EUROPEAN ACADEMIC RESEARCH
Vol. III, Issue 11/ February 2016

Impact Factor: 3.4546 (UIF)
DRJI Value: 5.9 (B+)

ISSN 2286-4822
www.euacademic.org

Study of Platelet Count and Indices in Smokers and Ex-smokers

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Abstract:

Background: *Cigarette smoking is a serious health problem and most important avoidable causes of death in worldwide. Many studies performed have proved its deleterious effects on many organ systems mainly respiratory, and cardiovascular systems.*

Materials and Methods: *This is a* ***c****omparative case-control study conducted at Khartoum state, in which a total of 150 patients were enrolled, 50 cigarette smokers, 50 non-smokers and 50 ex-smokers. Ethylene demine tetra acetic acid (EDTA) anticoagulated venous blood samples were collected from all participants for hematological analysis. The platelet count and indices were analyzed in whole blood using automated blood cell counter (Sysme-KX-21N).*

Results: *The results showed that, there was no statistically significant difference in PLTs count and indices when compared in study groups (P.value>0.05). No statistically significant correlation was found between duration of smoking, number of cigarette per day and each of platelet count and indices. Also no statistically significant correlation was found between duration of abstention and platelet count and indices in ex-smokers (P.value).*

Conclusion: *Smoking has no effect on platelet count and indices.*

Key words: platelet count, indices, smokers, ex-smokers

INTRODUCTION

Cigarette smoking is a serious health problem and most important avoidable causes of death worldwide. Many studies performed have proved its deleterious effects on many organ systems mainly respiratory, and cardiovascular systems. With 6000 chemical substance it contains, it exerts pharmacological, mutagenic, cancerogenic, toxic, and inflammatory effects[1]. In many studies, concerned with acute effects of smoking on hematological system, increases in WBC, eosinophils, and platelet (PLT) counts have been shown[2]. A correlation was established between smoking, and WBC counts. relatively higher WBC counts were detected in smokers [3.4, 5, 6, 7, 8, 9]. Cigarette smoking is a major risk factor for cardiovascular disease (CVD). other studies reported that smoking is associated with substantial reduction in risk of coronary heart disease (CHD) and stroke.(1,2) Smoking is associated with a variety of markers of inflammation such as C-reactive protein, white cell count, fibrinogen, and albumin, which have been shown to be independent risk factors for CHD.[10,11,12,13] Inflammation is another possible mechanism for the increased risk of CVD in smokers. Although most studies show hematological and inflammatory markers to be lowered after smoking cessation, few studies have examined the effects of duration of smoking cessation, and it appears that the effects of smoking on inflammatory markers may persist for many years. [11,12,14]

The effects of smoking on various metabolic and biological processes, hormone secretion, and hematopoietic system have been demonstrated. In many studies, among acute effects of smoking on hematological system ,Several studies reported that platelet histogram indices mean platelet volume (MPV) and platelet distribution width (PDW) might be considered as platelet activation markers, because during

the activation process the platelets became larger. PDW, also routinely reported by modern analyzers together with MPV, might be regarded as a marker of platelets activation, in fact reflecting a more Important heterogeneity of the platelets dimensions. Smoking cessation studies have demonstrated that some of these changes are reversible, and transitory in case of cessation of smoking [10].

MATERIALS AND METHODS

Study design and area

This study is a comparative case control study conducted at Khartoum state. A total of 150 subjects were enrolled, 50 were cigarette smoker, 50 non smokers, and 50 ex-smokers.

Blood Sample collection and analysis

Two and half milliliter (ml) venous blood sample was collected from each participant in ethylene demine tetra acetic acid (EDTA) for hematological analysis, and processed within two hours. The platelet count & indices were analyzed in whole blood using automated blood cell counter (Sysmex KX- 21N.

Ethical approval

This study was approved by the scientific committee of faculty of medical laboratory sciences, Al Neelain University, and informed consent was obtained from each participant before sample collection.

Data collection and analysis

Data was collected by designed questionnaire, and analyzed by statistical package for social program (SPSS) program. Qupantitative variables were represented as mean±SD and qualitative variables as frequency and percentage. Results of haematological values were compared in smokers, ex-smoker

rand non-smokers using ANOVA test. Pearson correlation was used to investigate correlation between quantitative outcomes.

RESULTS

A total of 150 adult male were enrolled in this study, their age range 25-69 years (Mean±SD: 37.50±9.99), 50 of them were smokers (Mean duration of smoking:12.20 years), 50 ex-smokers (mean duration of abstention: 10.18 years), and 50 non-smokers.

The smokers were regularly consuming minimum of two cigarette per day (Mean:10.52 cigarette) for at least one year.

The results showed that, there was no statistically significant difference in PLTs count and indies when compared in study groups (Table 1).

Table 1: Comparison of platelet count and indices in study subjects

Parameter	Smokers		Ex-smokers		Non-smokers		*P.value*
	Mean	SD	Mean	SD	Mean	SD	
PLT count ($X10^3/\mu l$)	245.84	56.64	250.74	55.83	241.16	65.08	0.72
MPV (fl)	9.72	0.86	9.68	0.92	9.88	1.02	0.54
PDW	12.45	1.84	12.64	2.11	12.75	2.08	0.75
P-LCR	23.67	6.83	23.45	6.89	24.81	7.83	0.59

No statistically significant correlation was found between duration of smoking, number of cigarette per day and each of platelet count and indices. Also no statistically significant correlation was found between duration of abstention and platelet count and indices in ex-smokers (Table 2).

Table 2: Correlation between duration of smoking, number of cigarette per day, duration of abstention and platelet count and indices.

Variable		PLTs count	MPV	PDW	PLCR
Duration	Person correlation	-0.05	-0.12	-0.15	-0.11
	P.value	0.68	0.37	0.29	0.42
Number of cigarette per	Person	-0.18	-0.22	-0.15	-0.23

day	correlation				
	P.value	0.20	0.11	0.29	0.10
Duration of abstention	Person correlation	-0.03	-0.22	-0.15	-0.22
	p.value	0.80	0.12	0.28	0.11

DISCUSSION

Smoking is one of most serious health problem and it has been reported to be associated with increased risk of cardiovascular disorders. In this study we investigated the effect of cigarette smoking on platelet count and indices to explore if platelet activation contributes to the cardiovascular diseases risk in the smokers or not.

The results showed that, there was no statistically significant difference in PLTs count and indices when compared in study groups. According to these findings we suggest that the effect of cigarette smoking on PLTs count and platelet morphological indices is insignificant. Similar results were also reported in other studies, Brummit *et al* found no statistically significant difference in PLTs count in healthy volunteer smokers [17]. Also Dotevall *et al* noted no changes in PLTs count in female smokers and non-smokers [18]; similar finding also reported by Suwansaksri *et al* who observed no alterations in PLTs in male smokers and non-smokers [19]. Our finding was disagree with that of Chao *et al* who reported a significant increase in PLTs count, fibrinogen, and platelet factor-3 (PF-3) activity, and decrease in the lag period of collagen-induced platelet aggregation. It was reported that the hormonal pathways regulating platelet production may be potentially impaired following smoking inducing production of platelets and increased platelets count (20). Also our result disagree with another study by Ghahremanfar *et al***,** who reported that cigarette smoking in healthy individuals results in significant and considerable effects on platelet count and morphological indices compared with non-smokers [21]. Variations in our study

and these studies may be because of differences in the type of cigarette or tobacco.

In the current study statistically significant correlation was found between duration of smoking, number of cigarette per day and duration of abstention on platelets count and indies. Similar results were reported by Inal *et al* who also reported no correlation between duration of cigarette smoking for less or more than 5 years on platelets count and MPV [22]. However, in this study the mean duration was approximately 10 years.

CONCLUSION

In conclusion, smoking has no effect on PLTs count and indices.

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