Studies on platlets diagnostic indexes in patients with acute myeloid leukaemia in Uganda

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Abstract

The study was done to determine platelets indexes of patients with acute myeloid leukaemia in a tertiary hospital in Uganda. The study was done in Ishaka Uganda at Kampala International University Teaching Hospital, Ishaka, Uganda. The study adopted hospital based cross-sectional design where patients who attended the hospital with acute myeloid luekaemia (AML) were selected for the study on purposive sampling technique and the haematological variables evaluated with the apparently healthy individuals. A total of eighty (80) subjects comprising forty (40) acute myeloid patients and forty (40) apparently healthy subjects were recruited for the study using purposive sampling technique. The data were analysed using student t-test and present as mean ± standard deviation using SPSS version 20 and level of significance set at P<0.05. The study revealed decrease in platelets and plateletcrit. This may lead to bleeding disorders that may be seen in the patients. The platelets inflammatory indexes had some impactful changes which may affect the quality of life of the patients. These changes in inflammatory indexes of platelets will help to determine the mortality and morbidity of the affected patients.

Keywords: Acute myeloid leukaemia, Platelets, platelet indexes, Uganda

1.0 Introduction

Acute myeloid leukemia (AML) is a group of neoplastic hematologic diseases classified by the proliferation and growth of immature hematopoietic cells in the bone marrow and blood [1]. A high incidence of AML is observed in adults, accounting for nearly 80% of adult acute leukemias and only 20% of childhood acute leukemias [2]. Although AML is a fairly rare disease, it accounts for only about 1.2% of cancer deaths in the United States [3-6]. It is most

common in acute leukemia in adults. Their frequency increases with age. The average age of acute myeloid leukemia (AML) patients is approximately 70 years [7]. Most studies found a higher prevalence of AML in men. This corresponds to a male-to-female ratio of 2.5:1 [8]. In 2013, more than 57% of these new leukemia cases were men [9]. Acute myeloid leukemia (AML) is indeed a diverse selection of numerous malignant diseases that can be grouped according to morphological, cytogenetic, molecular and genetic criteria [10].

The Franco-American British (FAB) system has generally become the standard for classifying AML into different subtypes [11]. Different AML subtypes are classified according to the stage of progenitor cell maturation in WBC and features of malignant transformation at initial diagnosis [12, 13]. In developing countries such as Uganda, population growth, aging and urbanization, dietary changes, better control of infections, and increased smoking will increase the burden of cancer, including haematological malignancies [14].

In addition to their critical role in hemostasis and thrombosis, there is increasing evidence that platelets contribute to inflammatory processes, microbial host defense, wound healing, angiogenesis and remodeling [15]. Platelets release more than 300 proteins and small molecules from their granules, including chemokines, cytokines such as interleukin-1 , CD40 ligand, -thromboglobulin, and growth factors, which affect the function of blood vessel walls and circulating immune cells [16-18].

2.0 Materials and Methods

2.1 Study area

The study was done in Ishaka Uganda at KIU-TH, Ishaka, Uganda

2.2 Study Design

This study employed a hospital-based cross-sectional design with purposive sampling techniques. In this design, patients presenting to hospital with acute myeloid leukemia (AML) were selected for a purposive sampling technique study to assess platelets and platelets indexes.

2.3 Subjects

A total of eighty (80) subjects comprising forty (40) acute myeloid patients and forty (40) apparently healthy subjects were recruited for the study using purposive sampling technique.

2.4 Ethical considerations

Ethical approval was obtained from the Research and Ethics Committee (REC) of Kampala International University in collaboration with Kampala International University Teaching Hospital and informed consent was obtained from the subjects. The details of the study were fully explained before subjects gave their informed consent, subjects were willing to participate in the study, and confidentiality was assured.

2.5 Laboratory Investigations

The laboratory investigations were carried out at Haematology Laboratory of Kampala International University Teaching Hospital, Ishaka, Uganda. The full blood counts of the subjects were determined using MIndray BC-3000 Plus.

2.6 Data analysis

The data were analysed using student t-test and present as mean ± standard deviation using SPSS version 20 and level of significance set at P<0.05

3.0 Results

Table 1: Platelets and platelets indexes in acute myeloid leukaemia patients

Parameters	AML	Control	P-value
Platelets (X10^9/L)	22.50±3.54	220.00±28.28	0.010[*]
RDW (fl)	57.65±1.91	46.00±1.41	0.020[*]
PDW (fl)	17.56±0.64	13.00±1.41	0.053
PCT (%)	0.02±0.01	0.20±0.01	0.002[*]
MPV (fl)	7.75±0.78	9.60±0.57	0.113
RPR	2.58±0.311	0.22±0.04	0.009[*]
PPR	0.79±0.09	0.06±0.00	0.009[*]
PPCR	727.50±180.31	61.58±2.23	0.035[*]
MPR	0.36±0.09	0.05±0.01	0.041[*]

Where, RDW= Red Cell Distribution Width, PDW= Platelet Distribution Width, PCT= Plateletcrit, MPV= Mean Platelet Volume, RPR= Red Cell Distribution Width-to- Platelets ratio, PPR= Platelet Distribution Width-to- Platelet ratio, PPCR= Platelet Distribution Width-to- plateletcrit ratio, MPR= Mean Platelet Volume-to- Platelet ratio

4.0 Discussion

The study revealed decrease in platelets and plateletcrit. This may lead to bleeding disorders that may be seen in the patients. The platelets inflammatory indexes had some impactful changes which may affect the quality of life of the patients. These changes in inflammatory indexes of platelets will help to determine the mortality and morbidity of the affected patients. This will lead to deranged cardiovascular function which will result to sudden deaths in the acute myeloid leuakemia patients. The patients should be monitored with these indexes as using them will be helpful to monitor the progress of the patients during and after treatment. The red cell indices were not affected in the acute leukemia patients. Malignant cells activate platelets, which attach to cancer cells and form a platelet layer that hides the malignant cells from the cellular components of the immune system [19], plays an important role in protecting malignant cells from chemotherapy-induced apoptosis [20]. It may play a similar role in hematologic malignancies. Platelets adhere in vivo to leukocytes from healthy donors and in vitro to leukemic cell lines and AML cells [21, 22].

5.0 Conclusion

The study revealed decrease in platelets and plateletcrit. This may lead to bleeding disorders that may be seen in the patients. The platelets inflammatory indexes had some impactful changes which may affect the quality of life of the patients. These changes in inflammatory indexes of platelets will help to determine the mortality and morbidity of the affected patients. This will lead to deranged cardiovascular function which will result to sudden deaths in the acute myeloid leuakemia patients.

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