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Neurosurgery

MPV, A SIMPLE MARKER TO PREDICT COVID-19 RELATED MORTALITY AMONG THE PEOPLE OVER 60

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ABSTRACT **Background:** Mean platelet volume (MPV) is a simple and cheap blood parameter which is widely available all around to world. Previously it was showed that MPV may be a good predictor for the underlying systemic inflammation. Thus, in the current study, we aimed to analyze whether it is a useful biomarker to predict the mortality among the subjects over 60 years old. **Material- Method:** We included 119 subjects over 60 who were admitted to intensive care unit due to COVID-19 infection and 26 healthy controls who were matched based on gender, age and the presence of diabetes mellitus and hypertension. **Results:** Baseline demographic features of thesubjects and healthy controls were similar. MPV level in serum were found to be elevated among the subjects with COVID-19 infection compared to health controls. Among COVID-19 infected subjects, MPV were also higher in deceased subjects than that in recovered group. Linear regression analyses revealed that elevated MPV level increased the risk of mortality 8 times (p value 0.005). **Conclusion:** A widely available parameter of complete blood count analyses, MPV, could be a simple, accurate predictor for mortality among COVID-19 infected subjects over 60.

KEYWORDS : COVID-19 infection, Mortality, Mean Platelet Volume

INTRODUCTION

COVID-19 pandemia led the each country builds its own local expert teams to decide the appropriate precautions which are necessary to stop spreading the disease itself (1). The implemented governmental restrictions varied from country to country. Since the predictions of who would show symptoms of infection, who would suffer a severe variant of it, or who would die due to the disease itself was not apparent, the researchers have been tryingto discover some biomarkers (2).

The researchers already showed that the fatality rate elevated from %1-2 among the subjects that are< 50 years old to %10-24 among the ones aged 70- 79 years (3).

Besides the complex mathematical scoring systems, a widely available marker could be more useful to approach to the subjects who already contracted COVID-19. Mean platelet volume (MPV), which is a part of complete blood count, was already defined by the researchers as a potential biomarker to predict the outcomes of systemic inflammatory diseases (4, 5).

Since the COVID-19 induced clinical deteriorations are much worse among the elderly people, we aimed to assess the utility of MPV to predict the mortality of COVID-19 related infection in elderly.

MATERIAL- METHOD:

This is a retrospectively designed and healthy controlled cross- sectional clinical study. We included the subjects over 60 who were already diagnosed with COVID-19 infection and hospitalized in the intensive care units of two hospitals (Balikesir Medical Faculty hospital and Ataturk Training and Education hospital in Balikesir).

Gender, age and co-morbidity (Diabetes mellitus and hypertension) matched healthy controls were selected from the out-patient clinic of Balikesir Medical Faculty hospital.

The subjects who were previously diagnosed with an active malignancy, chronic renal disease, and chronic obstructive or restrictive pulmonary diseases were excluded from the study. None of the patients were under any kind of immuno suppressive medication, including corticosteroids.

The general demographic information and the laboratory data were obtained from the computer system of the hospitals. Statistical analyses, including Kolmogorov- Smirnoff test to analyze the distribution of variables, Mann-Whitney U test and Chi-square test to compare the parametric and non-parametric data, were all performed by using SPSS 23.0.

Statistical significance was determined if p value was <0.005. The current study was approved by the local ethic committee of Balikesir University Ethical Committee.

RESULTS:

Baseline features of the subjects in the groups were similar based on age, BMI, gender distribution and DM or HT positivity (**Table 1**). On the other hand, MPV levels among COVID-19 subjects were significantly higher than that in control group (p value <0.001).

Table 1.The baseline characteristics of the subjects included into the current study.

	COVID-19 positive (N:119)	COVID-19 negative (N: 26)	P value
Sex, male, N (%)	65 (54.6)	12 (46.2)	0.285
Age, mean, years old (SD)	75.9 (7.9)	73.1 (5.9)	0.085
Diabetes Mellitus positivity, N (%)	31 (26.1)	9 (34.6)	0.256
Hypertension positivity, N (%)	86 (72.3)	22 (84.1)	0.144
BMI, mean (kg/ m²)(SD)	27.5 (5.3)	25.6 (2.8)	0.011
PLT, mean (k/ul) (SD)	284.1 (168.4)	283.2 (58.9)	0.173
MPV, mean (f/l) (SD)	10.4 (1.2)	8.6 (1.2)	<0.001

As seen in **Table 2**, mean age and MPV levels were both found to be greater among the OCVID-19 subjects who deceased due to COVID-19 related complications (p values 0.029 and <0.001, respectively).

Table 2.The comparision of COVID-19 patients to predicting the risk factors for mortality.

COVID-19 positive (N: 119)	Exitus (N: 88)	Survived (N: 31)	P value
Sex, male, N (%)	46 (52.2)	14 (45.1)	0.343
Age, mean, years old (SD)	76.4 (7.9)	75.6 (8.0)	0.599
Diabetes Mellitus positivity, N (%)	22 (25)	8 (25.8)	0.533
Hypertension positivity, N (%)	59 (67.0)	18 (58.0)	0.266
BMI, mean (SD)	25.8 (2.9)	25.4 (2.7)	0.561
PLT, mean (k/ul) (SD)	293.8 (186.7)	257.0 (124.8)	0.291
MPV, mean (f/l) (SD)	10.5 (1.1)	9.5 (1.3)	0.001

The lineer regression analyses for mortality revealed that MPV is the only significant risk factor can predict the mortality (**OR: 8.0, p value 0.005**) (**Table 3**).

Table 3. Linear regression analyses for mortality.

	β	SE of β	OR	P value	%95 CI for OR
Age	0.041	0.043	0.908	0.341	0.958- 1.132
BMI	0.004	0.109	0.001	0.971	0.791- 1.275
PLT	-0.002	0.002	0.689	0.406	0.994- 1.003
MPV	-0.959	0.338	8.0	0.005	0.198- 0.743

DISCUSSION

The mortality risk of COVID-19 infection was determined to increase 20- 25 times by the age elevated from 50s to 70s (**3**). Unlike the seasonal influenza infection, which has a U shape mortality pattern by age informing that the highest mortality rates seen in kids under 5 or elderly over 60, %80- 90 of the deaths were seen among the ones over 60- 70 (**3, 6**). Thus, we included only the subjects over 60 in our study.

Recently, a few studies focused on the role of MPV to predict the mortality of COVID-19 infection (**7, 8**). Wool and Miller determined that MPV levels were higher in COVID-19 infected subjects compared to non-COVID-19 ones in intensive care unit (**9**). Moreover, this increasing trend seen in COVID-19 infection was seen regardless of platelet level. MPV change during the first 72 hours of intensive care unit stay due to COVID-19 infection could be a risk factor for mortality (**8**). However, Fois and colleagues found that MPV level did not differ based on the mortality outcome (**10**). Since it was previously showed that presence of diabetes mellitus (DM) might have an additional effect on MPV levels, even among COVID-19 infected cases (**9**), in this study we matched our groups based on DM status.

In the current study, we determined not only that MPV was greater among COVID-19 infected elderly subjects compared with non-infected ones, but also MPV levels were higher in the non-survival COVID-19 infected subject. The elderly with COVID-19 infection who had elevated MPV levels in serum was found to have 8 times greater risk for mortality than that with MPV in normal range. In addition, this effect was irrelevant with the platelet level.

In conclusion, a widely available parameter of complete blood count analyses, MPV, could be a simple, accurate predictor for mortality among COVID-19 infected subjects over 60.

Disclosure and Conflict of Interest Statement
The authors have no relevant disclosures or conflicts of interest to declare.

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