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Role of CRP and CBC in determination of the damages occurrence due to COVID-19 infection

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Abstract: COVID-19 is a very risky inflammation which may lead to death. In this study, a total of (83) patients with corona virus were enrolled in Al- Numan Hospital during the period from 15th February to 15th November 2020. The results of age distribution showed that the age group (40-59) years was most vulnerable 11(45.8%) to acute infection with COVID-19, followed by the age group (20-39) 9(37.5%) P=0.741. The results of anti-COVID-19 IgM antibody (COVID-19 IgM) incidence in the studied cases according to their residency showed that acute incidence of COVID- 19 in rural areas was higher than in urban areas, P=0.090. Laboratory investigations demonstrated that lymphocyte count increased 43(51.8%) cases, while it decreased in 15(18.1%) of them. However, the hemoglobin concentration and the packed cells volume were low for all patients with COVID-19, 83(100.0%). The CRP value was elevated in 76(91.6) of patients in comparison with the control group, P= 0.005.

Keywords: ***CBC, COVID-19, CRP, , Damages***

Introduction

In 1930s, the acute phase protein called C-reactive protein (CRP) was discovered by Tilett & Francis, which is a pentameric protein produced in the liver under the action of interleukin 6 (IL-6) [1]. The very high levels of CRP (>50 mg/dL) is almost related to bacterial infection but increased concentrations are also observed in cardiovascular process, injuries & other inflammatory conditions. High levels of CRP suggest a pro-inflammatory condition and can be considered as a prognostic marker for underlying diseases [2]. The IL-6-correlated CRP is of increasing interest for prognostic values. Results of CBC indicate that the lymphocytes & platelets counts significantly reduced in both severe & mild COVID-19 patients, when compared to pneumonic patients not infected with COVID-19, assuming that patients with COVID-19 might have thrombocytopenia & lymphopenia [3]. Conversely, no significant variations were seen in proportions & quantities of neutrophils & monocytes among those patient groups. Patients with severe COVID-19 had higher significant CRP concentrations than pneumonic patients with no COVID-19-infection [4]. Biochemical investigations

revealed a highly significant variations between severe COVID-19 and pneumonic patients with no COVID-19-infection in regard to aspartate aminotransferase (AST), lactose dehydrogenase (LDH), estimated glomerular filtration rate (eGFR) and sodium ion levels [5]. Lymphopenia is a main finding in the majority of patients and some studies observed elevated neutrophil counts. It is noticed that the total number of WBCs differs between patients, which may indicate neutrophilia or lymphopenia dominance. Among the most common important abnormal finding in the CBC results of patients with COVID-19 are lymphopenia with mild thrombocytopenia [6]. Prolonged activated partial thromboplastin time (aPTT) and prothrombin time (PT) were also reported in some patients with COVID-19. In addition, high D-dimer levels further confirms coagulopathy occurrence and as will be discussed later, it is an important indication to the progression of Covid-19 disease [7]. As previously observed, inflammation-related parameters are highly increased in the acute phase. Erythrocyte sedimentation rate (ESR), serum C-reactive protein and pro-calcitonin are elevated in those patients, albeit with different levels [8]. Former studies demonstrated that solubl (sCD-163) that represents macrophage activation, is elevated along with ferritin during the acute phase of inflammation [9], assuming that ferritin levels could give diagnostic values and could be used for diagnosis of COVID-19 virus [10]. In this regard, the findings by a study which screened ferritin in hemodialysis patients found that COVID-19 patients showed a mean elevation of 275% following viral infections. They reported that ferritin conc. remained stable or slowly reduced during the illness period among the majority of patients [11].

Materials and methods

In this study, a total of (83) patients with corona virus were enrolled in Al- Numan Hospital during the period from 15th February to 15th November 2020. CRP concentration was measured by Min-vides device, showing 10 dg/dl more than a normal. For the complete blood count, the results of Lymphocyte count Hb% and Packed Cell volume were read by CBC count device.

Statistical analysis

The Microsoft Excel & SPSS version 18 were used for data analysis. For comparison of differences between the groups, Chi-square test was applied.

Results

Table (1) regarding results of age distribution showed that the age group (40-59) years was most vulnerable 11(45.8%) to acute infection with CVID-19, followed by the age group (20-39) 9(37.5%) P=0.741.

Table (1): prevalence of COVID-19 IgM infections according age groups

Patient			Group	COVID IgM		Total
				Normal	Elevated	
	Age	<20	Count	6	1	7
			%	10.2%	4.2%	8.4%
		20-39	Count	24	9	33
			%	40.7%	37.5%	39.8%
		40-59	Count	21	11	32
			%	35.6%	45.8%	38.6%
		60+	Count	8	3	11
			%	13.6%	12.5%	13.3%
		Total	Count	59	24	83
			%	100.0%	100.0%	100.0%
P=0.741						

The results of anti-COVID-19 IgM antibody (COCID-19 IgM) incidence in the studied cases according to their residency showed that acute incidence of Covid 19 in rural areas was higher than in urban areas, P=0.090 as shown in table (20).

Table (2): Distribution of COVID-19 IgM infection according residency

Patient			Group	COVID IgM		Total
				Normal	Elevated	
	Residence	Urban	Count	33	8	41
			%	55.9%	33.3%	49.4%
		Rural	Count	26	16	42
			%	44.1%	66.7%	50.6%
		Total	Count	59	24	83
			%	100.0%	100.0%	100.0%
P=0.090						

In table (3), the results revealed that lymphocyte count increased 43(51.8%) cases, while it decreased in 15(18.1%) of them. However, the hemoglobin concentration and the packed cells volume were low for all patients with Caovid-19, 83(100.0%). The CRP value was elevated in 76(91.6) of patients in comparison to the control group, P = 0.005.

Table (3): Results of CBC and CRP in patients with Caovid-19

Parameters		Group			
		Patient		Control	
		Count	%	Count	%
Lymphocyte P=0.005*	Low	15	18.1%	0	0.0%
	Normal	25	30.1%	83	100.0%
	High	43	51.8%	0	0.0%
Hb P=0.005*	Low	83	100.0%	1	1.2%
	Normal	0	0.0%	82	98.8%
	High	0	0.0%	0	0.0%
PCV P=0.005*	Low	83	100.0%	1	1.2%
	Normal	0	0.0%	82	98.8%
	High	0	0.0%	0	0.0%
CRP P=0.005*	Normal	7	8.4%	76	91.6%
	Elevated	76	91.6%	7	8.4%

Discussion

COVID-19 is a very risky infection which may lead to death. There is an evidence suggesting that elderly CRP levels are affected by estrogen hormone replacement therapy. Owing to its traditional utilization as an infection marker and cardiovascular event, it has been recently proven that CRP plays essential roles in inflammatory process and host response to infections including apoptosis, complement pathway, phagocytosis, nitric oxide release & cytokine production, especially IL-6 and TNF-α [12]. The distribution of COVID-19 infections according to age groups showed that the age group (40-59) years was the most vulnerable to acute infection and this finding agreed with South Korean researcher (Yu X.,2020) who found coronavirus infection danger among old aged individuals was significantly influenced more than other age group patients. Viral infection elevation among people within 40–59 age is related to double risk infections in old aged individuals. Moreover, increasing viral infections among old aged patients is also significantly correlated with infection risks than other age group [13]. The incidence of anti-COVID-19 IgM antibody (COCID-19 IgM), in studied cases according to residency revealed acute incidence of Covid

19 in rural areas was higher than urban areas, and this result disagreed with (Eckerle I, Meyer B. 2020) who reported in a study from Spain, which involved > 60.000 participants, a sero-prevalence of 5%, specificity–sensitivity range of 3·7% [both tests were positive] to 6·2% [one test positive at least], with urban places surrounding Madrid more than 10% (e.g, sero-prevalence by immunoassay in Cuenca was 13·6%). Such sero-prevalence variations were also observed in cases of laboratory-confirmed COVID-19, that were too higher in urban than in rural places. In a study from Switzerland, the same numbers were detected among the 2766 participant [14]. The results of lymphocyte count, hemoglobin concentration, PCV and CRP showed that the increase in lymphocyte count was in 43(51.8%) of patients, while the decrease was in 15(18.1%) of them, while, the hemoglobin concentration and the packed cells volume were low for all patients with COVIO-19. These findings agreed with (Yufei Y, *et al*, 2020) who observed that CRP & NLR levels were higher, whereas the percentage of lymphocytes was low in COVID-19 patients when compared with the controls. In patients with positive COVID-19, CRP & NLR of the moderate groups showed lower levels than the severely infected patients (severe, critical & death group), and the lymphocyte rate of the moderate group showed higher than the critical & death groups. No significant variations in WBC count were found among the studied groups. The CRP, NLR & lymphocyte rate were shown to be independent risk factors to COVID-19 infection in the logistic regression analysis. The result of AUC in combined determination of CRP & NLR was 0.863, which showed higher level than that of the NLR [15].

Also the hemoglobin and packed cells volume are decreased, and these resultsare in a harmony with (Lippi, Gi and Mattiuzzi, Ca. 2020), who found the initially first evaluation & longitudinal hemoglobin value monitoring is recommended in SARS-CoV-2 infected patients, while a progressive Hb value decrease may indicate a worsened clinical advancement. As a result, studies must be designed to evaluate whether transfusion supports (i.e with blood or packed red blood cell administration) could help in such clinical condition for prevention of evolution into serious disease and deaths [16].

Conclusion

- Regarding results of age distribution showed that the age group (40-59) years were most vulnerable to acute infection with COVID-19, followed by the age group (20-39).
- Anti-COVID-19 IgM antibody (COVID-19 IgM) incidence in the studied cases according to their residency showed that acute incidence of COVID- 19 in rural areas was higher than in urban areas.

- Lymphocyte cells count increased, while it decreased in some of them. However, the hemoglobin concentration and the packed cells volume were low for all patients with COVID-19.
- The CRP value was elevated in most of patients in comparison to the control group.

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