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Study of Platelets Behavior in COVID-19 Adult Patients

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ABSTRACT:
Background: Coronavirus disease (COVID-19) was first detected in in China and has rapidly spread and declared as a pandemic by the World Health Organization (WHO) in 2020.Thrombocytopenia was common complication, and thrombocytopenia one of risk factors association with high mortality rate. **Objective**: To investigate the relationship of thrombocytopenia with mortality in adult COVID 19 patients. **Methodology**: Retrospective observational cross section with sample size study were 90patients confirm diagnosis of COVID 19 by PCR, and admitted to hospital, we excluded age under 18 years old, Outpatient with COVID 19, Patient with preexisted hematological, Liver, renal & tumor disease, patient on aspirin. We collected first platelet count result in complete blood count (CBC) at admission patient in the hospital, we administrated questionnaire to obtain patients information as age, sex, chronic illness, time & place of admission with outcome of patient and laboratory investigation. **Results**: Thrombocytopenia was found in 48 patients with strong relationship between thrombocytopenia with mortality rate was 71.8%. And mortality rate in adult COVID19 patients with normal platelets count was 28.2%. **Conclusion**: Thrombocytopenia is observed with high incidence in COVID 19 patient which is associated with increased mortality rate among those patients.

Key words: Thrombocytopenia, Covid -19, Mortality rate

INTRODUCTION:

In November 2019, a new human Corona Virus Disease (COVID-19) outbreak was discovered in Wuhan, Hubei Province, China, again potentially originating from bat populations. However, it is possible that human-to-human transmission began earlier (WHO, 2020). Shortly after this outbreak, the virus was named SARS-CoV-2, and the outbreak was declared a global pandemic by the World Health Organization (WHO) in 2020 (WHO, 2020). On the 24th of March 2020, COVID-19 was confirmed to have spread to Libya, when the first case was officially confirmed in Tripoli in a 73-year-old man who had returned to the country on the 5th of March from a trip to Saudi Arabia (Amin et al, 2021). The first case in the city of Tobruk was detected on the 23rd of July 2020, when a 70- year-old female presented at Tobruk Medical Centre with a fever, cough, and shortness of breath. The diagnosis was confirmed using an oropharyngeal swab. (pascarella G et al.,2020). Generally, about one-third of people infected with the virus do not develop noticeable symptoms at any point in time (Gao et al., 2021). Asymptomatic carriers of COVID-19 tend not to test but can still spread the disease, while other infected people can develop symptoms after testing positive, known as pre-symptomatic carriers, or have very mild symptoms, in both cases; they can still also spread the virus. (Gandhi et al., 2020). As a common infection, there is a delay between the moment a person first becomes infected and the appearance of the first symptoms. The median delay for COVID-19 is four to five days (Gandhi et al., 2020), Most symptomatic people experience symptoms within two to seven days after exposure, and almost all will experience at least one symptom within 12 days (Wiersing et al., 2020). COVID -19 is transmitted when people breathe in air contaminated by droplets and small air particles containing the virus. The risk of breathing in these droplets is highest when people are nearby. Transmission can also occur if splashed or sprayed with 3 contaminated fluids in the eyes, nose, or mouth, and rarely via contaminated surfaces. People can remain contagious for up to 20 days and develop symptoms(McNeil., 2020). The symptoms of COVID-19 are divided into three clusters. The respiratory symptom cluster with cough, sputum, shortness of breath, and fever, the musculoskeletal symptom cluster, with muscle

and joint pain, headaches, and fatigue, and the digestive symptom cluster with abdominal pain, vomiting, and diarrhea. (Saniasiaya et al., 2020). The severity of the symptoms of COVID -19 can vary ranging from mild to critical and potentially fatal (Grant et al., 2020). 81% develop mild to moderate symptoms, while 14% develop severe symptoms (Saniasiaya et al., 2020). Thrombocytopenia has been identified as potential risk factors for COVID-19 mortality (Maquet J et al., 2020), and pathophysiology underlying the mechanisms still unclear because the role of platelets in Covid-19 infection is still not yet studied well and needs to be clarified in order to safe patients life and for choosing good trials of proper treatment strategies. So, our study tries to shed the light on the role of thrombocytopenia in Covid -19 adult patients admitted in Tobruk Medical Center.

Aims of the Study:

This study was carried out to determine the prevalence of thrombocytopenia in COVID-19 adult inpatients in Tobruk Medical Center and Investigate the relationship between thrombocytopenia and mortality rates in these patients.

Materials and Methods:

Study Design, Setting, and Population:

A retrospective observational study was conducted from July 2021 to September 2021 on COVID-19 patients in the isolation department at Tobruk Medical Center, Tobruk, Libya. The hospital is providing different medical services to more than 130.000 people in the region. All patients were confirmed by rapid real-time reverse transcription polymerization chain reaction (RT-PCR) on nasopharyngeal and oropharyngeal swabs (Mayo Clinic, 2022).

Inclusion Criteria:

1. Patients over 18 years old who were hospitalized with a diagnosis of COVID-19 in both the ward and ICU. 2.All patients with the diagnosis COVID-19 (confirmed by PCR rapid test from nasopharyngeal and oropharyngeal swab).

Exclusion Criteria:

1. Age under 18 years old.
2. Outpatient with COVID-19,
3. Patients with pre-existing cardiovascular, haematology, Liver, renal & tumor disease.
4. Patients on aspirin & anticoagulants. 5. Pregnancy.

Sample Size Determination and Sampling Technique:

The entire COVID-19 cases that fulfilled the inclusion criteria within the study period; the COVID-19 inpatients in the isolation departments, and those more than 18 years old were included in the study. A total of 90 COVID-19 patients (49 males and 41 females), (51 were admitted to a medical ward, and 39 were admitted to the ICU) were included.

Operational definition:

The value of a normal PLT was 150–450 per microliter of blood, while a PLT of less than 150 is considered thrombocytopenia (Cleveland Clinic, 2021). we collected first platelet count result in complete blood count (CBC) at admission patient in the hospital. Mild thrombocytopenia was (100–150), a moderate–thrombocytopenia was (100¬50) and severe–thrombocytopenia was (<50). (Cleveland Clinic, 2021)

Data Collection Procedures:

Retrospective data collection and data abstraction was used as a tool for the collection of socio-demographic data (gender, age), and past and current medical history, including the history of chronic disease. Information about the time of hospital admission and discharge whether the patient was admitted to an ICU or ward, and the final outcome, which was either ‘expired’ or ‘discharged was also collected. Besides, the laboratory investigations such as complete blood count (CBC), CRP, D-dimer, RFT, and the first PLT resulted in a CBC when patients were admitted to hospital, in both the wards and the ICUs were collected. The questionnaire was prepared in English.

Safety Management:

Personal protective equipment and cleaning along with hand sanitizer, face mask, ventilation, and social distance with avoided crowding area were provided at multiple locations throughout the workplace. Detergent/ disinfectant surface wipes were provided to clean workstations and equipment used. Bathrooms were stocked with hand soap for 20 minutes and paper towels and had posters with instructions on how to wash your hands. There was frequent cleaning of touched areas and surfaces. Disinfectant solutions were maintained at an appropriate strength and used per the manufacturer’s instructions. Wearing PPE 1, gloves and glasses when contact with files, cleaning and washing hands thoroughly with soap and water before and after each activity.

Data Management and Statistical Analysis:
The data were checked for completeness, cleaned, sorted, and categorized before being entered into EpiData version 4.6 and exported to IBM SPSS version 26 for analysis was used cross-section study. The socio-demographic and biochemical characteristics of study participants were summarized by using descriptive statistics and then presented in tables, figures, and text. Categorical variables were given as frequency rates and percentages. In all statistical tests, a p-value < 0.05 was considered statistically significant.

Ethical Considerations:
The study was conducted after it was reviewed and approved by the Ethical Review Committee of the isolation infectious department at Tobruk medical Centre. A permission letter to conduct the study was obtained before the commencement of the study, and the study was as per the principles of the Declaration of the Committee. All the data obtained were kept confidential by using codes instead of any personal identifiers and used only for the study purpose.

Results:
The 90 patients in this study, the mean age was 50 years old. There were 49 male and 41 patients. All patients had a confirmed diagnosis with a PCR test, 51 patients were admitted to a ward, while 39 were admitted to the ICU.

Descriptive data:

Age group:
The mean age was 50 years old. The age distribution is illustrated in tablet 1.
Most of the cases were in the age group 51-60 (22-24%) and the least are in the age group 91-100 (2 - 2.2%).

Table 1: Percentages of patients according to age group

Age	Count	Column N %
31–40 years	10	11.1%
41–50 years	14	15.6%
51–60 years	22	24.4%
61–70 years	15	16.7%
71–80 years	16	17.8%
81–90 years	6	6.7%
91–100 years	2	2.2%
Total	90	100.0%

Gender:
Output of patients are 90, 41 (45.6%) were female and 49 (54.4%) were males.

Table 2: percentage of patients according to gender.

Gender	Count	N%
Male	49	54.4%
Female	41	45.6%
Total	90	100.0%

Chronic illness:
Our study showed that 47.8% of patients had no history of chronic illness, while 52.2% had a chronic illness of which DM with HTN had the highest percentage (16.7%) (figure3). Hypertension alone comprises 13.3%, DM alone comprises 12.2%, and lung disease alone comprises 4.4%. On the hand, the least notable percentage (1.1%) were in the patients with cardiac diseases, or cardiac diseases with HTN. Also, a similar lower percentage was in patients with epilepsy.

Table 3: percentage of patient according to presence & absent of chronic illness.

Chronic illness	Count	Number %
With No chronic illness	43	47.8%
With chronic illness	57	
DM & HTN	15	16.7%
HTN	12	13.3%
DM	11	12.2%
Lung disease	4	4.4%
Cardiac disease	1	1.1%
Epilepsy	1	1.1%
HTN & Cardiac disease	1	1.1%
HTN & Lung disease	1	1.1%
Lung & cardiac disease	1	1.1%
Total	90	100%

Acute or Chronic COVID-19:

The most common of patient are acute result (acute less than 2weeks) with percentage 64.4% (58 patients), when chronic patients with 35.6% (32 patients).

Table 4: percentage of disease status- acute & chronic.

Acute or Chronic	Count	Number %
Acute	58	64.4%
Chronic	32	35.6%
Total	90	100.0%

ICU or Ward:

Most of patients were admitted to the ward (56.7%). The ICU patients, approximately 1/4th of them were on continuous positive air pressure (CPAP), and about 1/7th of them were on oxygen therapy by mask and only 2.2 was connected to mechanical ventilation (M.V).

Table 5: percentage of patients in ICU or Ward admission.

ICU or Ward	COUNT	Number %
Ward	51	56.7%
ICU	39	43.3%
ICU with CPAP	24	26.7%
ICU with O2	13	14.4%
ICU with M.V	2	2.2%
Total	90	100.0%

Length of Hospital Stay:
Most of the patients stayed 2-3days (46.7%), whereas those who had stayed one week had nearly 1/3rd of the total, and the lesser percentage was for those had prolonged stay of more than 2 weeks.

Table 6: percentage with patient's length stay in hospital.

Length stays in Hospital	Count	Number %
2-3 days	42	46.7%
Week	28	31.1%
> week	20	22.2%
Total	90	100.0%

Hemoglobin Level:
Most of patients are present with normal hemoglobin with percentage 94.5% (85), when only 5.6% of patients are present with low hemoglobin (5).

Table 7: percentage of HB

HB	COUNT	Number %
Normal	85	94.4%
Less < 11	5	5.6%
Total	90	100.0%

Number of WBC:
Most of patients are present with normal WBCs count with percentage (54.5%), when percentage of patient with high WBCs >10(28.9 %), was more the patients with low WBCs<5 (16.7%).

Table 8: Percentage of WBCs

WBCs	COUNT	Number%
Normal	49	54.5%
Low <5	15	16.7%
High >10	26	28.9%
Total	90	100.0%

Number of PLTS:
Our-study with low PLTs was more with percentage about 53.3%. Most common was with mild low platelets (PLTs number 100-150) with 42.2%, and less common with sever low PLTs (<50) with 1.1%.

Table 9: Percentage of PLTs:

PLTs	Count	Number%
Normal	42	46.7%
Mild low 150-100	38	42.2%
Moderate 100- 50	9	10.0%

Sever low <50	1	1.1%
Total	90	100.0%

Level of CRP:
Most of patients were with very high CRP with percentage 60.0% (54), when patients with normal CRP were less common with percentage 8.9%.(8)

Table 10: percentage of CRP.

CRP	Count	Number%
Very high (<30)	54	60.0%
High (7-30)	28	31.1%
Normal	8	8.9%
Total	90	100.0%

Level of D-dimer:
A significant proportion of the patients in the study had elevated D-dimer levels, with 27.8%having high level and 18.9% having very high levels. This may increase risk of blood clots or thrombosis in these patients particularly in the context of COVID-19 .

Table 11: percentage of D-dimer.

D-dimer	Count	Number%
Normal	48	53.3%
High	25	27.8%
Very high	17	18.9%
Total	90	100.0%

RFT:
Most of patients were normal RFT with percentage 88.9% (80), and only one patient was with ESRD 1.1%, when 10.0% of patient with elevated in RFT. which complication of COVID-19 , those patients were with normal renal function before infected with COVID-19. High RFT, meaning GFR 89 to 15, stage 2, stage 3, and stage 4 of chronic renal disease . (bindroo et al,2022)

Table 12: percentage of RFT:

RFT	Count	Number%
Normal	80	88.9%

High	9	10.0%
ESRD	1	1.1%
Total	90	100.0%

Outcome of patient:

Outcome of patients was 58 discharged with percentage (64.4%), when 32 of patients were died with percentage .(%35.6)

Table 13: percentage of discharge & died of patients.

Outcome	Count	Number%
Discharged	58	64.4%
Dead	32	35.6%
Total	90	100.0%

Relationships:

Prevalence of low PLT in COVID-19 patients:

Thrombocytopenia was found in 48 patients (53.2%), the low PLT (100–150) were 38, nine (10%) had a moderate–low PLT (100–50) and one patient (approx. 1%) had a severe–low PLT(50>) .

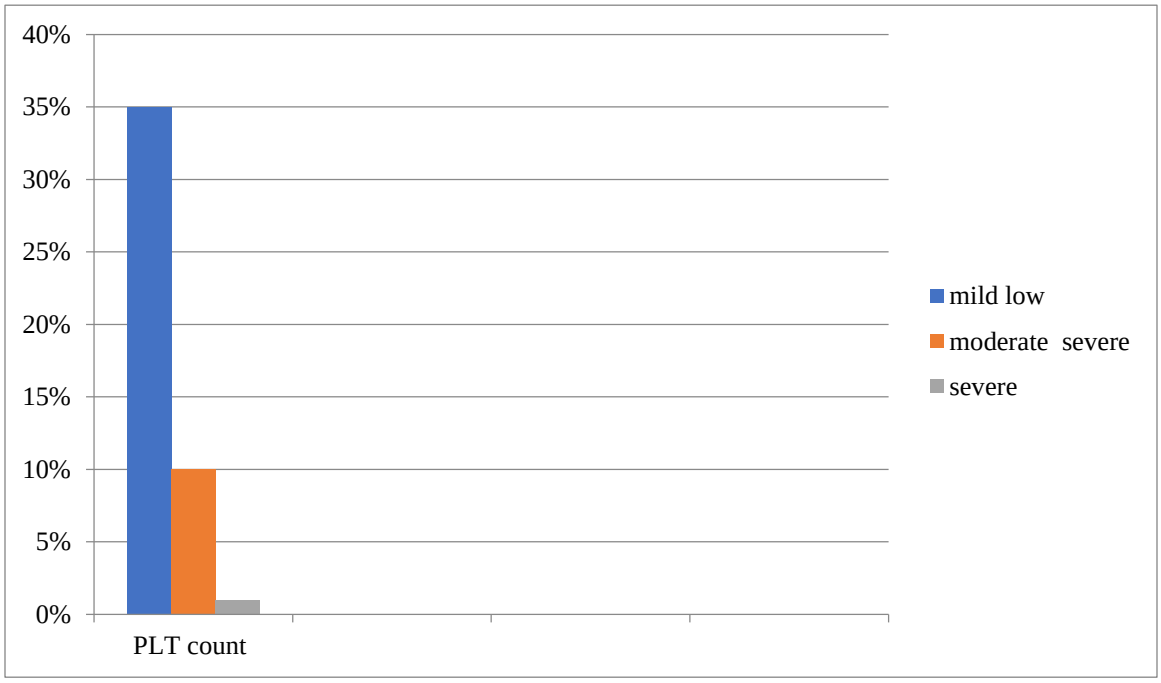

Figure 3: Prevalence of low PLT in COVID-19 patients

Relationship between PLT and mortality rates:

Our study revealed a strong relationship between low PLT and outcome, with a significant (P-value of 0.038) mortality in patients with thrombocytopenia, equating to 71.8%. In patients with a mild–low PLT, mortality was 53.1%, while the mortality rate for moderate–low PLT was 15.6%, and mortality in severe low PLT was 3.1%. The mortality rate in COVID-19 patients with a normal PLT was 28% (42 of the 90 patients presented with normal platelets number. Demonstrates a significant association between outcome and PLT, (P value = 0.038*)

Table 14: Relationship between outcome and PLT

	Expired		Discharge		Total		
PLT	N	%	N	%	N	%	
Normal	9	28.1%	33	56.9%	42	46.7%	P-value 0.038*
Mild–low (150–100)	17	53.1%	21	36.2%	38	42.2%	
Moderate–low (100–50)	5	15.6%	4	6.9%	9	10.0%	
Severe–low (<50)	1	3.1%	0	0.0%	1	1.1%	

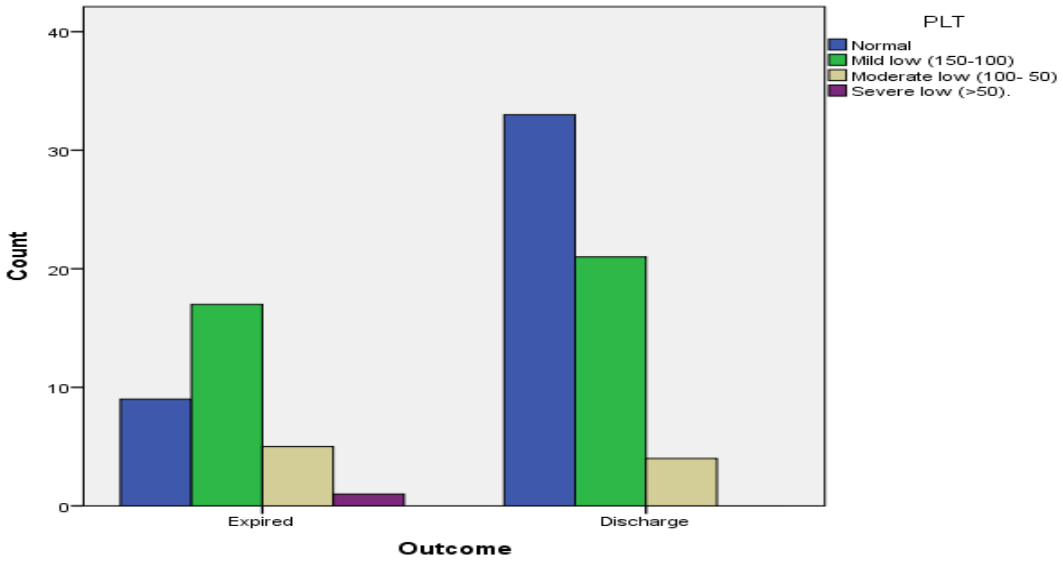

Figure 4: Relationship between outcome and PLT among the study sample

In identifying the risk factors in COVID-19 patients with thrombocytopenia, which lead to an increased mortality rate, a correlation test was conducted between mortality in thrombocytopenia COVID-19 patients and age, gender, chronic illness, if patient was acute or chronic, place of admission – ward or ICU – and length of stay in hospital, as well as on laboratory results for HB levels, WBC, PLT, CRP, D-dimer and RFT.

Relationship between mortality and age categories among the study sample:

The results revealed no significant association between outcome and age categories (P value = 0.547). There was a high incidence of mortality (25%) in patients aged between 60–70 years old, about 25%, while a low incidence of mortality was found in COVID-19 patients aged 18–30 years old.

Table 15: Relationship between outcome and age. Demonstrates no significant association between outcome and age categories (P-value = 0.547).

Age	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
18–30 years	1	3.1%	4	6.9%	5	5.6%	

31–40 years	4	12.5%	6	10.3%	10	11.1%	0.547
41–50 years	5	15.6%	9	15.5%	14	15.6%	
51–60 years	5	15.6%	17	29.3%	22	24.4%	
61–70 years	8	25.0%	7	12.1%	15	16.7%	
71–80 years	6	18.8%	10	17.2%	16	17.8%	
81–90 years	3	9.4%	3	5.2%	6	6.7%	
91–100 years	0	0.0%	2	3.4%	2	2.2%	

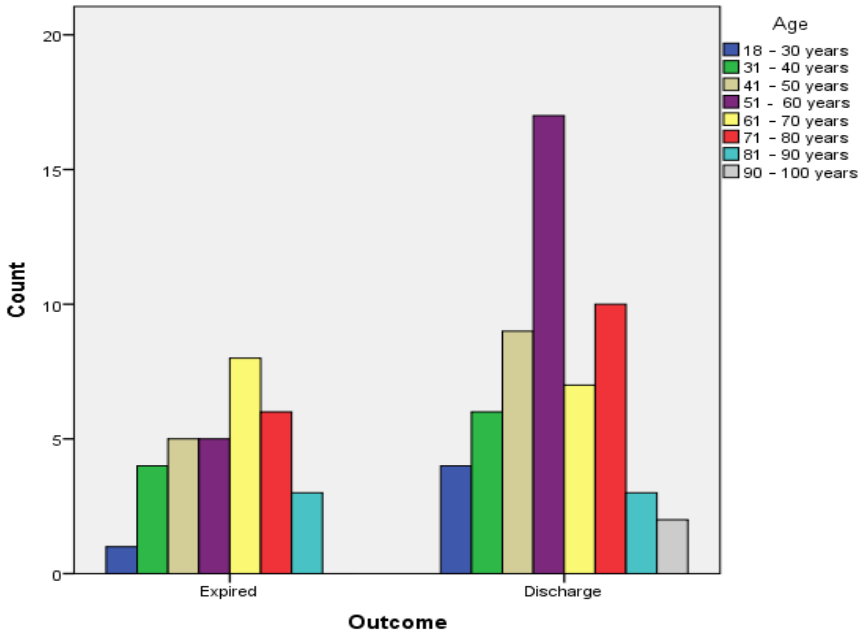

Figure 5: Relationship between outcome and age

However, the finding that there was no significant association between outcome and age categories (p-value: 0.45) is somewhat surprising ,given the known relationship between age and mortality inCOVID-19patients .

<u>Relationship between morality and gender in the study sample</u>:

In this study, there were 49 male and 41 female patients. The mortality rate was higher among the male than the female patients (approximately 63% for male patients). This demonstrates that there is no significant association between the outcome and gender (P-value = 0.254).

Table 16: Relationship between outcome and gender.

Demonstrates no significant association between outcome and gender (P- value = 0.254).

Gender	Expired		Discharged		Total		P-Value
	N	%	N	%	N	%	
Male	20	62.5%	29	50.0%	49	54.4%	0.254
Female	12	37.5%	29	50.0%	41	45.6%	

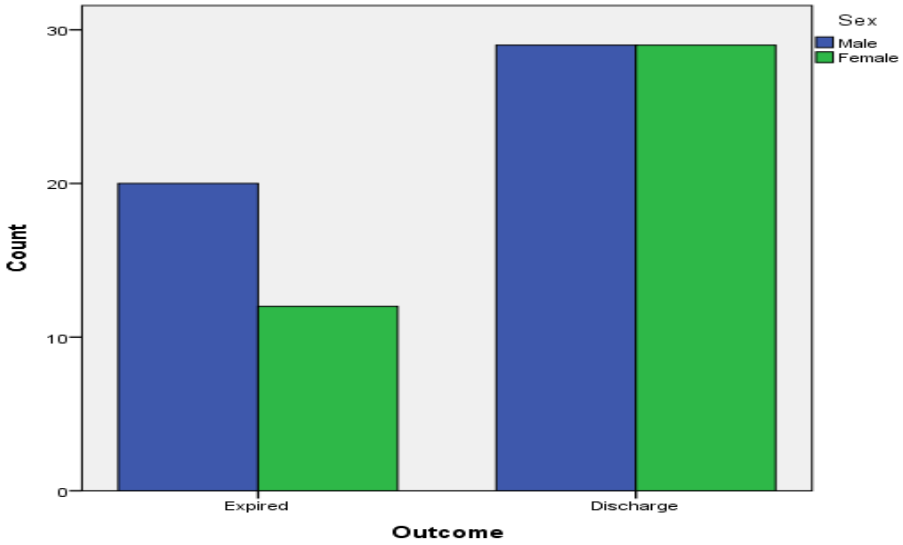

Figure 6: Relationship between outcome and gender

<u>Relationship between mortality and chronic illness categories among the study sample</u>:

The mortality rate was the same between the COVID-19 patients who had a chronic illness and those who did not. This shows that there is no significant association between outcome and chronic illness categories (P-value = 0.463). However, the rate of mortality was higher in hypertensive patients.

Table 17: Relationship between outcome and chronic illness categories.

Shows no significant association between outcome and chronic illness categories (P-value = 0.463).

Chronic illness	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
No chronic illness	14	43.8%	17.2%	50.0%	43	47.8%	0.463
DM & HTN	5	15.6%	10	17.2%	15	16.7%	
DM	3	9.4%	8	13.8%	11	12.2%	
HTN	7	21.9%	5	8.6%	12	13.3%	
Lung disease	1	3.1%	3	5.2%	4	4.4%	
Lung &Cardiac disease	1	3.1%	1	0.0%	1	1.1%	
Epilepsy	1	3.1%	0	0.0%	1	1.1%	
HTN & Lung disease	0	0.0%	1	1.7%	1	1.1%	
HTN & Cardiac disease	0	0.0%	1	1.7%	1	1.1%	
Cardiac disease	0	0.0%	1	1.7%	1	1.1%	

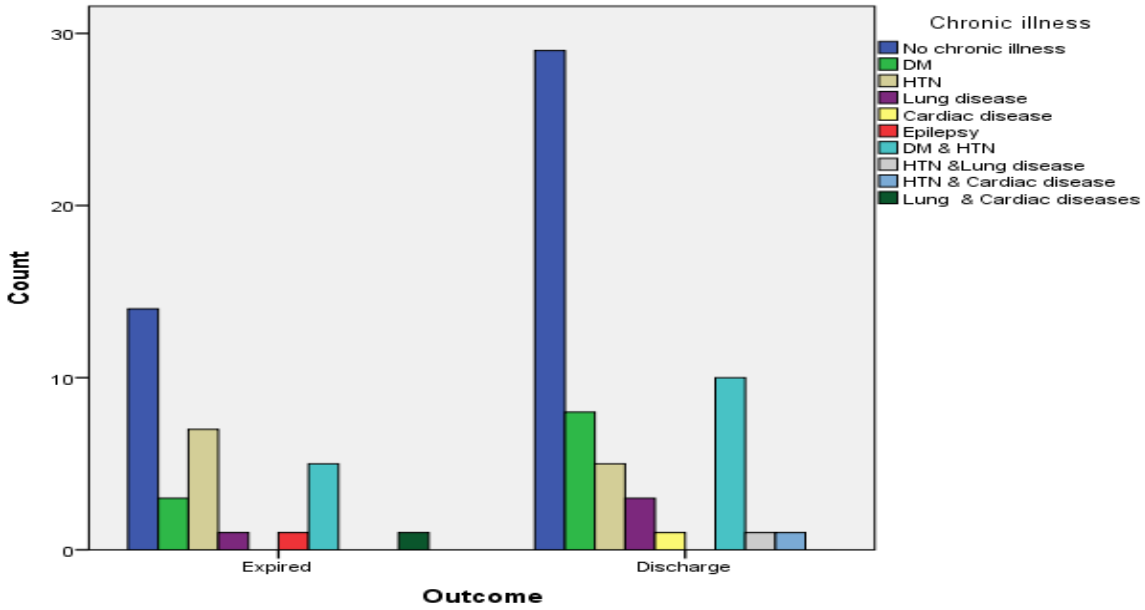

Figure 7: Relationship between outcome and chronic illness .

Relationship between mortality and disease chronicity among the study sample:

Mortality among acute COVID-19 patients was higher than among chronic patients; however, there was no significant association between outcome and disease chronicity (P-value = 0.862).

Table 18: Relationship between outcome and disease chronicity.

Shows no significant association between outcome and disease chronicity (P-value = 0.862).

Acute or Chronic	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
Acute	21	65.6%	37	63.8%	58	64.4%	0.862
Chronic	11	34.4%	21	36.2%	32	35.6%	

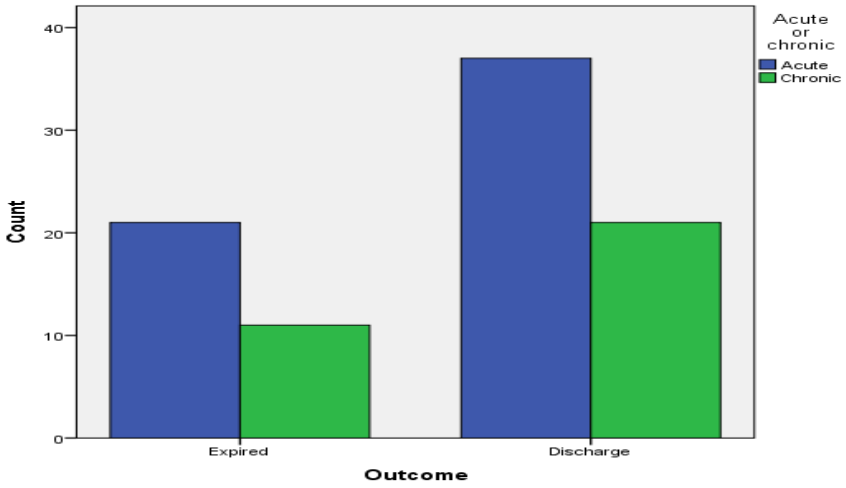

Figure 8: Relationship between outcome and disease chronicity

Relationship between mortality and length of hospital stay among the study sample:

The observation from table is that the mortality rate is highest among patients admitted to the ICU with CPAP (53.1%)and lowest among patients who were placed on an O2mask (3.1%). This suggests that the level of care received by COVID-19 patients is an important factor in determining outcome, with the patients of COVID-19in ICU with CPAP having the highest risk of mortality rate and patients in award with O2 mask having the lowest risk of mortality .This shows there was a highly significant association between outcome and hospital stay (P-value <0.001).

Table 19: Relationship between outcome and hospital stay.

Shows a highly significant association between outcome and hospital stay (P-value = <0.001).

ICU or ward	Outcome						P-value
	Expired		Discharged		Total		
Ward	N	%	N	%	N	%	
ICU with CPAP	10	31.3%	41	70.7%	51	56.7%	<0.001*
ICU with O2 MASK	17	53.1%	7	12.1%	24	26.7%	
ICU with MV	4	12.5%	9	15.5%	13	14.4%	
	1	3.1%	1	1.7%	2	2.2%	

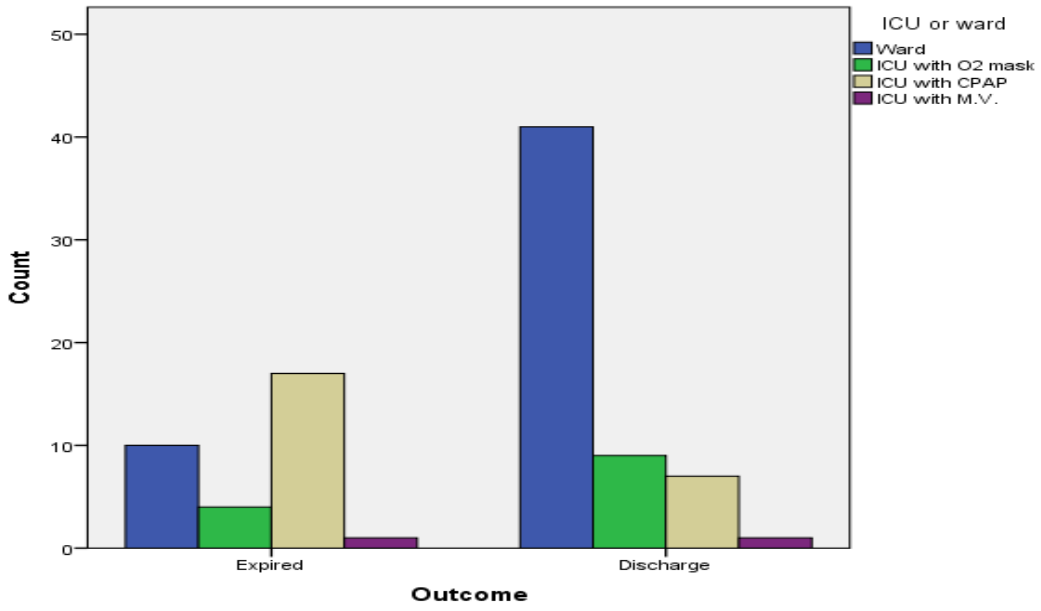

Figure 9: Relationship between outcome and hospital stay

Relationship between mortality and hospital stay in days among the study sample:

No significant association was found between the mortality rate in COVID-19 patients with thrombocytopenia and hospital stay in days (P-value = 0.424).

Table 20: Relationship between outcome and hospital stay in days among the study sample. Shows no significant association between outcome and hospital stay in days (P-value = 0.424).

Days stay in hospital	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
2–3 days	12	37.5%	30	51.7%	42	46.7%	0.424
Week	12	37.5%	16	27.6%	28	31.1%	
>Week	8	25.0%	12	20.7%	20	22.2%	

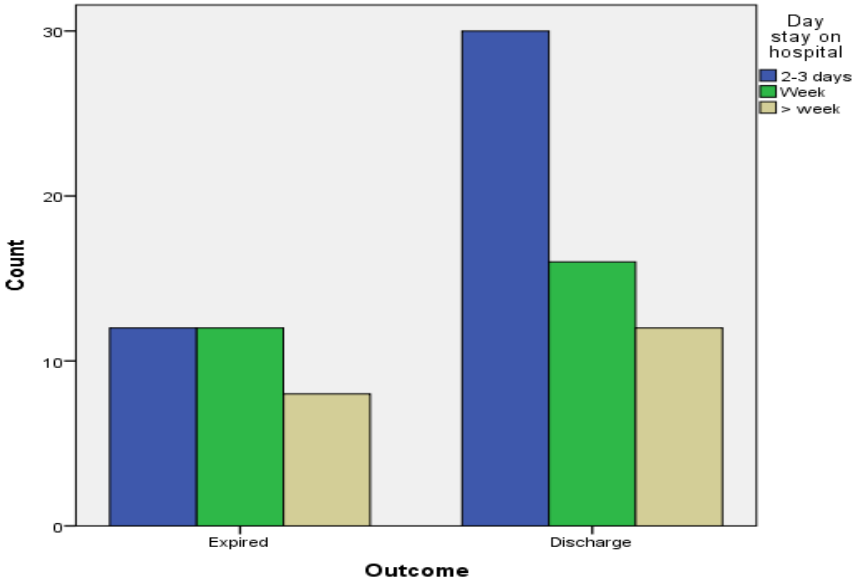

Figure 10: Relationship between outcome and hospital stay in days

Relationship between mortality and laboratory investigation among the study sample:

Relationship between outcome and HB:

Shows no significant association between outcome and HB (P-value = 0.831).

Tablet 21 : Relationship between outcome & HB.

Hb	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
Normal	30	93.8%	55	94.8%	85	94.4%	0.831
Anaemic (<11)	2	6.3%	3	5.2%	5	5.6%	

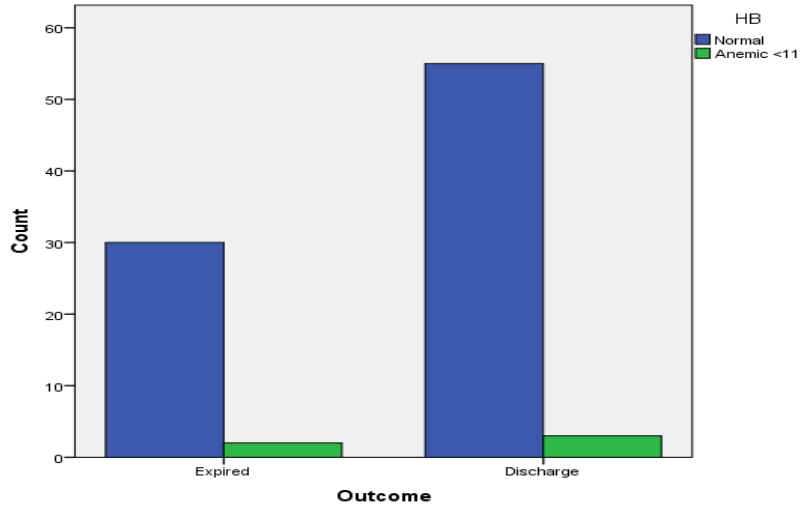

figure 11: Relationship between outcome &HB

Relationship between outcome and WBC among the study sample:
Shows no significant association between the outcome and WBC (P- value = 0.401).

Table 22: Relationship between outcome & WBCs

WBCs	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
Normal	15	46.9%	34	58.6%	49	54.4%	0.401
Low (<5)	5	15.6%	10	17.2%	15	16.7%	
High (>10)	12	37.5%	14	24.1%	26	28.9%	

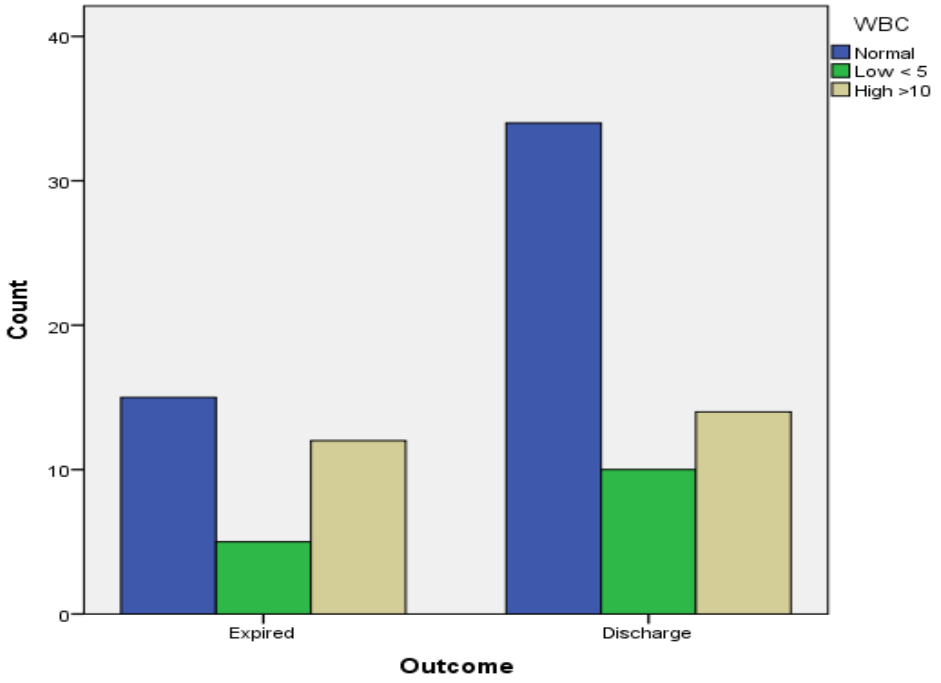

Figure 12: Relationship between outcome and WBC

Relationship between outcome and CRP among the study sample:
Our study showed no significant association between the outcome and CRP (P- value = 0.079).

Table 23: Relationship between outcome and CRP:

CRP	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
Normal	1	3.1%	7	12.1%	8	8.9%	0.079
High (30 –7)	7	21.9%	21	36.2%	28	31.1%	
Very high (>30)	24	75.0%	30	51.7%	54	60.0%	

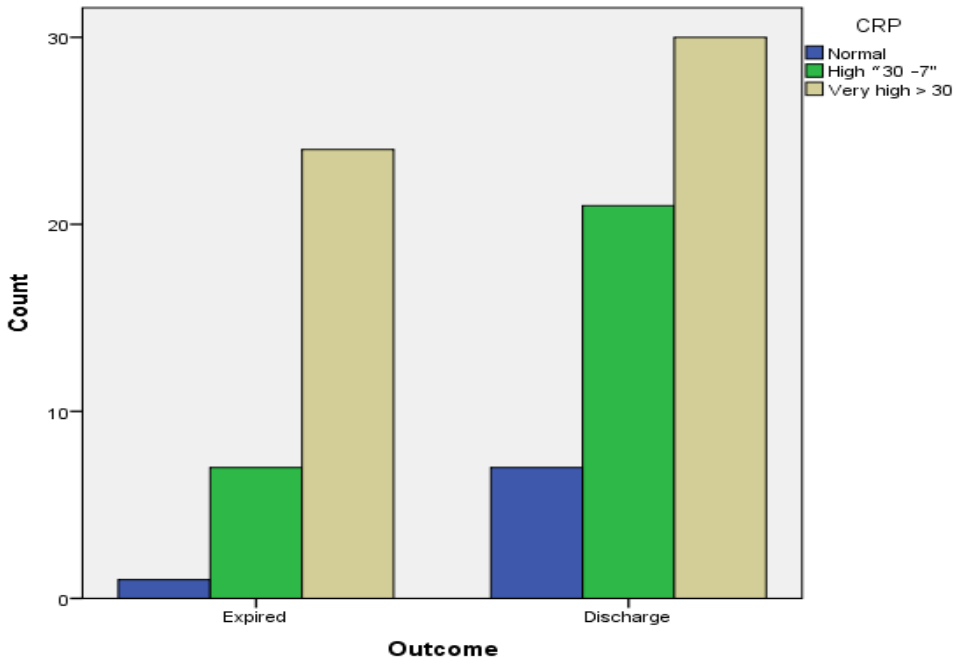

Figure 13: Relationship between outcome and CRP

<u>Relationship between mortality and D-Dimer among the study sample</u>:
There is no significant association between the outcome and D-Dimer (P-value = 0.543).

Table 24: Relationship between mortality and D-Dimer

D-Dimer:	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
Normal (0.5)	16	50.0%	32	55.2%	48	53.3%	0.543
High (0.9–0.6)	8	25.0%	17	29.3%	25	27.8%	
Very high (>1)	8	25.0%	9	15.5%	17	18.9%	

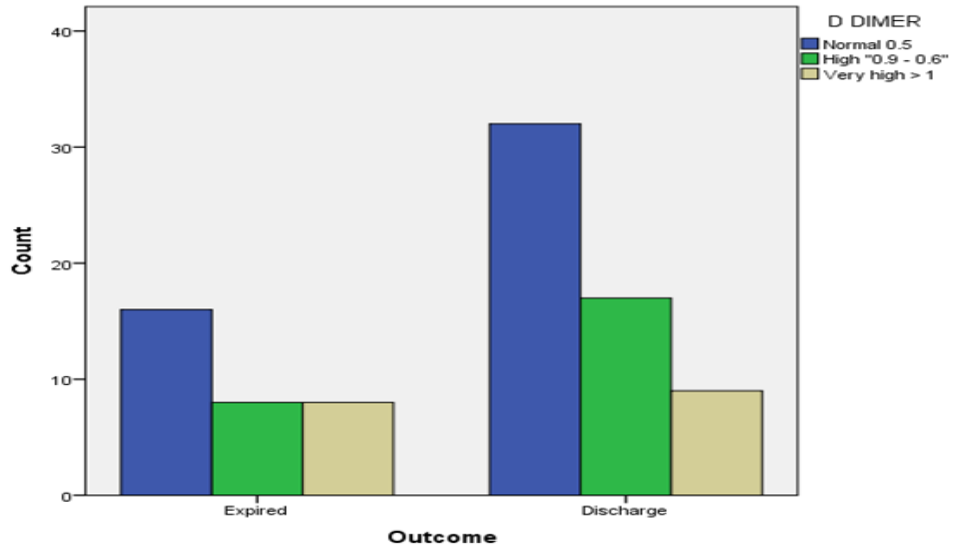

Figure 14: Relationship between outcome and D-dimer

Relationship between outcome and RFT among the study sample:

There is no significant association between outcome and RFT (P- value = 0.327)

Table 25: shows Relationship between outcome and RFT:

RFT	Outcome						P-value
	Expired		Discharged		Total		
	N	%	N	%	N	%	
Normal	27	84.4%	53	91.4%	80	88.9%	0.327
High	5	15.6%	4	6.9%	9	10.0%	
Very high	0	0.0%	1	1.7%	1	1.1%	

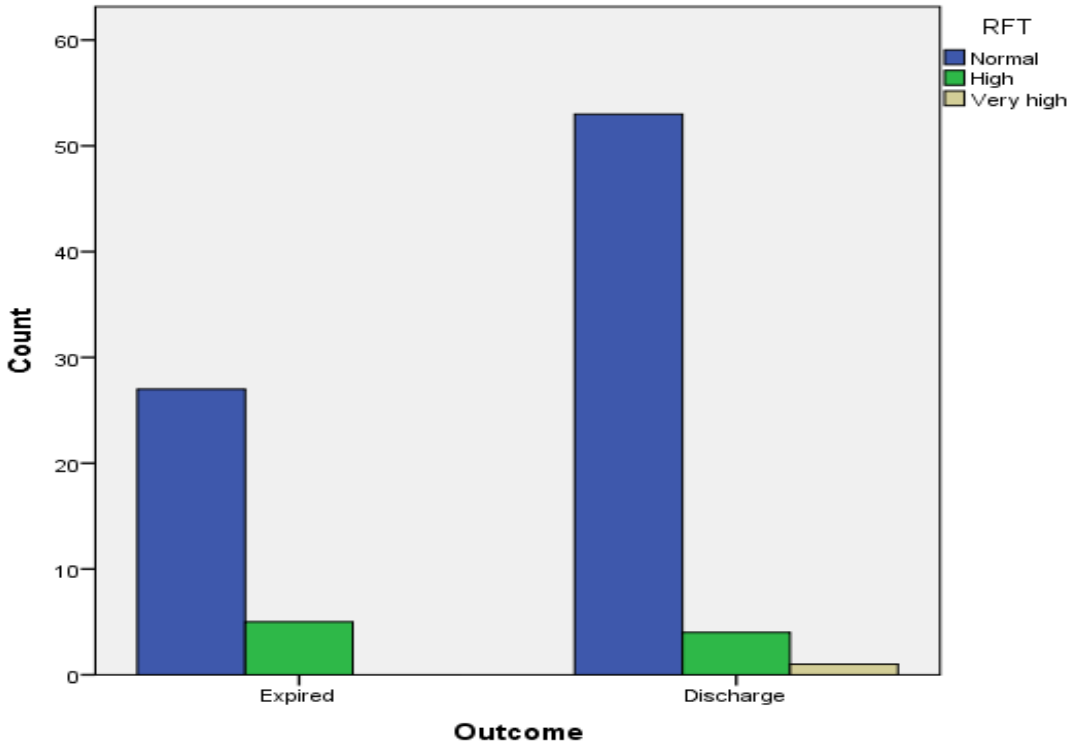

Figure15: Relationship between outcome and RFT

DISCUSSION:

Platelet pathophysiology in COVID-19 Patients:

Thrombocytopenia was the most common manifestation of the early epidemic of viral infection, it was observed in 20–55% of the SARS epidemic (Wool GD &Miller JL, 2021).

Among COVID-19 patients, thrombotic complications become a major problem; these complications may cause thrombocytopenia which intern may associate with disease severity. Thrombocytopenia can prolong hospitalization, increase the need of ventilation, and increase patient mortality (Delshad M et al., 2021). The prevalence of thrombocytopenia was statistically significant result, with a P-value of <0.03 .This might be due to COVID-19 patients having a higher level of P-selectin expression and activated platelets, elevated circulating platelet-leukocyte aggregates, increased aggregation, and thromboxane generation and leads to reduction in platelets production. Moreover, corona virus are able to infect bone marrow cells resulting in abnormal haematopoiesis with increase platelets destruction & as resulting in lung damage aggregation and formation micro -thrombi, which lead to increase platelets consumption. So, the direct attack on hematopoietic stem/progenitor cells by the virus, lung injury, and platelet destruction by auto-antibodies may burden the situation and also cause thrombocytopenia.(Xu et al., 2020). The results of this observational study are in agreement with a study conducted in Tongji Medical College, Wuhan, China, in

April 2020, which reported that thrombocytopenia, was found in 20.7% among all COVID-19 patients (Liu et al., 2020). It was also higher in COVID-19 patients, who had co-morbidity hypertension and diabetes (16.7%), which was also seen that in this study those COVID-19 patients were having 60% higher c-reactive protein, although statistically there was no significant association but it can support the mechanism of increasing platelets consumption with the circulating WBCs since chronic disease is associated with inflammatory process and presence of inflammatory mediators in the circulation. Moreover, following viral infection, the cytokine storm destroys bone marrow progenitor cells and leads to a decrease in PLT production beside virus lung damage, resulting in PLT aggregation and micro-thrombi formation in the lungs which causes more platelet consumption. (Xu et al., 2020). Production of autoantibody against PLT glycoproteins also destructs autoantibody-coated PLTs by the reticuloendothelial system leading to thrombocytopenia (Delshad M et al., 2021). A similar findings were reported in Turkey (Güçlü E et al., 2020), China (Liu Y et al., 2020). The aim of this study was to find out the relationship between thrombocytopenia and mortality rate in adult COVID-19 patients. A strong and statistically relationship was found between low PLT and outcome, with mortality rate of 71.7% in patients with thrombocytopenia (P-value of 0.038),.

In patients with a mild¬ low PLT; the mortality rate was 53%. While the mortality rate among patients with a moderate¬–low PLT was 15.6%, and in patients with a severe–low PLT was 3% which explain by we had only one case with sever thrombocytopenia in descriptive data which is not enough to study relationship between sever thrombocytopenia with mortality rate. This finding in our study agrees with the finding of a study conducted in China revealed that thrombocytopenia is detected in 5–41% of COVID- 19 patients and that the prevalence of thrombocytopenia increases with an increase in the severity of disease (Wool & Miller., 2021). In patients with a normal PLT the mortality was only 28%. The mortality in COVID 19 patient with thrombocytopenia was caused by Acute Respiratory distress Syndrome (ARDS). These results are similar to a study conducted in June 2020 in Turkey, which found that a decreased PLT was associated with a mortality rate 1.7 times higher than in COVID-19 patients with a normal PLT (Ertugrual et al., 2020). Zhu et al. in 2021 were conducted a study in Ireland and had founded an association with high mortality rates and thrombocytopenia in COVID-19 patients. Also,(Yajun GU et al, in 2020) revealed that thrombocytopenia was associated with a higher mortality rate than in COVID 19 patients with normal platelets by 22.4%.

In this study we investigate the correlation between mortality in COVID-19 patients with thrombocytopenia. Also finding suggested that mortality in COVID-19 patients was high (53%) in patients who were admitted to the ICU and had to be put on CPAP. Meanwhile, the mortality rate for patients admitted to a ward was approximately 31%. A highly statistically significant association was found between outcome and lenght hospital stay (P-value = <0.001). This result is similar to a study conducted by Guan et al.in 2021 in Iran, which reported that thrombocytopenia was present in 36.5% of COVID-19 patients in ICU and that patients with low PLTs had a lower survival rate than those with a normal PLT count. No statistically significant correlation was found between other risk factors and mortality in COVID-19 patients with a low PLT. Regarding the correlation between laboratory results ¬as HB, WBCs, D-dimer, CRP and RFT and mortality in COVID-19 patients with a low PLT, the findings revealed no significant correlation between laboratory results and mortality in COVID-19 patients with a low PLT. However, a previous study, in Chicago, found a high mortality rate among COVID-19 patients with high levels of D-dimer and thrombocytopenia (Wool & Miller., 2021).

Our study revealed that thrombocytopenia percentage observed with mild thrombocytopenia although Asrie F, Tekale E et al. in March 2022 where they were conducted their research following our study, it was revealed that the mortality rate increase with moderate to severe thrombocytopenia cases compared to mild thrombocytopenia, and this can be explained that most of our cases were studied in the a cute stage , and the other it could be the health care system itself, as the discharge percentage was 64.4 % and there was not convenient number of cases to be included in the study. On the other hand, our study revealed a strong relationship between thrombocytopenia and outcome with a significant (p value of 0.038) mortality equating to 71.8% versus 28.1 % in cases with normal platelets count, which is agreed with Qilin yang and Jun geo, et al .study in 2022 were they revealed that the optimal platelets count in associated with lowest risk in hospital mortality.

Other associated factors and Covid-19 mortality:

Regarding the gender and age group:

our study revealed that mostly was evident in male patients, although statistically was not significant, can explained that the most common age group in our study was between 60-70years old, because men were more in contact outside activity in our society, that explained by the study of **POLYMOD study,** Mossong J et al., 2008

showed that household, workplace and school structures strongly shape age- and gender-specific contacts made by individuals. Using the contact matrices from the latter study and calculating the ratio of the age-specific number of contacts for men and women (contacts men/contacts women) demonstrating that among ages 20–39, contacts are between 13%–26% higher among women, while among ages 50 to 69, they are 9%–14% higher among men. At the highest ages, the pattern reverses again, with women having slightly more contacts

Regarding chronic illness, chronicity and length of hospital stay:

it was observed that no significant association with chronic illness, although it was higher in hypertensive patients, this observation is agree with a meta-analysis of observational studies suggested that hypertension is an independent predictor for severe COVID-19 outcomes *(Bae S., et al.2021*).However, Garg S.,et al., 2020 proved that hypertension is one of the most common comorbidities in patients with severe COVID-19.

In addition to respiratory disease, a higher number of comorbidities, severe obesity, diabetes, chronic kidney disease, and coronary artery disease were significant independent risk factors for all-cause hospitalization and/or mortality.

The present study revealed that the risk of ICU admission is associated with increased mortality, this observation is agree with a study conducted in Tehran, Iran, in July 2021, found that 36.5% of COVID-19 patients had thrombocytopenia in the first week of infection (Safaroghi & Mahda et al., 2021 .However, another study done by Abdi S et al., 2022 who found that both overall in-hospital and ICU mortality increased over the summer surge of 2021 and the fifth wave of SARS-CoV-2 infection in Iran.

Regarding the Biochemical Parameters:

Wadman, 2020 and Murtty et al., 2020 was found that another common cause of death as a complication of Covid-19 is multi-organ failure and kidney function (RFT), although our study not revealed any association because most of the cases were observed in the acute stage, it would better if we can make a follow up chart to patient after their discharge regarding RFT. Our results revealed no significant association between mortality and WBCs however, platelets plays a role in recruiting and activating circulating leukocytes to the endothelial surface, leading to white blood cell diapedesis (Gandhi R, et al., 2020. Lymphopenia is the result of decreases in CD4+ or CD8+, T-lymphocytes related to the onset of disease due to virus induction of an inflammatory response. (Gandhi R, et al., 2020) Moreover, in our data analysis, it was obvious that higher percentage of CRP, although it was not significant which was agreed with the study of who stated that SARS-COV-2 infection may increase platelet destruction by increasing the level of autoantibodies and immune complexes, resulting in the specific destruction of platelet by the immune system (Xu et al.,2020) . Our data concerning D-Dimer revealed no statistical significance association with the mortality, However, Goudouris ES, 2021 proved that Patients with COVID-19 pneumonia exhibit coagulation abnormalities most commonly elevated levels of fibrinogen and D-dimer, often with mild thrombocytopenia. My explanation that the treatment policy for the patient is not available which might explain the state of the viral immune response and exact pathophysiology of the disease picture in these patients, since interventional therapy as NSIAD, heparin etc, and there were no control cases in our study which mean COVID-19 patients without exposure to risk factor D-dimer. We concluded that mild thrombocytopenia is presented in 42.2% of COVID-19 patients. It was significantly associated with the outcome of the disease (53.1% mortality). However, still, moderate and severe patients did not have significant thrombocytopenia (15.6% and 3.1%, respectively). Therefore, thrombocytopenia and patient outcome can be used as risk stratification markers in COVID-19 patients. Furthermore, a multicentre study with larger sample size is needed, for other associated factors regarding mortality of Covid-19 patient.

Summary:

Verbal informed consent was obtained from the isolation department in Tobruk medical centre, A retrospective observational study was conducted form July 2021 to September 2021, for patients were hospitalised with a diagnosis of COVID-19 by a rapid PCR test on nasopharyngeal and oro-pharyngeal swabs. The exclusion criteria were patients under 18 years old, outpatients with COVID-19, patients with pre-existing haematological liver, renal or oncology diseases and patients taking aspirin 75. A total of 90 patients were included in the study, aged between 18–100 years old. The mean age was 50 years old. Most of the cases were in the age group 51-60 about 22 patients and the least are in the age group 91-100 about 2 patients. There were 49 male and 41 female patients. 51 were admitted to a medical ward. 39 patients were admitted to an ICU, The ICU patients, approximately 1/4th of them were on CPAP about 24 patients, and about 1/7th of them were on oxygen therapy by mask 13 patients and only 2 patients were connected to mechanical ventilation. The most common of patient are acute result (acute less than 2weeks) with 58 patients , when chronic patients

with about 32 patients. We were found the patients had no history of chronic illness about 43 while the patients had a chronic illness of which DM with HTN had the high are 15 . Hypertension alone about 12, when DM patients are 11, and lung disease alone are 4 patients. the least epilepsy about one patient only. In our laboratory data, we were found, 85 of the patients were present with normal haemoglobin, when only 5 of patients are present with low haemoglobin. 49 of patients were present with normal WBCs count, when 26 of patients with high WBCs and 15 patients with low WBCs. 42 of patients with low PLTs , 38 of them were with mild low platelets . Most of patients was with very high CRP about 54 patients, when patients with normal CRP were 8 patients .48 the patients with normal D-dimer, when 25 patients with high D-dimer, and 17 patients with very high D-dimer. Most of patients was normal RFT with about 80, and only one patient was with ESRD, when 9 of patients with elevated in RFT. Most of the patients stayed 2-3days about 42, whereas those who had stayed one week had nearly 1/3rd of the total, and the lesser was for those had prolonged stay of more than 2 weeks. Out- come of patients was 58 discharged with percentage64.4% , when 32 of patients was dead with percentage 35.6%. Our study revealed a strong relationship between low PLT and outcome, with a significant (P-value of 0.038) mortality in patients with thrombocytopenia, equating to 71.8%. In patients with a mild–low PLT, mortality was 53.1%, while the mortality rate for moderate–low PLT was 15.6%, and mortality in severe low PLT was 3.1%. The mortality rate in COVID-19 patients with a normal PLT was 28% (42 of the 90 patients presented with normal platelets number. The mortality rate was higher among the male than the female patients. This demonstrates that there is no significant association between the outcome and gender (P-value = 0.254). Also mortality among acute COVID-19 patients was higher than among chronic patients The results revealed no significant association between outcome and age categories (P value = 0.547). There was a high incidence of mortality (25%) about 8 patients aged between 60–70 years old , while a low incidence of mortality was found in COVID-19 patients aged 18 –30 years old was only one. The mortality rate was the same between the COVID-19 patients who had a chronic illness and those who did not. This shows that there is no significant association between outcome and chronic illness categories (P-value = 0.463). However, the rate of mortality was higher in hypertensive patients were about 21. No significant association was found between the mortality rate in COVID-19 patients with thrombocytopenia and hospital stay in days (P-value = 0.424). 12 patients were dead after 3 days admitted, 12 patients were dead after one weeks admitted, 8 patients were dead after 2weeks admitted , The relationship between mortality rate and laboratory results shows . The 30 of patients with normal hemaglobin, and only 2 patients with anemia, there is no significant association between outcome and HB (P-value = 0.831). The 15 of patients were with normal WBC , 12 patients with high WBCs , there was shows that there is no significant association between the outcome and WBC (P- value = 0.401). Our study The 24 of patient were dead with normal CRP level . There was no significant association between the outcome and CRP (P- value = 0.079). 16 patients were dead with normal D-dimer level .There is no significant association between the outcome and D-Dimer (P-value = 0.543). Also 27 patients were dead with normal RFT. There is no significant association between outcome and RFT (P- value = 0.327)

CONCLUSION:

There was a high rate of thrombocytopenia in adult COVID-19 patients, which was associated with a high mortality rate, especially in patients admitted to the ICU.

Recommendations:

From the present study, it is recommended physicians should be aware of the relationship between mortality and low PLTs in COVID-19 patients, especially those in ICUs.

Limitations:

Some limitations to this study regarding the data collected on the COVID-19 patients admitted to hospital as there were missed data in the recorded information in their files, small sample sizes ,and relatively short period of time was conducted for study. Also ,providing detailed information about chronic illness and their potential clinical implication can help to inform future research on the mechanisms underlying relationship between chronic illness and COVID-19 outcome.

REFERENCES:

1. **Al-abdi T, Heraclide A ,papageoorgious A ET AL (2022):** impact of the COVID -19 lockdown on lifestyle behaviour and their association among adults in Qatar , doi : 10.1371/ journal .pone .
2. **Amin Bredan ,Omran Basoush,** Libyan J med 2021 published online 2021 doi ;10.1080/19932820.2021.1871798. COVID-19 epidemic in Libya.
3. **Asrie F, Tekle E, GelawY, Dgnew M, Gelaw A, Negash M , Kassa E .(2022):** http:///doi.org/100.2147/JBM.s366478.

4. **Bae S , kim SR , SHIM wj , Park sm ,(2021):**impact of cardiovascular disease and risk factor on fatal outcomesin patients with covid -19 accroding to age , a systematic analysis and meta analysis, doi :10.1136/hreat jnl -2021-317901.
5. **Bindroo S, Quintanilla Rodriguez BS,Challa HJ renal failure (2022);** in treasure island FL http:creative commones.org/licences/
6. **Cleveland clinic(2022) :**https:// my Cleveland clinic or g/health/diagnositic-21182-platelets count.
7. **Delshad M, Safaroghli-Azar A, Pourbagheri-Sigaroodi A, Poopak B, Shokouhi S, Bashash D.** Platelets in the perspective of COVID-19; pathophysiology of thrombocytopenia and its implication as prognostic and therapeutic opportunity. Int Immunopharmacol. 2021;99:107995. doi:10.1016/j.intimp.2021.107995
8. **Ertugrul Gucluc, Havva koacyigi, Huseyin Dogus et al (2020)**turkuy :0COVID-19 on platelets count and its , doi //:1806-928266.8.1122.
9. **Gandhi, R. T., Lynch, J. B., & Del Rio, C. (2020**). Mild or moderate Covid-19. The New England Journal of Medicine. 383(18). 1757–1766. doi:10.1056/NEJMcp2009249. PMID 32329974.
10. **Gao, Z., Xu, Y., Sun, C., Wang, X., Guo, Y., Qiu, S., & Ma, K. (2021). :** systematic review of asymptomatic infections with COVID-19. Journal of Microbiology, Immunology, and Infection = Wei Mian Yu Gan Ran Za Zhi. 54(1). 12–16. doi:10.1016/j.jmii.2020.05.001. ISSN 1684-1182. PMC 7227597. PMID 32425996.
11. **Garg S , Anand A , lamba Y, roy A , 2020:**molecular docking analysis of selected phytochemicals against SARS-COV-2 M receptor , doi : 10.1007/s 42535-020-00162-1
12. **Goudouris ES.laboratory diagnosis of COVID -19.j pediatrn(RIO J)2021** feb doi:10.1016j,jped2020.08.001.Epub2020aug 31 PMID:32882235.
13. **Grant, M. C., Geoghegan, L., Arbyn, M., Mohammed, Z., McGuinness, L., Clarke, E. L., & Wade, R. G. (2020).** The prevalence of symptoms in 24,410 adults infected by the novel coronavirus (SARS-CoV-2; COVID-19): A systematic review and meta-analysis of 148 studies from 9 countries. PLOS ONE. 15(6). e0234765. Bibcode:2020PLoSO..1534765G. doi:10.1371/journal.pone.0234765. PMC 7310678. PMID 32574165. S2CID 220046286.
14. **Guan, W. J., Ni, Z. Y., Hu, Y., Liang, W. H., Ou, C. Q., He, J. X., et al. (2020).** Clinical Characteristics of Coronavirus Disease 2019 in China. The New England Journal of Medicine. Massachusetts Medical Society. 382(18). 1708–1720. doi:10.1056/nejmoa2002032. PMC 7092819. PMID 32109013.
15. **Güçlü E, ocayiğit H, Okan HD, 2022**. Effect of COVID-19 on platelet count and its indices. Revista da Associação Médica Brasileira. 2020;66:1122–1127. doi:10.1590/1806-9282.66.8.1122 .
16. **Liu Y, Sun W, Guo Y, 2020:** Association between platelet parameters and mortality in coronavirus disease 2019: retrospective cohort study. Platelets. 2020;31(4):490–496. doi:10.1080/09537104.2020.175438
17. **Mayolinic(2020):**http:///www,mayoclinic.org. diagnosis- treatment/drc//20479976.
18. **Maquet J, Lafaurie M, Sommet A, Moulis G.(2020**).Thrombocytopenia is independently associated with poor outcome in patients hospitalized for COVID-19. Br J Haematol. 2020 Sep;190(5):e276-e279. doi: 10.1111/bjh.16950. Epub 2020 Aug 31. PMID: 32557535; PMCID: PMC7323390.
19. **McNeil Jr, D. G. (2020).** Wuhan coronavirus looks increasingly like a pandemic, experts say. The New York Times. ISSN 0362-4331. Archived from the original on 2 February 2020. Retrieved 4 April 2020.
20. **Mossong J , hens N, jit M , Beutels P, auranen k , et al 2008 :**social contacts and mixing patteran relavent to the spread of infectionus diseases , doi : org / 10. 1371/journal.pmed.oo5oo74.
21. **Murthy, S., Gomersall, C. D., & Fowler, R. A. (2020).** Care for Critically Ill Patients With COVID-19. JAMA. 323(15). 1499–

1500. doi:10.1001/jama.2020.3633. PMID 32159735.

22. **Quilin yang , Jun Gao, xiaomei Zeng , junyn Chen , (2022):**Relationship between platelets in hospital mortality in adult patients with covid -19, doi :10.3389/fmed.2022802412.pmid;35775003
23. **Pascarella G, Strumia A,piliego c, Bruno F,Scarlata s,Argo FE,covid-19 2020** diagnosis and management a comprehensive review j,intern 2020 doi :10.1111/joim.13091.epub2020 may PMID:32348588
24. **Safaroghli-Azar, Mahda delshed,Atieh pourbagheri-sigaroodi , et al (2021):**platelets in prespective COVID-19.pathophysiology and its implication as prognostic therapeutic opportunity. doi:10.1016/j.intimp.2021107995. – PMID:34304001
25. **Saniasiaya, J., & Islam, M. A. (2020).** Prevalence and characteristics of taste disorders in cases of COVID-19: A meta-analysis of 29,349 patients. *Otolaryngology–Head and Neck Surgery*. *165*(1): 33–42. doi:10.1177/0194599820981018. PMID 33320033. S2CID 229174644.
26. **Wadman. M. (2020).** How does coronavirus kill? Clinicians trace a ferocious rampage through the body, from brain to toes. *Science.* doi:10.1126/science.abc3208.
27. **Wiersinga, W. J., Rhodes, A., Cheng, A. C., Peacock, S. J., & Prescott, H. C. (2020).** Pathophysiology, Transmission, Diagnosis, and Treatment of Coronavius Disease 2019 (COVID-19): A Review. JAMA. *324*(8). 782–793. doi:10.1001/jama.2020.12839. PMID 32648899. S2CID 220465311.
28. **WHO. Novel coronavirus named 'Covid-19'. Today. Archived from the original on 2020.** Retrieved 11 February 2020.Pathogens & Immunity. 5(1): 342–363. doi:10.20411/pai.v5i1.377. PMC 7608487. PMID 33154981.
29. **Wool GD ,Miller JL ,** the impact of covid -19 disease on platelets and coagulation pathobiology 2021:88(1), doi : 10.1159/000512007.
30. **Xu, L., Liu, J., Lu, M., Yang, D., & Zheng, X. (2020).** Liver injury during highly pathogenic human coronavirus infections. Liver International. 40(5). 998–1004. doi:10.1111/liv.14435. PMC 7228361. PMID 32170806.
31. **Yajun GU, Zenyui LI, XIAOLONG zong ,(2020).** Thrombocytopenia is associated with COVID-19 severity and outocome, an up data meta analysis of patients with multiple outcome in Tianjin China ,Europe BMC.DOI://10.1093/LABMED/IMA 067.
32. .**Zhu, N., Zhang, D., Wang, W., Li, X., Yang, B., Song, J., et al. (2020).** A Novel Coronavirus from Patients with Pneumonia in China, 2019. The New England Journal of Medicine. 382(8). 727–733. doi:10.1056/NEJMoa2001017. PMC 7092803. PMID 31978945.