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Assessment of Hypercoagulability (Platelet Count and Indices) in Sudanese Patients with Acute Myeloblastic Leukemia

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Abstract: ***This study was done in patients with acute myelogenus leukemia inRadiation and Isotopes Centre Khartoum, Khartoum state, Sudan, during the period from November 2015 to March 2016. Aim: This study aimed to measurethe Platelet count and indices in patients with acute myelogenus leukemia. Methods: Venous blood (2.5ml) were collected in EthylenedemineTetraAcetic acid container from patients with acute myelogenus leukemia and measurement by automation technique (SysmexKX-21N for complete blood count). Results: The result showed that the mean of platelets count was (164.82 ± 182.18 X10^3 /µl SD) with p-value (0.004) while the mean of PDW was (10.2 ± 8.8 fL) with p-value (0.08) and the mean of the MPV was (6.1 ± 4.3fL) with p-value (0.00). Conclusion: Insignificant change in platelet count and indices of patients with acute myeloid leukemia when correlated with age, duration, and treatment. Also significant difference of mean PL.C and MPV, as well as insignificant mean of PDW was observed when it correlated with healthy control.***

Keyword: Hypercoagulability, Acute myeloblastic leukemia, PL.C, MPV, PDW

1. Introduction

The leukemia is a group of disorders characterized by the accumulation of malignant white cells in the bone marrow and blood, and lead to (i) bone marrow failure (i.e. anemia, neutropenia, and thrombocytopenia) and (ii) infiltration of organs. “Leukemia” is the general term for four different types of blood cancer called: Acute lymphocytic (lymphoblastic) leukemia (ALL), Acute myelogenous (myeloid) leukemia (AML), Chronic lymphocytic leukemia (CLL) and Chronic myelogenous leukemia (CML)[(1, 2)].

Acute myeloid leukemia (AML) is a malignant disease characterized by an accumulation of immature myeloid blast cells in the bone marrow and most often in the peripheral blood. AML can also be present in other tissues such as in the skin[(3, 4)].

Globally, during the period from 2009-2013 the number of new cases of acute myeloid leukemia and the number of death were 4.1/100.000 and 2.8/100.000 of population per year respectively,in contrast the number of new cases in 2016 was19.950/100.000 populations and the number of death was10.430/100.000 populations of all new cancer cases[(5)].

In Sudan the Leukemia is one of the most significant current health problems, it associated with large population resulting of high mortalityamong Sudanese population[(6)].

Despite of this high mortality there is no enough data reflect the relation between coagulation factors and AML Patient’s. Therefore the aim of this study was to assess the hypercoagulability (platelet count and indices) in Sudanese patients with acute myeloblastic leukemia.

2. Materials and Methods

This study was case control, hospital base study, conducted at Radiation and Isotopes center Khartoum (RICK), Sudan.

In study 80 blood samples wereincluded, 40 of these samples were collected from acute myeloid leukemia patient and the remaining 40 samples were collected from healthy persons and used as control.

Samples Collection

Blood samples were collected in possible aseptic condition from mid vein of the forearm (2.5ml). Collection was done using standard venipuncture technique disposal plastic syringe and put it inEthylene Di-amine Tetra-acetic Acid (EDTA) container, each container was numbered and every number was related to the questioner used in data collection,and then each container placed on electric mixer for 3 minutes.Then they immediately took to the lab to be analyzed usingsysmex (KX-21N), for complete blood count(CBC). Inside the machine the WBC count, RBC count, mean corpuscular volume (MCV), mean corpuscular hemoglobin concentration (MCHC) and platelets were measured by using the Direct Current detection method. The

HGB detector block measured the hemoglobin concentration using the non-cyanide hemoglobin method.After analyzing of each sample a result paper obtained from the machine containing the measurement of each parameter.

Control blood (EIGHTCHECK-3WP) using X control or L-J control program was used before starting sample analysis, to optimize the results.

The ethical clearance of this study was approved by department of hematology collage of medical laboratory science. Data were collected with verbal informed consent from patients, and the questionnaires were filled.

3. Results

The objective of this study is to determine the mean of Platelets count and indices in patients with AML, as well as tocorrelatethe possible risk factor (age, duration, treatment) with platelets count and indices.

In this study of 40studied patients 21(52.5%) were male and 19(47.5%) were female with age range from less than 9 years old up to 69 years old.

The result showed that the mean of platelets count was (164.82 ± 182.18 **X10^3 /µl** SD) with p-value (0.004) while the mean of PDW was (10.2 ± 8.8 fL) with p-value (0.08) and the mean of the MPV was (6.1 ± 4.3fL) with p-value (0.00) when compared to control group **table (1)**.

As illustrated in **figure (1)** the age of study populations was classified in to different group started from (0-9), (10-19), (20-29), (30-39), (40-49), (50-59) and (60-69). These age groups were subsequently correlated with PL.C, PDW and MPV, the result showed that, the maximum PL.C was observed at age group (0-9) (292cell/mm^3), the maximum PDW and MPV at 50-59 (15.7/fl and 6.6/fl) respectively. Statistically no significant association were observed between age group and PL.C, PDW and MPV the *p. value* was > 0.05 as showed in **table (2).**

Also the study populations were subsequently classified in to three groups according to the duration of disease (0-6 months, 7-12month and 13-48months),accordingly,the PL.C, PDW and MPV were(178.42 cell/mm^3, 116.83 cell/mm^3 and 20.33 cell/mm^3), (9.8/fl, 11.3/fl and 13.3/fl) and(6.2/fl, 5.8/fl and 5.6/fl) respectively as showed in**figure(2).**Statistically no significant association were observed between thePL.C, PDW and MPV of patients and duration of the disease *p. value* (> 0.05) as described in **table (2).**

In this study the PL.C, PDW and MPVof patients were also correlated with the treatment (ATRA (treinoin) and (Daunorub) **figure (3)**.The mean of PL.C was normal in those that used ATRA(treinoin) and (Daunorub) drugs, while the PDW and MPV within normal range in those that used (Daunorub) treatment and insignificant decreased in those that used ATRA(treinoin). Statistically no significant association were observed between (PL.C, PDW and MPV)and treatment that used *p. value* (> 0.05), table (2).

Table 1: Mean Differences of PL.C, PDW and MPV in AML patients and healthy control.

	Mean ± SD		***P. Value***
	Patients	Healthy control	
PL.C X103 /µl	164.82 ± 182.18SD	258.10 ± 81.0SD	0.004**
PDW/fL	10.2 ± 8.8SD	12.7 ± 1.0SD	0.08
MPV/fL	6.1 ± 4.3SD	9.6 ± 0.9SD	0.00**

Table 2: Correlation of PL.C, MPV and PDW with duration, Age and Treatment in AML
**Correlation is significant if the *p-value* is less than 0.05

Risk factor	***P. Value***		
	PL.C X10^3 / µl	PDW/fL	MPV/fL
Duration	0.692	0.46	0.76
Age	0.258	0.85	0.33
Treatment	0.95	0.21	0.50

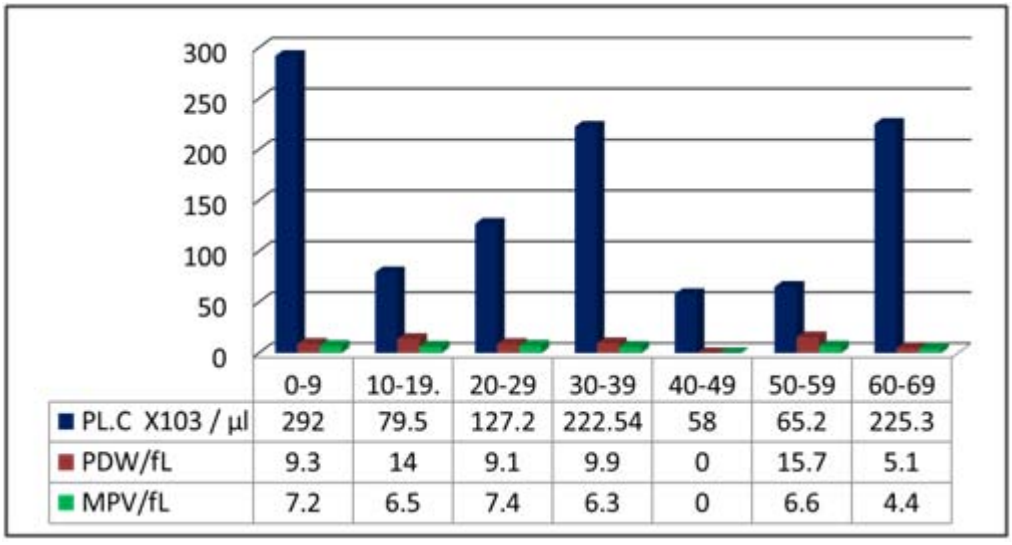

Figure 1: Correlation of mean PL.C, MPV and PDW of patients with age group

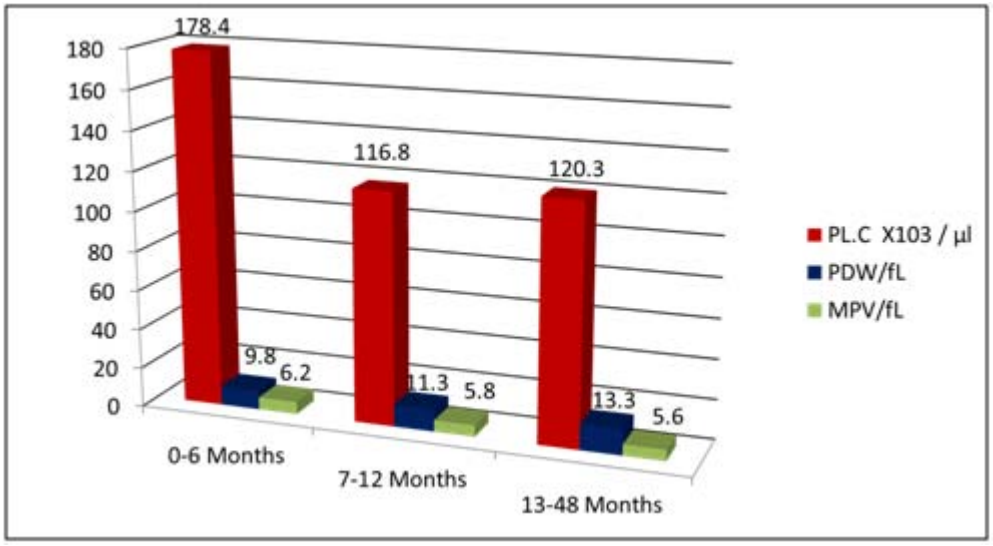

Figure 2: Correlation of mean PL.C, MPV and PDW of patients with Duration group

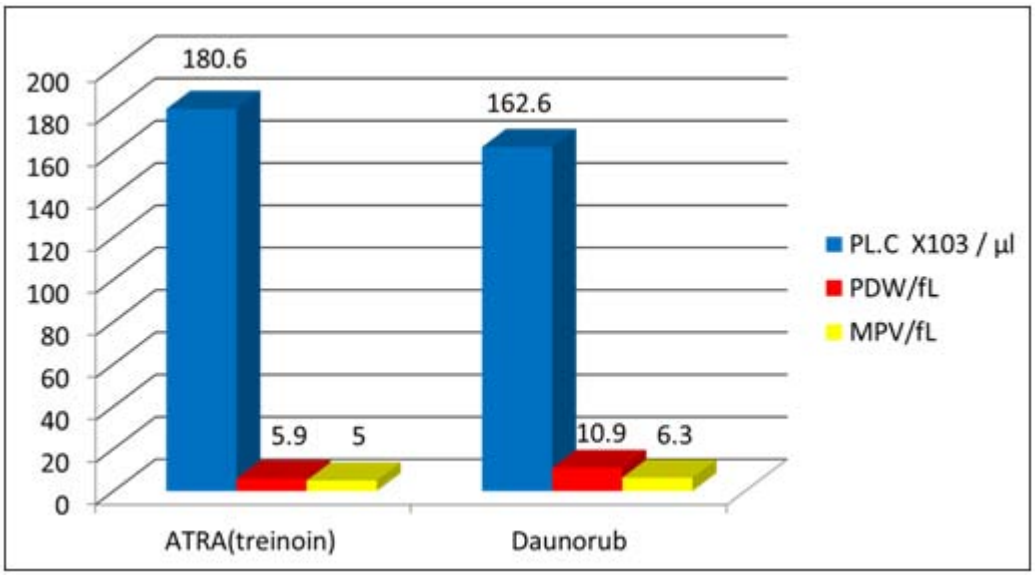

Figure 3: Correlation of mean PL.C, MPV and PDW of patients with treatment

4. Discussion

This study included 80 persons, 40 patients with AML male and female were selected for this study, and 40 normal healthy individual were selected as control group. This study was measured for them platelet count and indices.

The results showed significant difference of mean platelet count between the patients and healthy control groups. And showed significantly decreased of mean MPV of patients in correlation with healthy group, and showed insignificant difference of mean PDW of patients in correlation with healthy control group, these findings is in an agreement with study carried by Kim, *et al* (2014)[7], when they compare the platelet parameters in thrombocytopenic patients associated with AML and primary immune thrombocytopenia. In contrast our study reject the findings of Amar R, *et al* (2013)[8], when they reported significant decreased of platelet count in study aimed to assess the role of platelet parameters in diagnosing various clinical conditions.As well as the present study disagreed with Bumbea,*et al* (2011)[9]when they assess the platelet dysfunction in acute myeloid leukemia's and myelodysplastic syndromes, they reported significant decreased in platelet in patients AML *p.value* (0.001).

Also the result of PL.C, MPV and PDW was insignificant when correlated to age group, duration and treatment. This disagreed with Vijaya B, *et al* (1990) [10]when they reported significant decreased PL.C, MPV and PDW in patients with AML when correlated to age and sex.

5. Conclusion

The present study was concluded that,insignificant change in platelet count and indices of patients with acute myeloid leukemia when correlated with age, duration, and treatment.Also significant difference of mean PL.C and MPV, as well as insignificant mean of PDW was observed when it correlated with healthy control.

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