in the intensive care unit [4,5].

Different clinical laboratory assessments and chest computed tomography are applied to identify and screen of patients [6]. Clinical laboratory tests are usually including molecular, serologic and biochemical examinations [7].

Routine laboratory records have showed significant alterations in COVID-19 but it is not completely elucidated [8,9]. _ENREF_9The types of routine hematological and biochemical parameters prepare key evidence in terms of both severity and identification of COVID-19 [10].

Due to the small amount of research on the relationship between hematological parameters and clinical status of patients with COVID-19 who have undergone mucor, further research is needed in this area. The main goal of the present study is the investigation of albumin, WBC, RBC, hemoglobin, platelet, MCV and MCH levels in COVID-19 patients suffering from mucormycosis.

MATERIALS AND METHODS

This cross-sectional research was done during February 2021 to February 2022. This article is result of the

project with the ethics code of IR.SSU.REC.1400.194 that was approved in the ethics committee of Yazd Shahid Sadoughi University of Medical Sciences, Iran. All hospitalized PCR positive test COVID-19 patients with mucormycosis were participated in this study (Inclusion criteria). Consent was obtained from patients. All patient information was preserved as privacy. Also, exclusion criteria included patients with incomplete data. The samples were selected randomly according to the stated criteria. The recorded data included age (below or above 55 years), gender, hospitalization (ward and ICU) and recovery information (complete, relative and death).

The investigated laboratory tests included albumin (g/L), WBC (×1000/mm^3), RBC (x10^{12}/l), hemoglobin (g/L), platelet (×1000/mm^3), MCV (fl) and MCH (pg) levels.

By auto Hematology Analyzer and the main matching mixture (Shenzhen Mindray Bio-Medical Electronics Co., Ltd.) hematologic factors and cells were detected. Also, level of albumin was determined by a biochemical analyzer as automatic and the matching reagent as original (Shenzhen Mindray Bio-Medical Electronics Co., Ltd).

After the collection, the data were recorded in SPSS software (version 22) and Chi-Square test was also utilized to analyze the data. In all cases, $p<0.05$ was supposed as a significant level.

RESULTS

In current study, 33 patients with decisive diagnosis of COVID-19, positive PCR experiment and mucormycosis were assessed. In the present study, no significant difference was found between albumin levels based on the studied parameters (Table 1).

No significant difference was found between WBC and existing parameters (Table 2).

There was no significant difference about RBC (Table 3).

Also, no significant relationship was found between hemoglobin level and study parameters (Table 4).

In the case of MCH (Table 5), platelets (Table 6) and MCV (Table 7), the difference was not significant based on four parameters.

Table 1: Relationship between albumin level based on gender, age, hospitalization and recovery

Albumin		**Normal N (%)**	**Above normal N (%)**	**Total N (%)**	**p-value**
Gender	Female	5(33.3)	7(38.9)	12(36.4)	1
	Male	10(66.7)	11(6.1)	21(63.6)	
	Total	15(100)	18(100)	33(100)	
Age (year)	Below 55	7(46.7)	9(50.0)	16(48.5)	0.849
	Above 55	8(53.3)	9(50.0)	17(51.5)	
	Total	15(100)	18(100)	33(100)	
Hospitalization	Ward	9(60.0)	12(66.7)	21(63.6)	0.692
	ICU	6(40.0)	6(33.3)	12(36.4)	
	Total	15(100)	18(100)	33(100)	
Recovery	Complete	5(33.3)	4(22.2)	9(27.3)	0.758
	Relative	6(40.0)	9(50.0)	15(45.5)	
	Death	4(26.7)	5(27.8)	9(27.3)	
	Total	15(100)	18(100)	33(100)	

Table 2: Relationship between WBC based on gender, age, hospitalization and recovery

WBC		**Normal N (%)**	**Above normal N (%)**	**Total N (%)**	**p-value**
Gender	Female	4(40.0)	8(34.8)	12(36.4)	1
	Male	6(60.0)	15(65.2)	21(63.6)	
	Total	10(100)	23(100)	33(100)	
Age (year)	Below 55	4(40.0)	12(52.2)	16(48.5)	0.708
	Above 55	6(60.0)	11(47.8)	17(51.5)	
	Total	10(100)	23(100)	33(100)	
Hospitalization	Ward	8(80.0)	13(56.5)	21(63.6)	0.259
	ICU	2(20.0)	10(43.5)	12(36.4)	
	Total	10(100)	23(100)	33(100)	
Recovery	Complete	3(30.0)	6(26.1)	9(27.3)	0.320
	Relative	6(60.0)	9(39.1)	15(45.5)	
	Death	1(10.0)	8(34.8)	9(27.3)	
	Total	10(100)	23(100)	33(100)	

Table 3: Relationship between RBC based on gender, age, hospitalization and recovery

RBC		Normal N (%)	Above normal N (%)	Total N (%)	p-value
Gender	Female	6(27.3)	6(54.5)	12(36.4)	0.125
	Male	16(72.7)	5(45.5)	21(63.6)	
	Total	22(100)	11(100)	33(100)	
Age (year)	Below 55	9(40.9)	7(63.6)	16(48.5)	0.282
	Above 55	13(59.1)	4(36.4)	17(51.5)	
	Total	22(100)	11(100)	33(100)	
Hospitalization	Ward	14(63.6)	7(63.6)	21(63.6)	1
	ICU	8(36.4)	4(36.4)	12(36.4)	
	Total	22(100)	11(100)	33(100)	
Recovery	Complete	6(27.3)	3(27.3)	9(27.3)	1
	Relative	10(45.5)	5(45.5)	15(45.5)	
	Death	6(27.3)	3(27.3)	9(27.3)	
	Total	22(100)	11(100)	33(100)	

Table 4: Relationship between hemoglobin level based on gender, age, hospitalization and recovery

Hemoglobin level		Normal N (%)	Above normal N (%)	Total N (%)	p-value
Gender	Female	6(27.3)	6(54.5)	12(36.4)	0.125
	Male	16(72.7)	5(45.5)	21(63.6)	
	Total	22(100)	11(100)	33(100)	
Age (year)	Below 55	10(45.5)	6(54.5)	16(48.5)	0.622
	Above 55	12(54.5)	5(45.5)	17(51.5)	
	Total	22(100)	11(100)	33(100)	
Hospitalization	Ward	13(59.1)	8(72.7)	21(63.6)	0.703
	ICU	9(40.9)	3(27.3)	12(36.4)	
	Total	22(100)	11(100)	33(100)	
Recovery	Complete	6(27.3)	3(27.3)	9(27.3)	0.670
	Relative	9(40.9)	6(54.5)	15(45.5)	
	Death	7(31.8)	2(18.2)	9(27.3)	
	Total	22(100)	11(100)	33(100)	

Table 5: Relationship between MCH based on gender, age, hospitalization and recovery

MCH		Normal N (%)	Above normal N (%)	Total N (%)	p-value
Gender	Female	10(40.0)	2(25.0)	12(36.4)	0.678
	Male	15(60.0)	6(75.0)	21(63.6)	
	Total	25(100)	8(100)	33(100)	
Age (year)	Below 55	11(44.0)	5(62.5)	16(48.5)	0.438
	Above 55	14(56.0)	3(37.5)	17(51.5)	
	Total	25(100)	8(100)	33(100)	
Hospitalization	Ward	15(60.0)	6(75.0)	21(63.6)	0.678
	ICU	10(40.0)	2(25.0)	12(36.4)	
	Total	25(100)	8(100)	33(100)	
Recovery	Complete	6(24.0)	3(37.5)	9(27.3)	0.751
	Relative	12(48.0)	3(37.5)	15(45.5)	
	Death	7(28.0)	2(25.0)	9(27.3)	
	Total	25(100)	8(100)	33(100)	

Table 6: Relationship between platelet based on gender, age, hospitalization and recovery

Platelet		Normal N (%)	Above normal N (%)	Total N (%)	p-value
Gender	Female	10(40.0)	2(25.0)	12(36.4)	0.678
	Male	15(60.0)	6(75.0)	21(63.6)	
	Total	25(100)	8(100)	33(100)	
Age (year)	Below 55	12(48.0)	4(50.0)	16(48.5)	1
	Above 55	13(52.0)	4(50.0)	17(51.5)	
	Total	25(100)	8(100)	33(100)	
Hospitalization	Ward	17(68.0)	4(50.0)	21(63.6)	0.420
	ICU	8(32.0)	4(50.0)	12(36.4)	
	Total	25(100)	8(100)	33(100)	
Recovery	Complete	8(32.0)	1(12.5)	9(27.3)	0.224
	Relative	12(48.0)	3(37.5)	15(45.5)	
	Death	5(20.0)	4(50.0)	9(27.3)	
	Total	25(100)	8(100)	33(100)	

Table 7: Relationship between MCV based on gender, age, hospitalization and recovery

MCV		Normal N (%)	Above normal N (%)	Total N (%)	p-value
Gender	Female	9(36.0)	3(37.5)	12(36.4)	1
	Male	16(64.0)	5(62.5)	21(63.5)	
	Total	25(100)	8(100)	33(100)	
Age (year)	Below 55	10(40.0)	6(75.0)	16(48.5)	0.118
	Above 55	15(60.0)	2(25.0)	17(51.5)	
	Total	25(100)	8(100)	33(100)	
Hospitalization	Ward	14(56.0)	7(87.5)	21(63.6)	0.2
	ICU	11(44.0)	1(12.5)	12(36.4)	
	Total	25(100)	8(100)	33(100)	
Recovery	Complete	5(20.0)	4(50.0)	9(27.3)	0.235
	Relative	12(48.0)	3(37.5)	15(45.5)	
	Death	8(32.0)	1(12.5)	9(27.3)	
	Total	25(100)	8(100)	33(100)	

DISCUSSION

In the current study, no significant difference was found between albumin, WBC, RBC, hemoglobin, platelet, MCV and MCH levels in COVID-19 patients suffering from mucormycosis levels based on gender, age, hospitalization and recovery.

A study on COVID-19 patients in Ankara, Turkey, revealed that low hemoglobin levels in patients showed a poor prognosis. The number of WBCs in patients with a worse prognosis was significantly higher [11]. In the present study, was no observed significant difference between WBC and mentioned parameters in study among COVID-19 patients with mucormycosis that is probably because of low samples number.

Another study showed that hemoglobin levels in COVID-19 patients with pneumonia were significantly lower than the control group [12]. But, at present study hemoglobin wan not a significant parameter in COVID-19 patients with mucormycosis. We can perform hemoglobin test in a bigger population and compare with present study.

Another study in Istanbul, Turkey, showed that hemoglobin levels were significantly lower in the patient group [13]. In the present study, was no also detected a significant difference between hemoglobin rate based on parameters. Hemoglobin test should be also performed and compared based on other parameters.

In Saudi Arabia, a study on COVID-19 patients found that patients with severe infection in the ICU had significant reduction in RBC and hemoglobin [14]. But, in the present study, was no observed a significant association about these two tests.

In China, the level of WBC was significantly higher in the group with severe COVID-19 disease than in the group with moderate disease, while the level of hemoglobin and RBC in the group with severe disease was significantly lower than in the group with moderate disease [15]. The present study did not show a significant association about RBC and hemoglobin in COVID-19 patients with mucormycosis.

Another study in China showed that there was a statistically significant relationship between the COVID-19 comorbidities (respiratory, diabetes, heart and blood pressure) in terms of hemoglobin, RBC and MCV parameters. Also in the mentioned study in COVID-19 patients a significant difference was found in terms of RBC, hemoglobin, MCV and MCH based on sex [16]. The present study was done in COVID-19

patients with mucormycosis, but, no significant difference was found between RBC, hemoglobin, MCV and MCH levels.

Totally, the difference between the present study and above studies is probably because of cases numbers that were low. Reason of low samples was low cases of mucormycosis to this time.

CONCLUSION

In the current study, no significant difference was found between albumin, WBC, RBC, hemoglobin, platelet, MCV and MCH levels in COVID-19 patients suffering from mucormycosis levels based on gender, age, hospitalization and recovery. It is necessary to conduct more researches with a larger scale based on more parameters in patients with mucormycosis.

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Conflicts of interest

None declared.

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