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Routine blood tests as a crucial diagnostic tool for COVID-19

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A B S T R A C T

Routine laboratory tests are essential for identifying COVID-19 cases. Reviewing the clinical features of confirmed COVID-19 cases retrospectively can offer valuable insights, the data were collected from 240 files, which included all files from the beginning of the opening of the isolation center in first of June 2020, until the 30th of December 2021. Of the 240 cases, 100 cases were dead. Of survived cases, 54% were male and 46% were female. While the dead cases, 56% were male and 44% were female. In conclusion, the blood cell count plays a crucial role in both diagnosing and predicting the outcome of COVID-19, serving as a routine diagnostic tool. Low levels of leukocytes and differential white blood cell count can serve as indicators of a COVID-19 infection, while higher counts may indicate the progression of the disease. Conversely, lymphocyte and D-dimer levels do not provide diagnostic value but are indicative of the severity of COVID-19 cases.

1.Inroduction

The novel coronavirus was reported among patients with unexplained viral pneumonia in Wuhan City, Hubei Province in china in December 2019. Most suspected cases had contact with a sea food market where exotic animals are sold, this is said to be initiated the spread of the global pandemic (Juengling et al., 2020) Covid-19 clinical features range from asymptomatic carriage, flu-like symptoms including cough, fever, general weakness, myalgia, and respiratory failure requiring mechanical ventilation. The most known covid-19 complications were acute respiratory disease. The dry cough, Fever, muscle weakness, and chest pain are the most prevalent and typical symptoms of COVID-19 (Setti et al., 2020). The most common way of transmission COVID 19 infection is through to be by respiratory route, through large droplets or aerosols. Also infected surfaces and fomites have been the routes of infection in some instances (Li et al., 2020).

Laboratory diagnosis of COVID-19 is found to be achieved through molecular identification reverse transcriptase-quantitative polymerase chain reaction (RT-PCR) or viral gene sequencing (WHO, 2020). In countries with limited financial resources and in some developing nations, quick serological tests (such as complete blood count, D-dimer) are used alongside molecular testing for diagnosis. However, many of these settings lack the necessary laboratory and staff resources to conduct widespread molecular testing. Monitoring oxygen levels in Covid-19 patients is also essential. The lack of resources often results in delays between testing and confirmation of diagnosis, highlighting the importance of physician intervention. During this waiting period, a patient's medical history, blood test results, and imaging studies are crucial for assisting in the diagnostic process. In Libya, the first case of COVID-19 was identified on March 2020, and about months later, the number of

reported COVID-19 cases started to increase notably. The outbreak was first prominent in the southern region (Sabha) and then spread to the western and eastern parts of Libya (Bredan and Bakoush, 2021). This study was focusing on important blood laboratory tests that are routinely tested and readily available even in Al-Jufra Covid-19 Isolation department to determine the differences between laboratory parameters in COVID-19 case and severe or death COVID-19 cases. The investigation scope includes hematological parameters including total blood cells count and D-dimer levels.

2. Materials and methods:

The current cross-sectional study aimed to conduct a comprehensive survey of all files of patients diagnosed with the Covid-19 virus, in accordance with the National Center for Disease Control protocol. They were referred to the isolation center in Al-Jufra, Libya. Our study was focused on analyzing the clinical characteristics of COVID-19 cases. The data were collected from 240 files. It included all files from the beginning of the opening of the isolation center in first of June 2020, until the 30th of December 2021. Related data to gender, age, date of admission, and date of discharge, CBC laboratory analysis measured on Sysmex XE 2100 (Sysmex, Japan). D-dimer tests, level of oxygen in the blood, the patient's condition was also recorded in terms of recovery or death. A case was considered confirmed when was tested positively for SARS-CoV-2 by RT-PCR (Zou et al., 2020). Data was collected, according to its availability in the patient's file. Patients characteristics: Age, Gender, health status were recorded for each patient. SPSS package was used in analyzing the results.

Statistical analyses: for data analyzing (SPSS version 18) used. A 2-tailed P-value of less than 0.05 was counted significant . For the comparison 95% power to detect a significant difference in mortality.

3. Results:

The results of the current study showed that the mortality rate in males was 23%, while the mortality rate in females was 18%. For the comparison between the two variables, a t-test was conducted for the two different samples (Table 1), and the mean calculated for the reading of the D-dimer for the cases that recovered was 0.9045, while the reading of the D-dimer of the dead cases was 3.0610, while the standard deviation was 1.20 and 3.60, respectively. The results were statistically significant differences between the D-dimer reading of recovered and died cases. Since the probability value was 0.000, which is less than the confidence level of 0.05. Therefore its concluded that there are differences in the D-dimer readings between the cases that healed and the cases that died in males.

Table No. (1): illustrated the Means of D-dimer reading for Males, standard deviation for Males, standard

	Status	Number	Mean	Standard deviation	T- value	p- value
D-dimer Reading	recovered	52	0.905	1.202	4.042-	0.000
	died	40	3.061	3.600	-3.636	0.001

The comparison between the two variables, a t-test was conducted for the two different samples, and the arithmetic mean calculated for the D-dimer reading for the cases that recovered was 0.6621, while the D-dimer reading for the cases that died was 3.6002, while the standard deviation was 0.53 and 3.46, respectively. The results of the test were statistically significant. Indicated the differences between D-dimer for the cured cases were and the cases that died. The probability value was 0.000, which is less than the confidence level of 0.05. (Table 2), therefore, we conclude there were differences in the D-dimer readings between recovered cases and the cases that died in females

Table No. (2): illustrated the Means of D-dimer reading for Females, standard deviation

	Status	Number	Mean	Standard deviation	T-value	p-value
D-dimer Reading	recovered	45	0.6620	0.5390	-5.605	0.000
	died	34	3.600	3.468	-4.895	0.001

The Distribution of gender among recovered cases of Covid-19 showed the number of the male was76 and female was 64 as presented in Figure 1.

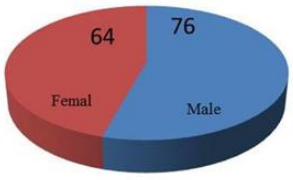

Fig. 1. Destribution of gender among recoverd cases of Covid-19

The comparison between the two variables, a t-test was conducted for the two different samples, and the arithmetic mean calculated for the ages of males who recovered was 57.78 and those who died was 68.48, while the standard deviation was 19.08 and 13.45, respectively. As the probability value was 0.000, which is less than the confidence level of 0.05. There were statistically significant differences in the average ages of males who died and who recovered, and we also conclude that those who died average age is greater than those who recovered (Table 3).

Table No. (3): illustrated the Means of ages of males who died and those who recovered

	Status	Number	Mean	Standard deviation	T-value	p-value
Ages	recovered	76	57.78	19.078	-3.592	0.000
	died	56	68.48	13.446	-3.781	0.001

The comparison between the two variables, a t-test was conducted for the two different samples, and the mean calculated for the ages of the females who recovered was 54.31 and those who died was 63.52, while the standard deviation was 18.87 and 15.74, respectively. as the probability value was 0.009, which is less than the confidence level of 0.05, this agreed with the researcher assumed that there are statistically significant differences in the average ages of females who died and those who recovered, and we also conclude that those who died have an average age greater than those who recovered (Table 4).

Table No. (4): illustrated the Means of ages of females who died and those who recovered

	Status	**Number**	**Mean**	**Standard deviation**	**T-value**	**p-value**
Ages	recovered	64	54.31	18.878	-2.661	0.000
	died	44	63.52	15.741	-2.752	0.007

The results of the current study (Table 5) showed that the average CBC readings for covid-19 males were similar in the cases that recovered and the cases that died. The results of the T-test showed that there were no statistically significant differences in the averages of the cases that recovered and the cases that died for each of the red blood cells (RBC), Hemoglobin HGB, Platelets (PLAT), lymphocyte (LYMPH). There were significant differences between the means of white blood cells (WBC) and neutrophils for the cases that recovered compared to the cases that died.

The mean WBC for the patients who recovered was 8.37 and the standard deviation for them was 4.00. The arithmetic mean for those who died was 12.94 and the standard deviation for them was 8.22. The t-value was 3.48 and the p-value was 0.00. Neutrophils for patients who recovered is 6.48, and the standard deviation for them was 3.62. Arithmetic mean for those who died was 10.44. The standard deviation for them is 7.76. The t-value is -3.32 and the p-value is 0.00. We conclude there were statistically significant differences in the average neutrophils reading.

Table No. (5): illustrated the mean rates, standard deviation, T. value, P- value of CBC analysis for males who died and those who recovered

CBC	**Status**	**No..**	**Mean**	**Standard deviation**	**T-value**	**P-value**
WBC	Recovered	62	8.37	4.00	-3.84	0.00
	Died	49	12.94	8.22		
RBC	Recovered	66	4.52	0.70	0.15	0.87
	Died	53	4.50	0.80		
HGB	Recovered	66	12.78	2.10	0.46	0.64
	Died	53	12.58	2.46		
PLAT	Recovered	66	211.52	93.93	-0.17	0.86
	Died	53	214.87	115.18		
LYMPH	Recovered	62	1.14	0.81	1.11	0.26
	Died	49	0.97	0.70		
NEUT	Recovered	54	6.48	3.62	-3.32	0.00
	Died	43	10.44	7.76		

The results of the study showed that the CBC analyzes were similar for the females who died and the females who recovered. The results of t-test showed that the differences between the means of recovered cases and those who died were not significant for WBC, RBC, HGB, PLAT, and NUTE, as shown in the table (6). While the arithmetic mean of the lymph node for patients who recovered was 1.37. The standard deviation for them was 0.83. The arithmetic mean for those who died is 0.94 and standard deviation for them is 0.53. The t-value was 2.77, and the p-value was 0.00. There were statistically significant differences for the average lymphocytes reading.

Table No. (6): illustrated the mean rates, standard deviation, T. value, P- value of CBC reading for females who died and those who recovered

CBC	Status	No..	Mean	Standard deviation	T-value	P-value
WBC	Recovered	51	8.21	3.34	-0.50	0.61
	Died	38	8.75	6.47		
RBC	Recovered	58	4.26	0.54	-1.00	0.31
	Died	39	4.82	4.18		
HGB	Recovered	58	11.86	3.72	0.66	0.506
	Died	39	11.43	1.75		
PLAT	Recovered	58	260.79	101.45	1.92	0.05
	Died	39	220.72	98.73		
LYMPH	Recovered	48	1.37	0.83	2.77	0.00
	Died	38	0.94	0.53		
NEUT	Recovered	40	6.38	3.06	-0.32	0.74
	Died	36	6.71	5.39		

4. Discussion:

CBC readings for covid-19 males were similar in the recovered cases and dead cases. Results showed statistically significant differences with *p* value 0.000. The low value of WBC count was associated with infection of COVID-19 patients in this study. A previously similar finding was observed by Cheng and his colagues (Cheng et al. 2020).
WBC differentiation showed a significant association between the neutrophils and COVID-19 patientsas shown in Table (7). The most represented neutrophils analysis for males who died and those who recovered showed statistically significant of *p*-value 0.00. Thrombocytopenia has been implicated as a marker for severe SARS-CoV-2 infection. In this study were no association between Platelet count in dead males and the recovered. The *p* value was 0.86. This was in contrast to the study by Cheng and his co-authors (2020) showed a significant association between a low number of platelets and COVID-19 patients. (Cheng etal., 2019). The finding of thrombocytopenia as a marker of severe covid-19 cases was in similarity of others. (G. Lippi et al., 2020). It was observed that thrombocytopenia in COVID-19 cases is, as a result of thrombocyte production, activation, or consumption (Assinger 2014). The D-dimer for the cases that were cured and the cases that died, as the probability value was 0.000, which is less than the confidence level of 0.05. (Table 2), therefore, conclude that there are differences in the D-dimer readings between the cases that were recovered and the cases that died in females. This was in similar with previous studies by Gao and his colleagues (2020. Furthermore as a marker of mortality at higher levels by others (Hu etal., 2020, Weiss and Murdoch 2020).

5.Conclusion:

In conclusion, the cheaper and routinely carried out blood investigations may help in diagnosis and monitoring and should be estimated always during care of Corona patients. Patients with Corona have lower WBC and neutrophil levels than those with community-acquired respiratory chest disease . However, in our study, a mild increase in baseline in white blood cells count. This study showed thrombocyte counts can be used as a marker to differentiate between Corona and other infections regardless of severity. The determination of D-dimer levels did not demonstrate diagnostic test. It is may be important show the COVID-19 patient severity. This screening study of COVID-19 cases, allowing better evaluation of diagnosis and may assisting the medical decisions facing lack of resources in a pandemic situation. In addition, the upgrade of diagnostic laboratories in such countries is essential to meet the demands and challenges facing epidemics and pandemics.

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