Thrombocyte Indices in Pediatric Age Group

Pediatrik Yaş Grubunda Trombosit İndisleri

Research Article / Araştırma Makalesi

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ABSTRACT

Platelet (PLT) indices mean platelet volume (MPV), platelet hematocrit (PCT) and platelet distribution width (PDW) are probably the most ignored parameters by the clinicians. Although several studies held among different disease states, they do not have diagnostic value yet. Our aim was to determine the reference range of platelet parameters in venous blood samples of a population with an age range 6 months to 18 years in a hospital laboratory. This retrospective study consisted of 710 healthy children and the subjects were categorized into five groups according to their age. Age distribution of these groups was 6 months; 12 months; 18 months; 2-5 years and 6-18 years respectively. Our data revealed significant differences with regard to the MPV, PCT and PDW among the groups ($p<0.001$). Also, it was found that the increased PLT count was statistically associated with an elevated PCT value ($r = 0.91$, $p < 0.0001$) and the number of PLT correlated negatively with MPV ($r = -0.38$, $p < 0.001$). PDW showed a positive correlation with MPV ($r = 0.3$, $p < 0.001$), but negatively with PLT ($r= -0.2$) and PCT ($r = -0.1$) ($p < 0.001$). Our data revealed that determination of the PDW reference range is fundamental, and the association of this parameter with the platelet number and mean platelet volume may be used for the diagnosis and differentiation of several pathologies.

Key Words
Thrombocyte, platelet distribution width, platelet hematocrit, mean platelet volume.

ÖZET

Trombosit indisleri olan ortalama trombosit hacmi, trombosit hematokriti ve trombosit genişlik dağılımı, klinisyenler tarafından çok da dikkate alınmayan parametrelerdir. Her ne kadar bazı hastalıklarla ilişkileri belirtilmişse de, henüz tam bir tanı değeri bulunmamaktadır. Amacımız, trombosit parametrelerini 6 ay-18 yaş arası çocukluk çağı yaş grubunda dağılımlarını belirlemektir. Elde ettiğimiz veriler, trombosit sayısının artmasıyla, trombosit hematokrit değerinin arttığını ($r = 0.91$, $p < 0.0001$) ve buna karşın ortalama trombosit hacmiyle ters orantılı olduğunu göstermiştir ($r = 0.3$, $p < 0.001$). Trombosit genişlik dağılımı ortalama trombosit hacmi arasında doğru orantılı bir bağıntı varken ($r = 0.3$, $p < 0.001$), trombosit sayısı ($r= -0.2$) ve trombosit hematokriti ($r = -0.1$) ile arasında ters bir orantı bulunmaktadır ($r = -0.1$, $p < 0.001$). Verilerimiz trombosit dağılım genişliğinin temel olduğunu ve bazı hastalıklarda tanı ve ayırıcı tanıda kullanılabileceğini düşündürmektedir.

Anahtar Kelimeler
Trombosit, trombosit genişlik dağılım, platelet hematokriti , ortalama platelet hacmi.

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INTRODUCTION

As the automated hematological analyzers improve, they contribute more precise and even faster results of several blood cell parameters automatically. Among these parameters, platelet (PLT) indices "Mean Platelet Volume" (MPV), "Platelet Hematocrit" (PCT) and "Platelet Distribution Width" (PDW) are probably the most ignored parameters by clinicians. Although several studies held among different disease states, they do not have diagnostic value yet. However, mainly PDW was reported as a useful tool for distinguishing reactive thrombocytosis and thrombocytosis associated with myeloproliferative disorder, and also thrombocytopenia [1-3].

Moreover, there are reports indicating marked difference of these parameters for the prematurity, gestational age, pediatric age group and also, effect of blood glucose, percent body fat and ischemic ECG changes on MPV determinants in elderly population and during sickle cell crisis [4-9].

Further, there is a marked difficulty of standardization and it has been suggested that each laboratory, hence each automated analyzer should have its own reference intervals [1]. It was also reported that, timing of the analysis is important, as time prolongs the indices alter [10].

Our aim was to determine the reference range of platelet parameters in venous blood samples of a population with an age range 6 months to 18 years in a hospital laboratory.

MATERIAL AND METHODS

This retrospective study consisted of 710 healthy children and the subjects were categorized into five groups according to their age. Age distribution of these groups was 6 months; 12 months; 18 months; 2-5 years and 6-18 years respectively. These blood sampling was performed during routine analysis of well-baby and children. Data of platelet counts, platelet indices, mean platelet volume (MPV), platelet hematocrit (PCT) and platelet distribution width (PDW) were analyzed. All the whole blood count was performed in an automatic blood analyzer (Beckman COULTER® Gen-S Hematology Analyzer; USA) in less than hour time preventing any possible thrombocyte indices alteration due to the use of EDTA as a chemical for the blood sampling.

The results of PLT number, mean platelet volume (MPV), platelet distribution width (PDW), and thrombocytocrit (PCT) were expressed as the mean ± standard deviation (s.d.). Comparisons of the PLT parameters among the groups were evaluated by the analysis of variance test (ANOVA). A *LSD* from Post Hoc tests was performed to detect different groups. The correlations between the PLT count, MPV, PCT, and PDW were assessed by using *Pearson correlation* test. Besides, t-test was performed to compare these parameters between male and female children.

The statistical analyses were performed by statistical package for social sciences (SPSS Inc., Chicago, IL). For all test, a p value < 0.05 was accepted as significant.

Table 1. The distribution of platelet parameters of the study population according to the age groups.

Age groups	n	PLT	MPV	PC	PDW
6 months	(42)	342.8 ± 66	7.2 ± 0.6	0.24 ± 0.04	16.2 ± 0.42
12 months	(247)	326.5 ± 86	7.1 ± 0.6	0.22 ± 0.05	16.1 ± 0.48
18 months	(62)	326.0 ± 78	6.8 ± 0.7	0.22 ± 0.05	16.2 ± 0.41
2-5 years	(177)	310.6 ± 73	6.9 ± 0.6	0.21 ± 0.04	16.2 ± 0.56
6-18 years	(182)	265.2 ± 69	7.5 ± 0.8	0.19 ± 0.05	16.4 ± 0.53

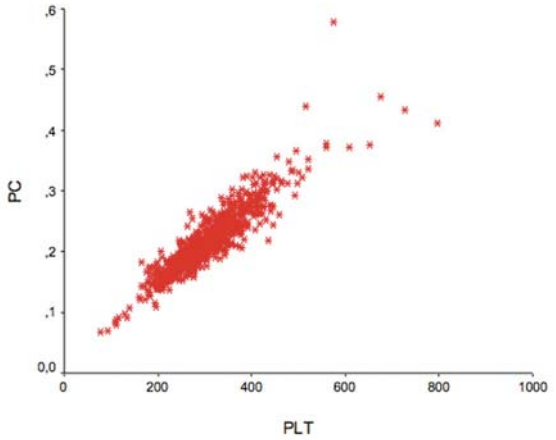

Figure 1. PLT count correlation with PC.

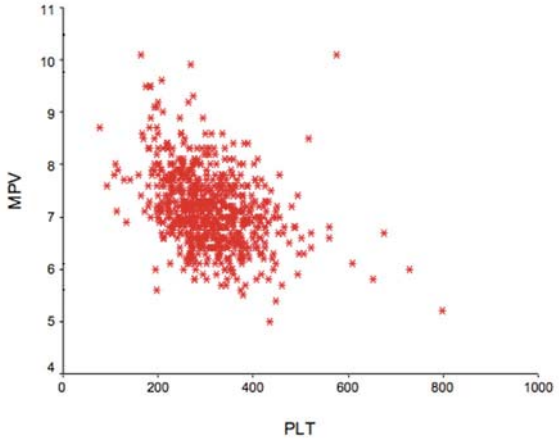

Figure 2. PLT count correlation with MPV.

RESULTS

Our data on the distribution of MPW, PDW and PCT were shown in Table 1. The ANOVA test showed that there were significant differences with regard to the MPV, PCT and PDW among the groups ($p < 0.001$). Further it was found that the increased PLT count was statistically associated with an elevated PCT value ($r = 0.91$, $p < 0.0001$) (Figure 1).

As shown in Figure 2, the number of PLT correlated negatively with MPV ($r = -0.38$, $p < 0.001$). PDW showed a positive correlation with MPV ($r = 0.3$, $p < 0.001$), but negatively with PLT ($r = -0.2$) and PC ($r = -0.1$, $p < 0.001$).

DISCUSSION

As technology advances, more indices are available in complete blood count. However, it is interesting that more information can be drawn from these parameters such as PDW but they were mostly discarded as being without clinical interest by the clinicians.

Our data reached to the same conclusion with the previously reported data on platelet indices. The decrease of platelet number with the subsequent increase of mean platelet volume in relation to age is important. This may possibly resulted from the platelets having become more efficient in carrying out their haemostatic function.

Correlation between platelet number and platelet indices should be monitored, as they may have a role in the pathogenesis of thrombotic events.

Our data revealed that determination of the PDW reference range is fundamental, and the association of this parameter with the platelet number and mean platelet volume may be used for the diagnosis and differentiation of several pathologies.

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