EVALUATION OF PLATELETS AND SOME INFLAMMATION MARKERS OF PATIENTS WITH ACUTE MYELOID LEUKAEMIA IN A TERTIARY HOSPITAL IN UGANDA

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ABSTRACT

The study was done to determine paltelets and some inflammation markers 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. The ages of the patients were below 25 years. 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 results showed decrease in platelets (*P=0.017*), lymphocytes (*P=0.047*), neutrophils (*P=0.009*), NLR (*P=0.005*) and PLR (*P=0.007*), increase in PDW (*P=0.007*) and no significant difference in MPV (*P=0.151*) and PCT (*P=0.057*) of patients with acute myeloid leukaemia compared to the apparently health subjects respectively. The study revealed decrease in platelets, lymphocytes, neutrophils, NLR and PLR, increase in PDW and no significant difference in MPV and PCT of patients with acute myeloid leukaemia.

Keywords*: Acute myeloid leukaemia, Platelets, Inflammation markers, platelet indices*

INTRODUCTION

Acute myelogenous leukemia (AML) is a group of neoplastic haematologic diseases classified by the proliferation and growth of immature haematopoietic cells in the bone marrow and blood (Obeagu *et al.,* 2022). A high incidence of AML is observed in adults, accounting for nearly 80% of adult acute leukaemias and only 20% of childhood acute leukaemias (ACS, 2016). Although AML is a fairly rare disease, it accounts for only about 1.2% of cancer deaths in the United States (Jemal *et al.*, 2002; Obeagu and Obeagu, 2018; Obeagu and Babar, 2021; Obeagu, 2022). It is most commonly seen in adults with acute leukaemia. Their incidence increases with age. The

average age of acute myeloid leukemia (AML) patients is approximately 70 years (Ossenkupplunge and Löwenberg, 2015). Most studies have found a higher prevalence of AML in men. This equates to her male to female ratio of 2.5:1 (Belson et al., 2007). In 2013, more than 57% of this new leukaemia cases were male (ACS, 2013). Acute myeloid leukaemia (AML) is actually a diverse selection of numerous malignant neoplastic diseases that can be grouped on morphological, cytogenetic, as well as molecular and genetic criteria (His, 2012). The Franco-American British (FAB) system has generally become the standard for classifying AML into different subtypes (Bennett *et al.*, 1976). Different subtypes of AML are classified according to the stage of progenitor cell maturation in WBC and the characteristics of malignant transformation at initial diagnosis Obeagu, 2018; Obeagu *et al.,* 2021. In developing countries such as Uganda, population growth, aging and urbanization, changing diets, better control of infections, and increased smoking are increasing the burden of cancer, including haematological malignancies (Rathee *et al.*, 2014).).

MATERIALS AND METHODS

Study area

The study was done in Ishaka Uganda at Kampala International University Teaching Hospital, Ishaka, Uganda. Kampala International University Teaching Hospital, Ishaka, Uganda. Is located in the Western part of Uganda and serves both Western Uganda populace and entire Uganda. A lot of Health staff drawn from different continent work in the hospital.

Study Design

The study adopted cross-sectional hospital based design with purposive sampling technique where patients who attended the hospital with acute myeloid luekaemia (AML) were selected for the study on purposive sampling technique and the platelets and some inflammation markers were evaluated with the apparently healthy individuals. The ages of the patients were below 25 years.

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.

Ethical issues

Ethical approval was obtained from the institution and informed consent obtained from the subjects. The details of the study were fully explained to the subject before they gave their consent and they willing participated in the study and confidentiality assured to them.

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.

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 $P<0.05$

RESULTS

Table 1: Platelets and some inflammation markers in acute myeloid leukaemia patients

Parameters	AML	CONTROL	*P-Value*
Platelets (X 10^9/L)	27.50±10.61	225.00±35.36	*0.017**
LYM(X 10^9/L)	1.45±0.07	2.15±0.21	*0.047**
NEU(X 10^9/L)	1.10±0.14	4.50±0.42	*0.009**

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MPV (fl)	7.75±0.78	9.60±0.85	*0.151*
PCT (%)	0.02±0.00	0.13±0.04	*0.057*
PDW (fl)	17.50±0.57	11.70±0.42	*0.007**
NLR	0.77±0.13	2.10±0.01	*0.005**
PLR	19.17±8.25	104.35±6.15	*0.007**

The results showed decrease in platelets (27.50±10.61 X 10^9/L, 225.00±35.36 X 10^9/L, *P=0.017*), lymphocytes (1.45±0.07 X 10^9/L, 2.15±0.21 X 10^9/L, *P=0.047*) , neutrophils (1.10±0.14 X 10^9/L, 4.50±0.42 X 10^9/L, *P=0.009*), NLR (0.77±0.13, 2.10±0.01, *P=0.005*) and PLR (19.17±8.25, 104.35±6.15, *P=0.007*), increase in PDW (17.50±0.57fl, 11.70±0.42fl, *P=0.007*) and no significant difference in MPV (7.75±0.78fl, 9.60±0.85fl, *P=0.151*) and PCT(0.02±0.00%, 0.13±0.04%, *P=0.057*) of patients with acute myeloid leukaemia compared to the apparently health subjects respectively.

DISCUSSION

Acute myeloid leukaemia alters the bone marrow activities by altering the haematopietic activities of the stem cells which affect the peripheral circulation of formed elements. The neutrophils and lymphocytes were decreased in patients with acute myeloid leukaemeia by suppressing the level of white cells (Obeagu *et al.,* 2020). This will affect the immunity in the patients and they will be highly vulnerable to infections and inflammatory processes. This will lead to alterations in cytokine levels thereby inducing inflmamations which may be central to morbidity and mortality caused by AML to the affected patients. This will lead to increased release of cytokines especially the inflammatory cytokine which may be hyper regulated thereby damaging the patients systems and altering the well-being the patients. There was also decrease in the neutrophils which can affect cell mediated immunity of the patients (Belson *et al.,* 2007). This will lead to immunosuppression in terms of phagocytic and opsonisation of microbial agents. The red blood cells were deceased such as the red blood cells, haemoglobin and packed cell volume. This shows why the patients

may be highly anaemic and may need exchange blood transfusion. Human umbilical cord blood should be utilized in the management of the patients to improve the haematopoietic activity of the bone marrow and quick recovery of the patents (Rathee *et al.,* 2014). The red cell indices were not affected in the acute leukemia patients. Malignant cells activate platelets, which adhere to cancer cells and form a layer of platelets, hiding the malignant cells from cellular components of the immune system (Amo *et al.,* 2014). Platelets play an important role in protecting malignant cells from chemotherapy-induced apoptosis (Haemmerle *et al.,* 2018). It may play a similar role in hematologic malignancies. Platelets adhere to leukocytes from healthy donors in vivo and to leukemic cell lines and AML cells in vitro (Li *et al.*, 2000).

CONCLUSION

The study revealed decrease in platelets, lymphocytes, neutrophils, Neutrophils to lymphocytes ratio and Platelets to lymphocytes ratio, increase in Platelet distribution width and no significant difference in MPV and PCT of patients with acute myeloid leukaemia **.**

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