Stallion Journal for Multidisciplinary Associated Research Studies
ISSN (Online): 2583-3340
Volume-3 Issue-6 || December 2024 || PP. 100-103 https://doi.org/10.55544/sjmars.3.6.6

The Effects of Statin Therapy on Mean Platelet Volume in Patients with Cardiovascular Diseases

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www.sjmars.com || Vol. 3 No. 6 (2024): December Issue

Date of Submission: 16-12-2024	**Date of Acceptance:** 31-12-2024	**Date of Publication:** 06-01-2025

ABSTRACT

The statins are the excellent therapy for decreasing the lipid and described in about all patients with cardiovascular diseases. It has a strong role in decreasing the morbidity and mortality present with cardiovascular diseases. In recent study, it has been conducted that its major effects is far more than lowering the lipid but also it has a great role in cardiac diseases as the thrombocytopenia and platelet dysregulation also associated in decreasing the cardiac disease effects. This study explained the statin role on the efficiency of the markers and its effect in patients with cardiovascular disease. The platelet counts were examined by the flow cytometer, the samples of blood were collected from patients before and after treatment. The results showed the express of CD62P and CD63 were decrease in patients had the therapy compared to the patients without it. The study concluded that the statin therapy decrease the mean of platelet volume (MPV) in the patients suffer from this diseases.

Keywords- Mean platelets volume (MPV), statin, flow cytometer, cardiovascular disease.

I. INTRODUCTION

The statins which is the strong drugs that prevent the cholesterol biosynthesis by deregulated the coenzyme-A when it applied in patients with cardiovascular disease , the statins are present in the patients with vascular diseases as diabetes, hypertension, or old age, so the decreasing of cardiovascular events present with decreasing the cholesterol by the effect of statins [1] , however, the data used in this study showed that the statins may also spend a direct inhibition of several pathways of hemostasis, such the activation of platelet and cascade coagulation, as it could be a relationship between statin treatment and cerebral hemorrhage [2] . The size of the platelets consider a good indicator for the activity of platelet and this had been identified as a dangerous marker for cardiovascular diseases and vascular risk factors [3] . The Platelet activation could be important in cardiovascular studies as the markers become reactive. MPV increased and different as the larger platelets are more adhesive and could be associate larger than the small ones [4].

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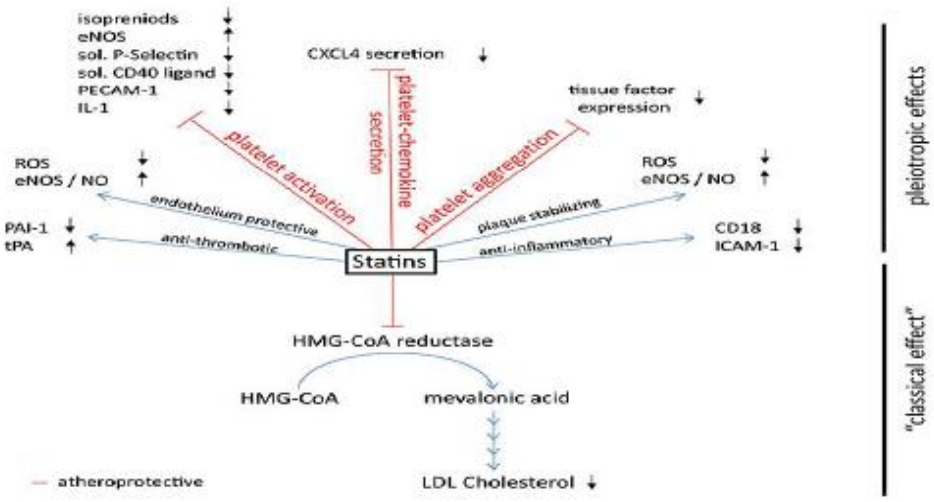

Fig.1: Effects of statin on platelet-based functions.

Many studies illustrated that statins could be used for long-term produced atherosclerotic, this indicated that statin has impact on thromboembolism and these might explain the stabilization of the plaques at vascular injury sites. However, statins also shows its effects by various mechanisms, including interfering with platelet function by inhibit the activity of platelet role; to achieve these effects, statin use various factors to control the clotting system and platelet function (Figure 2) [5].

All present studies on cardiac diseases showed that the effects were related to lipid-lowering effect as part of the mechanism in cardiac process [6]. This study were aimed to revealed that the platelet count could be affected by statins, and to properly identify this effect; the platelet activity could be estimated by CD62P and CD63 expressed on it, which enhanced after cardiovascular disease and decreased in patients with therapy [7]. The therapy could decrease the cardiovascular sign, including myocardial infarction, stroke, and death. Many studies investigated that the statins prevent the platelet function either by the check the marker cluster as well as other atoms needed for counting the platelet [8].

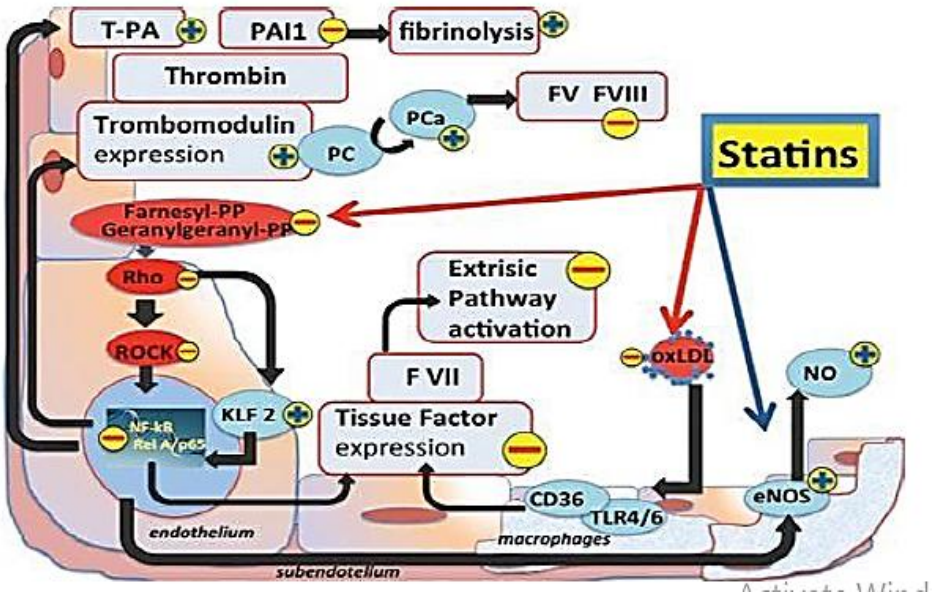

Fig.2: Statins as an anticoagulant drug.

Two techniques could be applied by statin, including the activation of cyclooxygenase-1 and the regulation of nitric oxide [9]. The cardiovascular is a type of diseases, with facility events. Platelets also had a strong role in the regulation of this diseases, such as atherosclerosis, which could causes the thrombosis [10] The platelet cluster and adhesion causes thrombosis by crossed of the myocardial ischemia, hypoxia, and eventually necrosis for cardiovascular diseases [11]. The platelets could be sensitive in such dangerous situation, which causes the evolution of cardiovascular diseases [12].

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II. MATERIALS AND METHODS

2.1 Patients

About 60 of the patients without apparent systemic diseases, any sort of renal diseases, hepatic diseases and with a family history of blood disorders were excluded as well as without treatment and about 60 from the patients with receiving therapy which are well-known to be affecting the function of platelets (e.g. aspirin) [13].

2.2 Collection of sampling and examine the platelet activity

The blood samples were collected by venipuncture of the forearm veins with cardiovascular disease. Venous blood (5ml) were freshly withdrawn into EDTA-treated tubes [14]. All the platelets were enumerated using hemocytometer chamber (Neubauer). The marker activity (CD62P and CD63) was assessed using the flow cytometry by centrifuged the sodium citrate containing the blood for about fifteen minutes at room temperature in the dark. The platelets were mixed with IgG1 and analyzed by the flow cytometry [15].

III. RESULT AND DISCUSSION

The values of platelets represent the CD62P and CD63 were absolutely decrease in the patients with the treatment of statin compared with those without statin. Many study investigate that statins could have important role for their lipid-lowering effects which allows it to interfere with the platelet as wheel as its inflammatory and oxidative role [16] , as some research indicated the activity of leukocyte become higher after ischemic stroke which causing the brain damage [12]. The statin therapy had a hard effect on the vascular atherosclerosis and could lowering the cardiovascular effects, comprise the myocardial infarction, stroke, and death [17]. This study indicated that the increase express of CD62P and CD63 were interacted with bad medical outcomes, therefore, the lowering of platelet activity could be helpful in increasing the clinical outcome [18]. Reducing platelet count may be part of the antiplatelet activity which may increase the effect of aspirin and this will explain the pleiotropic activity of statin [19] .The decrease in the activity of platelet is different technique as the statins causes the antithrombotic effect and this effect conducted in patients with cardiovascular disease leading to atherosclerosis [20]. Another important role of statin therapy, which may be associated with its antithrombotic activity, which causing the hemorrhage [18]. The Platelets consider the essential part of the blood homeostasis and play a central role in the process of thrombogenesis, atherogenesis, and atherosclerotic lesions [21]. The pleiotropic role of statin is expanding gradually; and is increasingly used for various systemic diseases. The effects on platelet is being greatly associated to a decrease in the expression of inflammatory together with endothelial functionality and blood homeostasis [22]. Previous studies showed that statin effects on platelets were mainly associated with high doses (up to 80mg) or even low doses of atorvastatin, simvastatin or pravastatin for short period could leading to slight platelet dysfunction. Also the high dose induced reduction in platelet aggregation and modulated platelet functionality compared to low dose [23].

Table 1. The Clinical data of patients.

Parameters	Patients without statin treatment	Patients with statin treatment
WBC [/mL]	6,585 ± 3,220	4,359 ± 1,265
Haemoglobin [g/dL]	15.2 ± 2.4	12.5 ± 0.1
HDL-cholesterol	40 ± 11	35 ± 9
LDL-cholesterol	178 ± 19	102 ± 15
Platelet [× 103]	284 ± 63	111 ± 55
Mean platelet volume [fL]	7.65 ± 0.55	5.37 ± 0.56
CD62P(%)+	4.3 ± 0.4	2.2 ± 0.6
CD63(%)+	1.5 ± 0.5	1.2 ± 0.2

IV. CONCLUSION

The effects of statin has been thoroughly explained, not as decreasing the lipid only but also as antioxidant, antithrombotic, and atherosclerotic plaque stabilization. However, it could change the platelet activation, these ability allow a new therapeutic strategy to increase the capability to antithrombotic therapy and to decrease the vascular damage.

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