

An Examination of the Impact of Regular Exercise Participation on Blood Platelet Parameters

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Abstract: This study was conducted with a view to comparing blood platelet levels of athletes who do sports regularly in various branches at least for five years with those of sedentary university students. The study contained 36 voluntary students- 18 athletes doing sports in various branches and 18 sedentary university students- at the age interval of 20-22. Volunteers were selected among those who do not regularly take drugs, alcohol and any other harmful substance. After the volunteers were provided with information concerning the study, they were measured for their physical attributes such as body height and body weight and their blood samples were taken. Volunteers were warned not to take in any food or liquid after 22:00 PM in the night before blood samples were taken. Blood samples taken from the volunteers from their forearm antecubital area in line with hygiene rules were analyzed in the central laboratory by means of an auto-analyzer for haematological levels such as platelets (PLT), plateletcrit (PCT), Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW). Independent samples t test was used in order to determine the difference among groups. $p < 0.05$ value was accepted as significant. The study revealed that the differences in PLT, MPV and PCT levels among the groups were statistically significant ($p < 0.01$). As a conclusion, despite the fact that red blood cells were within the reference interval, the positive difference in favour of athletes against sedentary students at the same age interval is considered to be owing to athletes' regular participation in exercise, life quality and nutrition habits.

Key words: Athletes • Sedentary • Exercise • Platelet Parameters

INTRODUCTION

It is known that long-term exercise has a positive impact on the organism provided that the loading elements are well-planned [1,2]. Blood cells, as a part of blood biochemistry reflecting any change in the organism, are also positively affected [3]. Nevertheless, when we analyze the studies conducted in this field, we see that there is not a full consensus on how exercise affects haematology. There are studies suggesting an increase [4,5]. and a decrease [6] in haematological parameters after exercise while some others report no change in the level of haematological parameters [7]. Such differences are reported to be stemming probably from the methods employed in studies, type of exercise, gender, age, life quality, physiological and physical condition of subjects as well as severity, duration and frequency of exercise [4,8].

It is stated that the increase in the platelet level can be explained by haemaconcentration due to exercise whereas another explanation is that the stressful factors result in neural system activation and increase blood platelet level [2].

This study was conducted with a view to comparing blood platelet levels of athletes who do sports regularly in various branches at least for five years with those of sedentary university students.

MATERIALS AND METHODS

This study covered a total of 20 voluntary male subjects- 18 athletes with an average age of 20.55 ± 0.70 years from various team sports (basketball, handball and volleyball) (Group 1) and 18 sedentary university students with an average age of 20.88 ± 0.75 years (Group 2). ID information was taken as basis in identifying ages of the

participating subjects. Subjects were warned not to take in any food or liquid after 10:00 PM one night before the blood samples were taken. Blood samples were taken at 9:00-10:00 AM on an empty stomach in the laboratory. 5 ml blood samples taken from the forearm antecubital area in line with hygiene rules were put into EDTA tubes and were analyzed in the central laboratory by an architect-brand blood counting device for blood platelet parameters such as platelets (PLT), plateletcrit (PCT), Mean Platelet Volume (MPV) and Platelet Distribution Width (PDW).

SPSS (Statistical Package for the Social Sciences) was used in data analysis. Measurement results were presented as mean and standard deviation. The Shapiro-Wilk test was used to evaluate whether the data displayed a normal distribution. As the data displayed normal distribution, Independent samples t test was used in order to determine the difference among groups. $p < 0.05$ value was accepted as significant.

RESULTS

Values of all participating subjects are given in the table. When we analyzed the values about age variable, we found the youngest age as 20 years and the oldest age as 22 years, the mean age being 20.72 ± 0.74 years. When we analyzed the values about body height variable, we found the shortest one as 167 cm and the tallest one as 185 cm, the mean height being 177.80 ± 4.32 cm. When we examined the values about body weight, we found the

lowest weight as 71 kg and the highest weight as 88 kg, the mean weight being 78.63 ± 4.47 kg. When we examined the body mass index values, the lowest one was 22.80 kg/m^2 and the highest one as 28.05 kg/m^2 , the mean value being $24.92 \pm 3.78 \text{ kg/m}^2$.

Values concerning PLT parameters of all participating subjects were given in the table. When we analyzed the values concerning the PLT variable, we found that the lowest value was 156 while the highest value was 281, the mean value being 215.63 ± 26.26 . When we analyzed the values concerning the MPV variable, we found the lowest as 7.10 and the highest as 9.70, the mean value being 8.09 ± 0.76 . When we analyzed the values concerning the PD variable, the lowest value was 45.40 while the highest one was 17.80, the mean value being 16.67 ± 0.54 . When we analyzed the values concerning the PCT variable, the lowest value was 0.15 whereas the highest one was 0.28, the mean value being 0.18 ± 0.024 .

When we made an intergroup comparison of subjects at the age interval of 20-22, we found out that the difference in physical measurement values such as body weight, body height and body mass index was insignificant ($p > 0.05$).

When we examined the values of platelet parameters of athletes and sedentary university students at the same age group in Table 4, we found that the differences in PLT, MPV and PCT levels were statistically significant ($p < 0.01$) whereas the difference in PD value was insignificant ($p > 0.05$).

Table 1: Descriptive Statistical Distribution of Physical Attributes of Subjects

Variables	n	Min	Max	Mean	S _D
Age (year)	36	20.00	22.00	20.72	0.74
Height (cm)	36	167.00	185.00	177.80	4.32
Body Weight (kg)	36	71.00	88.00	78.63	4.47
BMI (kg/m ²)	36	22.80	28.05	24.92	3.78

Table 2: Descriptive Statistical Distribution of PLT Parameters of Participants

Variables	n	Min	Max	Mean	S _D
PLT	36	156.00	281.00	215.63	26.26
MPV (fL)	36	7.10	9.70	8.09	0.76
PD	36	15.40	17.80	16.67	0.54
PCT (%)	36	0.15	0.28	0.18	0.024

Table 3: Comparison of Physical Attributes Of Subjects

Variables	Group	n	Mean	S _D	t	p
Age (year)	1. Group	18	20.55	0.70	-1.366	0.181
	2. Group	18	20.88	0.75		
Height (cm)	1. Group	18	178.16	4.57	0.495	0.624
	2. Group	18	177.44	4.16		
Body Weight (kg)	1. Group	18	77.88	5.21	-1.006	0.321
	2. Group	18	79.38	3.58		
BMI (kg/m ²)	1. Group	18	24.58	0.88	0.385	0.702
	2. Group	18	24.09	5.35		

1. Group: Athletes 2. Group: Sedentary

Table 4: Statistical Distribution of PLT Parameters of Groups

Variables	Group	n	Mean	S _D	t	p
PLT	1.Group	18	200.61	20.96	-4.155	0.000**
	2. Group	18	230.66	22.41		
MPV (fL)	1.Group	18	8.67	0.66	6.945	0.000**
	2. Group	18	7.51	0.23		
PD	1.Group	18	16.71	0.46	0.450	0.655
	2. Group	18	16.63	0.63		
PCT (%)	1.Group	18	0.19	0.02	2.434	0.020*
	2. Group	18	0.17	0.01		

*p<0.05, ** p<0.01 1. Group : Athletes 2. Group: Sedentary

DISCUSSION

As a result of this study conducted with a view to comparing blood platelet levels of athletes who do sports regularly in various branches at least for five years with those of sedentary university students, it was found out that the values obtained fell within the reference interval. It was also observed that there were differences between athletes and sedentary students in PLT, MPV and PCT values ($p<0.01$) while the difference in PD value was not significant ($p>0.05$). A comparison of the values obtained in this study with other studies conducted in this field showed that there were similarities as well as differences.

Some studies suggested that acute and chronic exercise increased the platelet level [9,10] whereas some others reported no impact [11-12]. There are various findings concerning the changes that take place in the number of platelet after exercise [13]. Patlar and Keskin [14] reported that sub-maximal exercise had an impact on platelet parameters while Ersöz [15] suggested that sub-maximal exercises did not have any impact on platelet level. Such differences are suggested to be stemming from the duration and severity of the exercise program [16].

Özyener *et al.* [17] stated that exercise with maximal severity had an impact on platelet parameters. The literature suggests that exercise with maximal and sub-maximal severity give rise to short-term temporary increases in the number of peripheral platelets while the number of platelet does not change after short-term moderate exercises with lighter severity [13,18,19].

Akar *et al.* stated that platelet level was significantly higher at the end of sub-maximal exercise compared to that before the exercise [20].

The increase in platelets can be explained by haemaconcentration due to exercise while another explanation is that pushing and stressful factors lead to neural system activation and increase the number of blood platelets [2].

To conclude, although blood platelets are within the reference interval, the positive difference of athletes from sedentary students at the same age group in platelet levels is considered to be originating from regular participation of athletes in sports, their life quality and nutritional habits.

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