

# Correlation of symptom depression levels with mean platelet volume rate on patients of acute coronary syndrome

L Hasugian<sup>1</sup>, H Hanum<sup>1</sup>, W Hanida<sup>1</sup> and Z Safri<sup>2</sup>

<sup>1</sup>Division of Psychosomatic, Department of Internal Medicine, Universitas Sumatera Utara, Medan, Indonesia

<sup>2</sup>Division Cardiology and Vascular, Department of Internal Medicine, Universitas Sumatera Utara, Medan, Indonesia

\*Corresponding author e-mail: lilyoce@gmail.com

**Abstract.** Patients with Depression and the acute coronary syndrome (ACS) is rarely detected, although in some studies say that depression can worsen cardiovascularly and increase mortality. From research, Canan F et al found that increasing levels of Mean platelet volume (MPV) as a risk factor for atherosclerosis and MPV was higher in patients with depression compared with patients without depression. In this study used observational methods of measurement of cross-sectional data. Research began in November 2015 - May 2016 against General Hospital inpatients H. Adam Malik Medan. There are 64 patients with a diagnosis of ACS were given Beck Depression Inventory (BDI), then calculated a score of BDI patients and MPV levels were seen when they first entered the hospital before being given treatment. Patients answered quieter on days 3-7 after diagnosis ACS. ACS Patients were divided into 3 groups: acute myocardial infarction with ST elevation, acute myocardial infarction with non-ST elevation and unstable angina pectoris. The level of depression is grouped into not depression, mild depression, moderate depression and severe depression. Statistically significant with  $p\text{-value} < 0.05$ . Based on the linear correlation analysis, it was found a positive correlation with  $r = 0.542$ . And the relationship is statistically significant with  $p\text{-value} 0.000003$ .

## 1. Introduction

Depression is a common mental disorder characterized by sadness, loss of interest in pleasure, guilt, concentration difficulty, disturbed sleep, reduced appetite and low energy. This problem can be chronic or recurrent (50% - 65%) and may cause disruption in a person's ability to perform daily activities. In severe cases, depression can cause a person to commit suicide.[1,2]

Depression can increase the risk of morbidity and mortality in cardiovascular disease. Depressed patients with cardiovascular disorders also have a worse prognostic compared with depressed patients without cardiovascular disorders. However, patients with the acute coronary syndrome (SKA) with depression are still very difficult to detect early. It is due to lack of recognition of signs of depression in patients with SKA. Depression affects patient behavior such as smoking, not taking medication, and decreased physical activity. Also, depression also affects physiological factors such as platelet activation, autonomic nervous system disorders, and inflammation.[3,4]

Depression after SKA may increase the risk of cardiovascular events even increase mortality. The Meta-analysis study of 22 studies found that cardiovascular events with depression had 2-2.5 times higher risk of having new cardiovascular events compared with those without depression. There are



researches that focus on different elements after the onset of SKA. Depression may associate with cardiovascular prognoses, such as the severity of depression (ie the difference between mild depression and severe depression), depressive symptoms profile, and depression episodes after acute attacks of SKA. Also, it is advisable to look at the extent of post-SKA depression with a cardiovascular prognosis that may be related to the nature and timing of depressive episodes, whether depression appears first or recurrent, and whether the onset is before the acute attack of SKA or after an acute attack of SKA.[5,6]

From Canan F et al., It was found that elevated MPV levels as a risk factor for atherosclerosis and MPV were significantly higher in patients with major depression compared with patients without depression ( $p = 0.001$ ). Linear regression analysis was found to be a significant relationship between MPV levels and major depression ( $r = 0.123$ ;  $p = 0.001$ ).[3,7] From several studies such as those conducted by Dominique L et al, Lippi G et al, and Yaghoubi A et al., There was significantly higher MPV levels in cardiovascular patients with depression than non-depressed patients.[4,8,9]

## **2. Methods**

### *2.1 Patients Selection*

This research was observational with the method of measuring data by cross section. The study began in November 2015 - May 2016. The study was conducted on inpatients of RSUP. H. Adam Malik Medan period, November 2015 - May 2016. Inclusion criteria were first with SKA sufferers treated at Haji Adam Malik Hospital Medan and patient  $\geq 18$  years old. Exclusion criteria were patients with blood disorders such as thrombocytopenia, thrombocytosis and malignancy and patients who used previous anti-platelets. Subjects were given a Beck Depression Inventory (BDI) questionnaire consisting of 21 questions to screen for depressive symptoms, then determined the level of symptoms of depression by looking at the BDI score, given on day 3 after diagnosis of SKA was confirmed. This study was approved by the local ethics committee.

### *2.2 Definition of depression*

Depression is a mood disorder that has the main symptoms of depressive affects, loss of interest and excitement and lack of energy that leads to tiredness and decline in activity.[13] Beck Depression Inventory (BDI) is an instrument for measuring the degree of depression. Aaron T. Beck. With a cut-off value of 9, not depression; 10 to 15, mild depression; 16-23, moderate depression;  $> 24$ , severe depression with a total score of 63.

### *2.3. Definition of MPV*

MPV is a potential marker for assessing platelet reactivity. Platelets are larger, more metabolically and enzymatically active and have greater prothrombotic potential. Increased levels of MPV can be as a broad indicator, a more reactive platelet can be a risk factor for SKA.[11,26] It is said to be positive when levels  $> 9$  fL.

### *2.4 Statistical Methods*

Data were analyzed using SPSS statistics program for Windows, version 18.0 (SPSS Inc., Chicago, Illinois, USA); with  $p$ -value  $< 0.05$  considered statistically significant.

## **3. Result**

From 64 patients, 40 were with IMA STE, 14 IMA non-STE and 10 with APTS. Of the 40 people with IMA STE, 19 (47.5%) were found with mild depression, 12 (30%) with moderate depression, 7 (17.5%) were not depressed and 2 (5%) with severe depression. Of the 14 people with non STE IMA, 6 (42.9%) had moderate depression, 5 people (35.7% with mild depression, 2 people (14.3%) with major depression and 1 person (7.1%) with no depression, compared with 10 diagnosed with APTS, 6 people (60%) with mild depression, 3 people (30%) with moderate depression, 1 person (10%) with

major depression, and from the diagnosis of SKA, the majority of patients had mild depression (46.9%), with  $p = 0.559$ . (Table 1)

**Table 1.** Table level of symptom of depression symptom in patientof SKA.

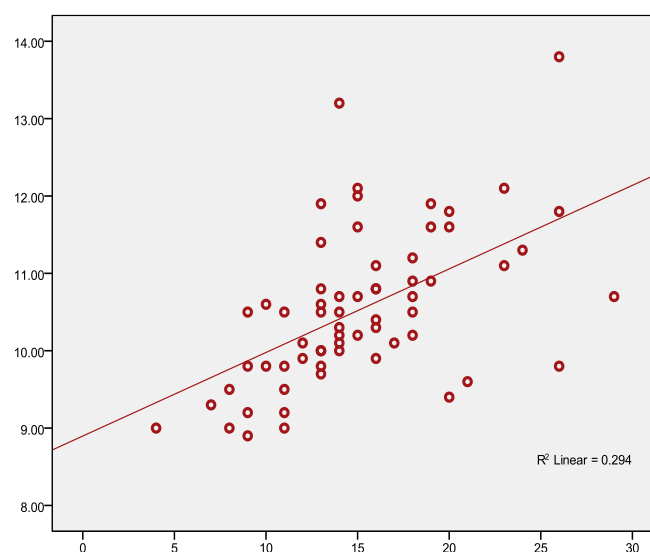
DEPRESSION LEVEL	DIAGNOSIS			TOTAL	Percentage (%)
	IMA STE	APTS	IMA non STE		
No Depression	7	0	1	8	12.5
Mild Depression	19	6	5	30	46.9
Moderate Depression	12	3	6	21	32.8
Severe Depression	2	1	2	5	7.8

In Table 2, the mean MPV on STA diagnoses was 10.46, the mean MPV at the APTS diagnosis was 10.46 and the mean MPV on the STA non-IMA diagnosis was 10.79.

**Table 2.** Mean rate of MPV in patientof SKA.

Diagnosis	Total	Mean rate of MPV	Minimum	Maximum
IMA STE	40	10.46	8.90	13.20
APTS	10	10.46	9.80	11.40
IMA non STE	14	10.79	9.30	13.80
<b>Total</b>	<b>64</b>	<b>10.53</b>	<b>8.90</b>	<b>13.80</b>

The mean of MPV in all sample of research with diagnosis of SKA was 10.53 and from all SKA patients was found the majority of symptom level of depression was 30 people. Both of these will be correlated, whether they have a relationship or not, using the Pearson correlation test. We can see the linear line between MPV levels with depression symptom level. Where the higher the level of the symptom of depression, the higher the MPV level of the patient. This is statistically significant with  $p = 0.000003$ . And has a positive correlation with the value of  $r = 0.542$ . This can be seen in figure 1.



**Figure 1.** Correlation between depression rate and MPV.

#### 4. Discussion

In this study, 64 SKA patients who have met the inclusion criteria indicated; the age of the majority of patients was  $>45$  years old with total 54 people (84.4%), and age  $\leq 45$  years as many as 10 people (15.6%), (93.75%) and women (6.25%). In Kaplan's study it is said that psychosocial factors can affect the rate of depression in old age, which includes loss of social role, increased self-isolation, financial limitation and decreased cognitive function.[10,11]

Of all samples with this SKA diagnosis, 46.9% found mild depression, with  $p = 0.559$ , which means no significant relationship between depression level and SKA. Although Grace et al's study suggest that patients with SKA with depression will have a worse prognostic and increase recurrent cardiovascular rates and have a higher risk of death factor compared to patients without depression.

In this study found the majority of the level of symptoms of mild depression, although patients with diagnosis SKA is a severe and life-threatening disease. From previous studies, moderate to severe depression was present in SKA patients with depression. However, there are several studies that found patients with SKA with mild to moderate depression alone. This is influenced by the psychosocial factors of the patient, where the family support to the patient so that the patient is stronger in dealing with his illness and makes the patient confident to return to his normal life.[12]

From the study of Canan F et al (2012), it was found that elevated MPV levels as a risk factor for atherosclerosis and MPV were significantly higher in patients with major depression compared with patients without depression ( $p = 0.001$ ). Linear regression analysis found a significant relationship between MPV levels and major depression ( $r = 0.123$ ;  $p = 0.001$ ).[3,7]

The average of MPV content in this research sample is 10.53 with minimum MPV content of 8.9 and maximal MPV content of 13.8. And the mean of each diagnosis of SKA did not differ greatly with the mean MPV level at IMA STE was 10.46, the mean MPV at the APTS diagnosis was 10.46 and the mean MPV on the STA non-IMA diagnosis was 10.79. From this data we can conclude that the average MPV of each diagnosis is not much different. In a study conducted by Hasanah Mumpuni in Dr. Sardjito, Yogyakarta between January 2009 to January 2011, found the average of MPV content is 8.85 fL by using ROC analysis. Where in the study, if MPV levels  $> 8.85$  fL was associated with higher cardiovascular events higher than in MPV  $\leq 8.85$  fL of 28.4% compared to 18.9% with  $p = 0.034$ , with the relative risk of 1.65 95% CI 1.037 - 2.783. The mean of MPV in SKA with major cardiovascular events was significantly higher than in SKA without major cardiovascular events ( $9,506 \pm 1.76$  fL  $96 \pm 1.45$  with  $p = 0.001$ ), so in this study it was concluded that MPV was associated with major cardiovascular events in SKA.[13]

From the analysis of MPV levels relationship with depression symptom level in this study, we can see the linear line between MPV levels with depression symptom level. Where the higher the level of the symptom of depression, the higher the MPV level of the patient. This is statistically significant with  $p = 0.000003$ . And has a positive correlation with the value of  $r = 0.542$ , which means there is a moderate correlation strength between the level of depression symptom with MPV levels. This is consistent with previous studies such as Canan F et al.'s study, which stated that MPV levels were significantly higher in patients with major depression compared with patients without depression ( $r = 0.123$ ;  $p = 0.001$ ). 3,7 Medium correlation strength in the study this may be because of the overall study sample, the majority suffered from mild depression, and the comparison of the number of samples that differed greatly between each depression level, and from the sample also found the majority of age  $> 45$  years, and the numbers differed greatly compared to those aged  $\leq 45$  year. This is likely to cause the correlation of this research with moderate strength.

This study has limitations among others; in this study, it is unknown whether the previous patient was depressed or not and acomorbids for acute coronary syndromes were not assessed.

#### 5. Conclusion

The results of diagnostic tests obtained from this research data, indicate that there is a positive correlation between MPV levels with the level of symptoms of depression in patients SKA. so that MPV may be used as a predictor of depression in patients with SKA.

## References

- [1] Yancy C W, Jessup M, Bozkurt B, Drazner M H, Fonarow G C, Geraci S A, *et al.* 2013 ACCF/AHA 2013 guideline for the management of heart failure, a report of the american college of cardiology/american heart association task force on practice guidelines *Circulation* **128** e240-e327
- [2] Solnek, Barbara L, Seiter and Tom 2002 How to diagnose and treat depression *Proquest* p 12
- [3] Schuyler D 2000 Depression comes in many disguises to the providers of primary care: Recognition and management *J. South Care Med. Assoc.* **96** 267-75
- [4] Canan F, Dikici S, Kutlucan A, Celbek G, Coskun H, Gungor A, *et al.* 2012 Association of mean platelet volume with DSM-IV major depression in a large community-based population: The MELEN study *J. Psych. Res.* 298-302
- [5] Musselman, Dominique L, Tomer A, Manatunga K A, Knight B T, Porter M R, *et al.* 1996 Exaggerated platelet reactivity in major depression *Am. J. Psych.* **153** 10
- [6] Zuidersma M, Thombs B D and Jonge P D 2011 Onset and recurrence of depression as predictors of cardiovascular prognosis in depressed acute coronary syndrome patients: A systemic review *Psychother. Psycosom.* **80** 227-37
- [7] Edmondson D, Newman J D, Chang M J, Wyer P and Davidson K W 2012 Depression is associated with longer emergency department length of stay in acute coronary syndrome patients *BMC Emerg. Med.* **12** 14
- [8] Endler G, Klimesch A, Plassmann H S, Schillinger M, Exner M, Mannhalter C, *et al.* 2002 Mean platelet volume is an independent risk factor for myocardial infarction but not for coronary artery disease *Br. J. Haematol.* **117** 399-403
- [9] McCaig L F and Burt C W 2001 National hospital ambulatory medical care survey: 1999 emergency department summary *Adv. Data* **320** 1-34
- [10] Lippi G, Filippozzi L, Salvagno G L, Montagnana M, Franchini M, Guidi G C, *et al.* 2009 Increased mean platelet volume in patients with acute coronary syndrome *Arch. Pathol. Lab. Med.* **133** 1441-3
- [11] Kaplan H I, Sadock B J and Grebb J A 2010 *Sinopsis psikiatri edisi ke-7* (Jakarta: Binarupa Aksara) pp 79-88
- [12] Kumar A and Cannon P 2009 Acute coronary syndromes: diagnosis and management *Part I Mayo Clin. Proc.* **84(10)** 917-93
- [13] Ruberman W, Weinblatt E, Goldberg J D and Chaudhary B S 1984 Psychosocial influences on mortality after myocardial infarction *N. Engl. J. Med.* **311(9)** 552-9
- [14] Mumpuni H 2011 Hubungan mean platelet volume dengan kejadian kardiovaskular mayor pada penderita sindroma koroner akut selama perawatan di rumah sakit (Yogyakarta: FK UGM)