A RETROSPECTIVE STUDY OF PLATELET INDICES IN THE ABSENCE OF THROMBOCYTOPENIA IN COVID-19 PATIENTS UNDERGONE TREATMENT AT UNIVERSITY HOSPITAL, GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY (UH-KDU)

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Background: Hematological parameters like platelets (PLT) and platelet indices (PLT-IND) were affected more frequently in COVID-19. Although, most patients with complications have shown thrombocytopenia associated with changes in the PLT-IND, still there were seriously ill patients without thrombocytopenia.

Objective: To find out the effects of PLT associated indices on COVID-19 patients in treatment at University Hospital-General Sir John Kotelawala Defence University (UH-KDU), who were not presented with thrombocytopenia.

Methods: This study was conducted with 100 COVID-19 infected patients; ages between $18 - 90$ years and confirmed using Real Time Polymerized Chain Reaction (RT-PCR) tests in August to October 2021 at UH-KDU. They have not been associated with thrombocytopenia for all 7 days. The recorded data of PLT and PLT-IND of day 1 to 7 were obtained from the Department of Haematology, UH-KDU. A statistical analysis was performed using IBM-SPSS-Version_21. First, the data were tested for normalization, followed by Wilcoxon Signed Rank Test analysis to compare their means between 2 to 7 days.

Results: The mean values of PLT and Plateletcrit (PCT) continuously increased from day $1 - 7$ within their normal range while the Platelet Distribution Width (PDW) showed almost constant. Mean Platelet Volume (MPV), Platelet Large Cell Count (PLCC), Platelet Large Cell Ratio (PLCR) had minor variations. Since they did not follow normal distribution, the non-parametric Wilcoxon Signed Rank Test was performed. Pairs of PLT and PCT showed a significant difference ($p<0.05$) among the mean values of them from day $1 - 5$ meanwhile PLCC showed a significant difference ($p<0.05$) from day $1 - 3$. However, none of the parameters were able to show a significant difference from day $1 - 7$.

Conclusion: The significant increasing tendency of PLCC in day $1 - 3$ indicates that the bone marrow made an early attempt to make large platelets even in the absence of thrombocytopenia in COVID-19. However, as the PLT continuously increased from day $1 - 7$, the mean PLCR did not show any significant difference. These initial findings should be validated by increasing the number of patients and obtaining the PLT and PLT-IND for consecutive days.

Key Words: COVID-19, platelets, thrombocytopenia, platelet large cell count

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INTRODUCTION

Haematological parameters like platelets (PLT) and platelet indices (PLT-IND) were affected and studied more frequently in clinical settings COVID-19 and affected with the increased thromboses that was prominent among COVID-19 patients (Wool and Miller, 2020). Although, most of the patients with complications have shown thrombocytopenia with platelet anisocytosis, still, there were seriously ill patients without thrombocytopenia (Zhu et al., 2021). In such a situation, the main aim of this research was to find out the effects of PLT associated indices on COVID-19 patients undergoing treatment at University Hospital, General Sir John Kotelawala Defence University (UH-KDU) who were not associated with thrombocytopenia (Jeon et al., 2020), (Khan et al., 2020).

METHODOLOGY

This study was conducted with 100 COVID-19 infected patients, ages between 18 – 90 years and confirmed using Real Time Polymerized Chain Reaction (RT-PCR) tests in August to October 2021. They have not been associated with thrombocytopenia for all 7 days. The recorded data of PLT and PLT-IND of day 1 to 7 were obtained from the Department of Haematology, UH-KDU. A statistical analysis was performed using IBM-SPSS-Version_21. First, the data were tested for normalization, followed by non-parametric Wilcoxon Signed Rank Test analysis to compare their means between 2 to 7 days.

RESULTS AND DISCUSSION

At the initial step, the data were tested for normalization using SPSS_Version_21. When the number of data was more than 50 (n>=50), the Kolmogorov-Smirnova method was used to test the normalization and when n<50 the Shapiro-Wilk method was used (Table 1).

Table 1: Data normalization using SPSS (Descriptive Statistics Explore)

Parameters	Kolmogorov-Smirnov[a] (Sig.)	Shapiro-Wilk (Sig.)
PLTD1	.003	.000
PLTD2	.025	.000
PLTD3	.026	.000
PLTD4	.200[*]	.003
PLTD5	.200[*]	.006

PLTD6	.200*	.013
PLTD7	.200*	.012
MPVD1	.002	.000
MPVD2	.001	.000
MPVD3	.059	.001
MPVD4	.000	.000
MPVD5	.000	.000
MPVD6	.000	.000
MPVD7	.056	.009
PDWD1	.004	.011
PDWD2	.025	.177
PDWD3	.068	.375
PDWD4	.039	.289
PDWD5	.001	.001
PDWD6	.200*	.085
PDWD7	.200*	.686
PCTD1	.000	.000
PCTD2	.019	.000
PCTD3	.065	.000
PCTD4	.094	.037
PCTD5	.200*	.005
PCTD6	.200*	.009
PCTD7	.200*	.023
PLCCD1	.000	.000
PLCCD2	.002	.000
PLCCD3	.027	.000
PLCCD4	.200*	.225
PLCCD5	.200*	.001
PLCCD6	.177	.011
PLCCD7	.200*	.094
PLCRD1	.161	.010
PLCRD2	.000	.000
PLCRD3	.031	.000
PLCRD4	.010	.001
PLCRD5	.000	.001
PLCRD6	.003	.000

PLCRD7	.170	.033

Highlighted (Ash) parameters were not in anormal distribution.

Since all parameters, Platelets (PLT), Mean Platelet Volume (MPV), Platelet Distribution Width (PDW), Plateletcrit (PCT), Platelet Large Cell Count (PLCC) and Platelet Large Cell Ratio (PLCR) did not show normal distribution, the non-parametric analysis was performed through the following steps.

In the next step, the Non-Parametric Wilcoxon Signed Rank Test was performed to compare the mean values between two parameters among all.

The following tables show the behaviour of the mean of each, and every parameter used in 1-7 days (Table 2).

Table 2: Mean values of PLT, MPV, PDW, PCT, PLCC and PLCR

Descriptive Statistics					
Indices	**Number**	**Mean**	**Indices**	**Number**	**Mean**
PLTD1	34	301.47	PCTD1	34	2.829
PLTD2	34	313.32	PCTD2	34	3.036
PLTD3	34	339.35	PCTD3	34	3.193
PLTD4	34	340.32	PCTD4	34	3.210
PLTD5	34	362.67	PCTD5	34	3.421
PLTD6	34	344.79	PCTD6	34	3.187
PLTD7	34	353.70	PCTD7	34	3.252
MPVD1	34	9.77	PLCCD1	33	69.75
MPVD2	34	9.73	PLCCD2	33	75.33
MPVD3	34	9.79	PLCCD3	33	78.66
MPVD4	34	9.79	PLCCD4	33	78.93
MPVD5	34	9.69	PLCCD5	33	85.15
MPVD6	34	9.80	PLCCD6	33	76.03
MPVD7	34	9.89	PLCCD7	33	77.78
PDWD1	35	16.31	PLCRD1	34	25.73
PDWD2	35	16.28	PLCRD2	34	25.70
PDWD3	35	16.35	PLCRD3	34	26.13
PDWD4	35	16.34	PLCRD4	34	26.39
PDWD5	35	16.30	PLCRD5	34	25.18
PDWD6	35	16.22	PLCRD6	34	26.36
PDWD7	35	16.31	PLCRD7	34	26.15

Therefore, for further analysis, the non-parametric tests had to be used. In order to find the mean difference among days 1 to 7 in all the PLT and PLT IND, the Wilcoxon Signed Rank Test analysis was used-and the Sig. $p < 0.05$ was considered as a significance.

Table 3: Wilcoxon Signed Ranked Test analysis of PLT for $1 - 7$ days.

Indices	Asymp.Sig
PLT Day 1-PLT Day2	0.043
PLT Day 1-PLT Day 3	0.000
PLT Day 1-PLT Day 4	0.000
PLT Day 1-PLT Day 5	0.001
PLT Day 1-PLT Day 6	0.067
PLT Day 1-PLT Day 7	0.163

Table 4: Wilcoxon Signed Ranked Test analysis of PCT for $1 - 7$ days.

Indices	Asymp.Sig
PCT Day 1-PCT Day2	0.006
PCT Day 1-PCT Day 3	0.000
PCT Day 1-PCT Day 4	0.000
PCT Day 1-PCT Day 5	0.001
PCT Day 1-PCT Day 6	0.047
PCT Day 1-PCT Day 7	0.180

Table 5: Wilcoxon Signed Ranked Test analysis of PLCC for $1 - 7$ days.

Indices	Asymp.Sig
PLCC Day 1-PLCC Day2	0.010
PLCC Day 1-PLCC Day3	0.000
PLCC Day 1-PLCC Day4	0.000
PLCC Day 1-PLCC Day5	0.001
PLCC Day 1-PLCC Day6	0.072
PLCC Day 1-PLCC Day7	0.264

DISCUSSION

When analysing the means of PLT and PLT indices during the 7 days, the mean value of PLT, PCT and PLCC were increasing from days 1 to 5. Zhu et al. (2021) revealed that the majority of the patients, especially, who suffered from complications, have shown thrombocytopenia, platelet anisocytosis and coagulation abnormalities. Since the bone marrow made an attempt

to produce more platelets in the first few days, the immature large platelets may have been released to the circulation resulted in increased PLCC and PLCR (Jeon et al., 2020).

CONCLUSIONS

The significant increasing tendency of PLCC in day 1 – 3 indicates that the bone marrow made an early attempt to make large platelets even in the absence of thrombocytopenia in COVID-19. However, as the PLT continuously increased from days 1 – 7, the mean PLCR did not show any significant difference.

RECOMMENDATION

The initial results could be warranted by including a large number of patients' data with respect to a similar condition. It enables improving the other parameters too and could also be used to validate the initial findings.

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