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STUDY ON LEUKEMIC INCIDENCE AND THE RELEVANCE OF THE VALUES OF HEMATOLOGICAL PARAMETERS IN DIAGNOSIS

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Key words: *weight of leukemias, hemoglobin, hematocrit, blood and medullary smear*

INTRODUCTION

We live in the era of revolutionary technology, in which various diagnostic and research tools have been discovered, which have added value to modern medicine, have saved many human lives in the ongoing struggle with the most fateful diseases.

However, the etiology and mechanism of action of this dreadful disease called leukemia can not yet be fully explained. Whether they develop slowly and develop clinically-hematological chronology, or that through the accompanying disorders they fall into the improper name of "acute," the leukemia allows them to be identified by means of the disturbances caused, but especially by the presence of cells with forms of presentation from apparently normal to leukemic, with obvious malignant features. The large variety of pathological cells in acute or chronic leukemia makes it difficult to identify the type of cells involved in the leukemic process, which is why limiting the one-hour examination of circulating or bone marrow cell populations to only May-Grünwald-Giemsa stained becomes inadequate. Certain cyto-enzymic-chemical explorations, along with cyto-immunological, even in small numbers, are imperative for the correct determination of the type of leukemic cell that imparts the dominant character of the disease. The primary purpose of such an apparent requirement is to ascertain as accurately as possible the pathological cell base for which the therapy that is most likely to be effective will be selected. Also, such an attitude is useful in sketching a most realistic prognosis.

Modern therapies, last generation, fail to give total satisfaction, that is to stop the disease, which still makes many victims among humanity. The suffering of the patient with leukemia, as well as any type of cancer, is impressive, perhaps also because it is terrifying to know that death is imminent, that every day may be the last.It is a real challenge for any biologist to have a deeper study of leukemia due to the complexity of this blood cell cancer.

MATERIAL AND METHODS

This study was conducted in a group of 70 patients with diagnosis framed in several types of leukemia. Patients enrolled in the study were hospitalized in the Hematology Department of the "St. Pantelimon" Emergency Hospital, from Focsani, Vrancea County, during 2013-2016. Laboratory determinations have been performed in the S.C. Medcenter, S.R.L. The samples examined were taken prior to the introduction of therapies or surgical interventions.

In this study we aim to track the share of acute leukemia in relation to chronic lesions, the distribution of subjects by gender, age, urban / rural environment. Also, for a quantitative and qualitative assessment of haematological parameters, the following laboratory tests were performed: complete blood count, cytological blood smear test, medulogram and reticulocyte count.

Full blood count is a quantitative evaluation method that investigates blood cells and was performed with the Celltac MEK-8222 K automatic hematology analyzer (Figures 1 and 2).

The blood smear cytology examination of the blood smear is a precious investigation and together with the hemoleogram is the first step in the diagnosis of haematological disorders. The blood smear was colored May Grünwald - Giemsa (Figures 3,4,5).

Medullary aspiration was obtained by iliac bone puncture, which is free of major incidents. From the aspirated medullary material, several smears were performed quickly before the coagulation probe. The smears were air-dried, fast fastening. For the morphological examination of the cellular elements and their counting was colored by May Grünwald-Giemsa.

For counting reticulocytes (young, immature red blood cell erythrocytes containing residual nucleic acids), blood was collected on the EDTA anticoagulant, in vaccinations of the same type as those used for haemoleucogram harvesting. RNA from immature erythrocytes was precipitated and stained with a supravitalic dye (cells stained vividly), such as brilliant cresyl blue (Figures 6, 7, 8).

RESULTS AND DISCUSSIONS

In the following graphs are the results obtained from the statistically processed study. The

results obtained on the lot studied in this paper are in accordance with the literature.

The gender distribution of the investigated patients (Figure 9) shows a higher proportion of men with leukemia (62%) compared to women (38%). Leukemias are considered neoplastic disease, with prognostic retardation, especially when the preleukemic phase is not detected at an early stage. In our study, the most affected age groups are those from 61-70 years (26%) and those from 51-60 years (24%) with chronic leukemias (Figure 10). The terms "acute" and "chronic" refer to the natural course of the disease. Patients with acute forms develop for several weeks or months, as opposed to those with a longer-lasting chronic form. As expected, chronic leukemias ais the most common (71%, Figure 11).

The clinical classification of leukemias corresponds to the maturity degree of the predominant cell type present in bone marrow and peripheral blood. The cells with the lowest blast-like maturation degree are the predominant cell type found in peripheral blood and bone marrow in acute leukemia. Chronic leukemia predominates cells with a more mature aspect. Classically, the leukemias may be acute or chronic myeloid (granulocytic) or acute or chronic lymphocytic leukemia (lymphocytes).

Of the types of leukemia, the most common in our study were LLC - chronic lymphoid leukemia (46%), LGC - chronic granulocytic leukemia (22%) and LMC - acute myeloid leukemia (20%), other forms had much lower percentages (Figure 12).

The cytological examination of the capillary blood smear revealed the presence of chronic myeloid monocytic leukemia (Figure 13) with neutrophils - 44%, lymphocytes - 10%, monocytes - 4%, eosinophils - 2%, 40% blasts or acute myeloid leukemia - 65% myeloblasts, erythrocyte anisocytosis (oxifiles macrocytes, microcite), light poikilocytosis (dacrocytes, ovalocytes, schizocytes), very rare platelets, isolated with thrombocyte anisocytosis, macrotrombocytes (Figure 17).

The cytological examination of the bone marrow revealed in Fig. 14: hyperkeletal marrow; (40%) with the following formula: myeloblasts-1%, promyelocytes-1%, myelocytes-5%, metamielocytes-13%, unsegmentated-7%, segmented-9%, eosinophils-2% %. Rare giant cells. Quantitative increased erythroblastic series (50%), basophil erythroblasts and polychromatophils predominate. Rare megaloblastic polychromatophils. Relatively frequent erythroblasts in mitosis, binucleated with karyochore nucleus and Jolly bodies. The megakaryocytes present, some of them with a hyperblobated nucleus. Reduced thrombocytosis; 5% plasmocytes, some with reactive aspect.

In Figure 15, the cytological examination of the bone marrow highlighted: rich cellularity, granulated cells (78%), present maturation (myeloblasts-2%, promyelocytes-1%, myelocytes-15%, 15% methamyelocytes, unsegmentated-19%, segmented-25%). Quantitative erythroblastic series (on average 40%) of normoblastic type. The polychromatophilic erythroblasts predominate. Rare erythroblasts in mitosis. Present megakaryocytes, relatively normal numerical. Reduced thrombocytosis. 5% plasma cells.

In Figure 16, bone marrow cytology examines notes: rich cellularity, normal quantitative granulocyte series (38%), gigantocytes present, increased erythroblastic series (48%), megaloblastic type, basophilic erythroblasts (19%) and polychromatophils (26%) predominate. Presence of erythroblasts in mitosis, with budding nuclei and in caryodous. Present megakaryocytes, normal numerical. Thrombocytosis present, rare plasmocyte with reactive aspect (2%). 2% myeloblasts, 2% myelocytes, 10% methamyelocytes, 8% unshed, 16% segmented, 2% eosinophils, 10% lymphocytes.

And in Figure 18, the marrow appears slightly hypercellular; 65% plasmocytes isolated or grouped; 24% small lymphocytes, quantitative reduced granulocyte series (10%), predominantly composed of neutrophilic segments (6%), extremely low erythroblastic series quantitative (1%), present megakaryocytes, normal numerical, present thrombocytosis.

Fig. 1. Celltac MEK-8222 K Analyzer

Fig. 2. Celltac MEK-8222 K, manual system

Fig. 3. Capillary blood smear

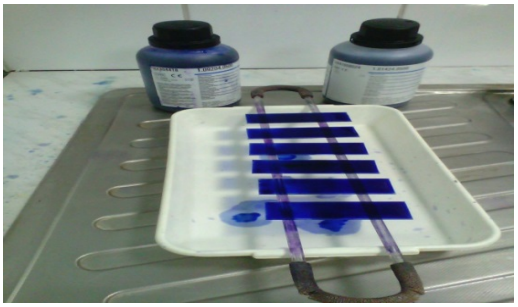

Fig. 4. Peripheral blood smear. Fixing with May Grünwald solution

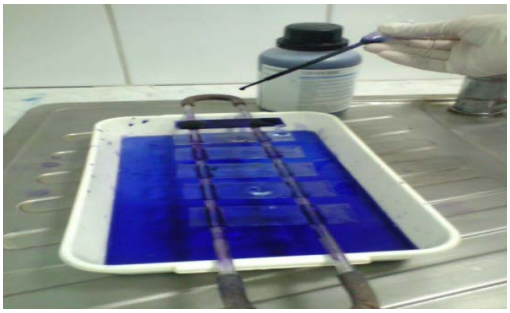

Fig. 5. Peripheral blood smear. The second panoptic staining stage

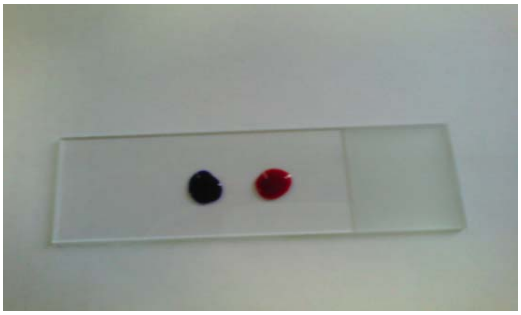

Fig. 6. Reticulocyte technique. Equal parts of blood and brilliant cresyl

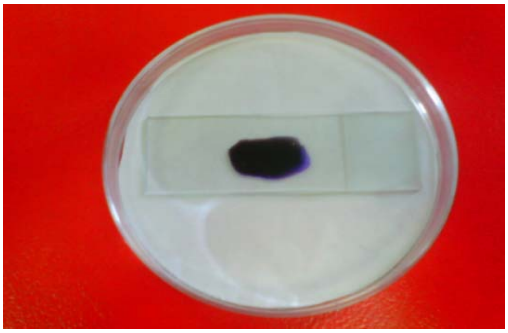

Fig. 7. Reticulocyte technique. The mixture is homogenized in the wet chamber

Fig. 8. Reticulocyte smear

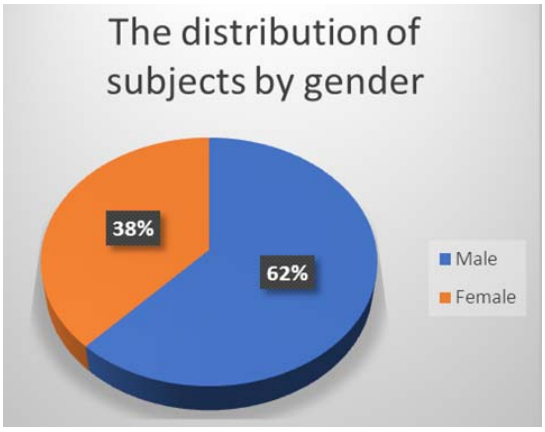

Fig. 9. Percentage distribution of subjects investigated by gender

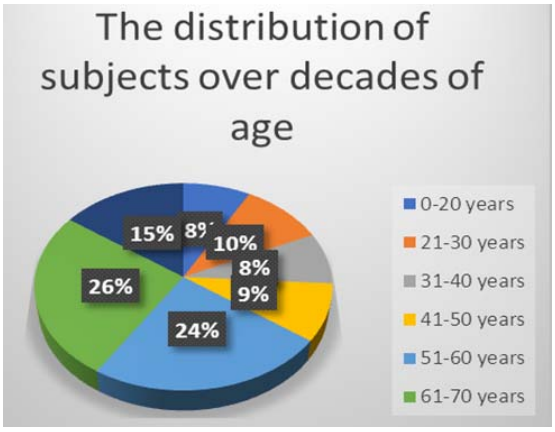

Fig. 10. Percentage distribution of investigated subjects over decades of age

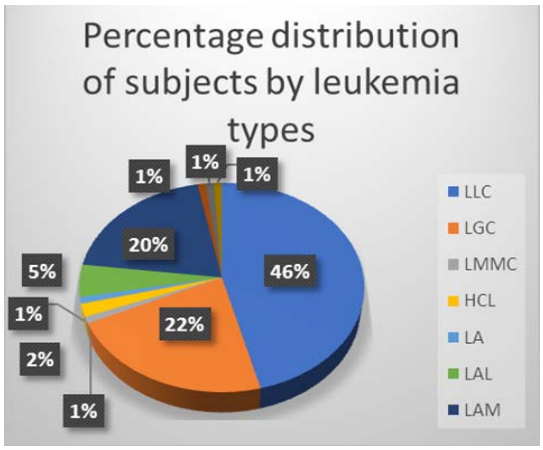

Fig. 11. Percentage distribution of types of acute and chronic leukemia

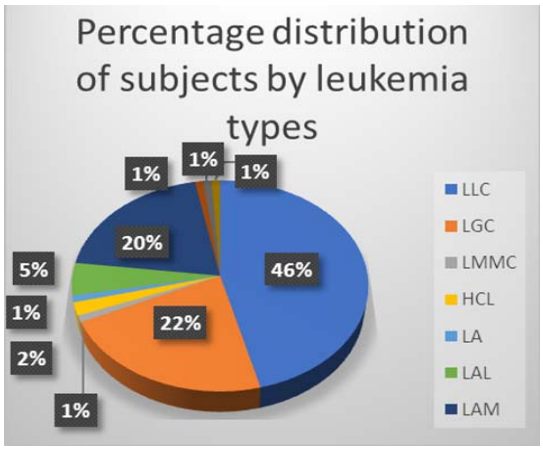

Fig. 12. Percentage distribution of subjects by leukemia types

LAL (acute lymphoblastic leukemia), LLC (chronic lymphocytic leukemia), LAM (chronic myeloid leukemia), LAM (acute myeloid leukemia)

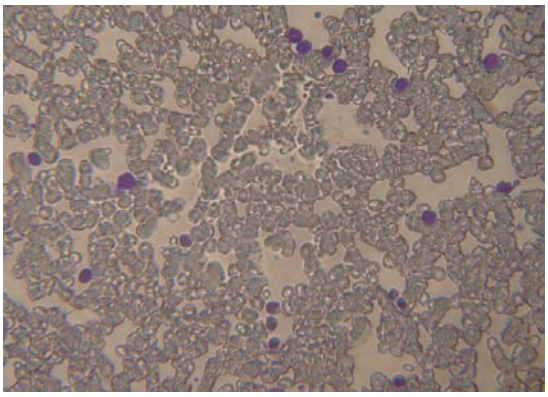

Fig. 13. Cytological examination of the capillary blood smear - Chronic myeloid monocytic leukemia

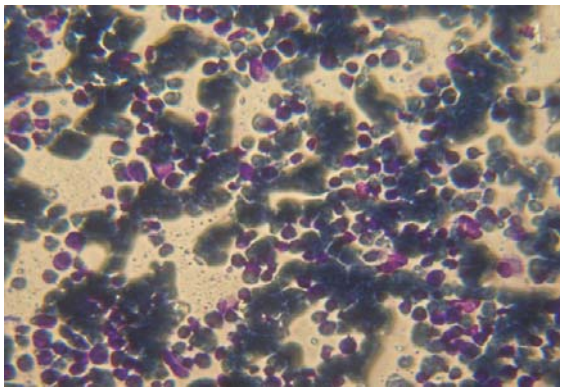

Fig. 14. Cytological bone marrow test - hyperkeletal marrow. Increased erythroblastic series (50%)

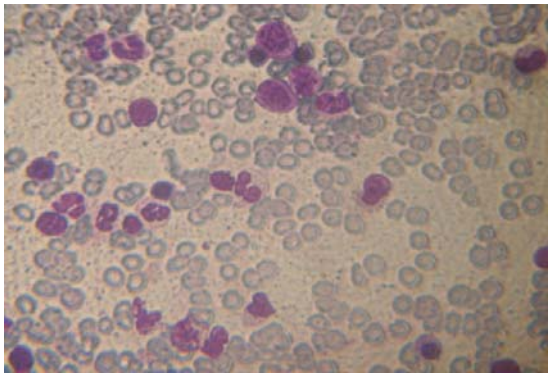

Fig.15. Cytological bone marrow examination - rich cellularity; Granulocyte series grown quantitatively with maturation

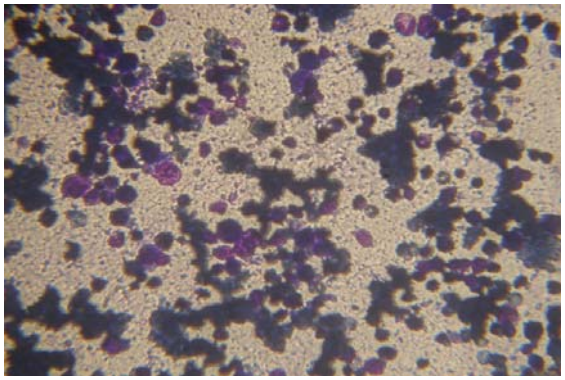

Fig. 16. Cytological bone marrow examination - rich cellularity; Quantitative normal granulocyte series, gigantocytes present

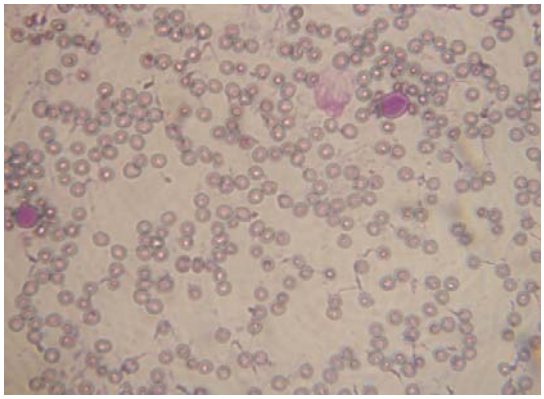

Fig. 17. Cytological examination of blood smear - Acute myeloid leukemia - 65% myeloblasts

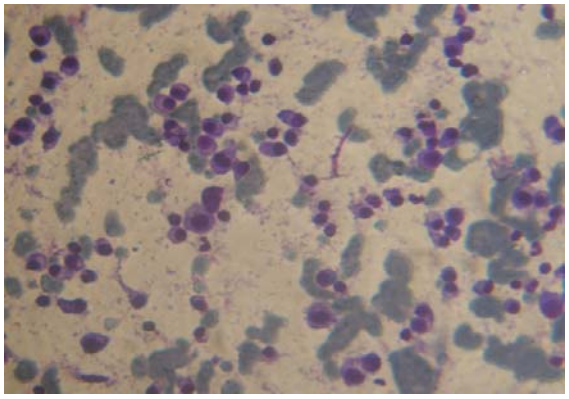

Fig.18. Cytological bone marrow examination - light hypercellular marrow, 65% plasmocytes isolated or grouped

CONCLUSIONS

Acute leukemias evolve very quickly, being deadly within a few months without treatment. Chronic leukemia compared with acute leukemia has a longer evolution, but prognosis is still reserved.

Statistically, men were found to be more affected (62%) than women with these diseases.

Leukemia is not a contagious disease, with one exception: that produced by viruses: HTLV human T-cell leukemia virus. This type of leukemia can be transmitted to another person with blood transfusion.

Chronic leukemias (71%) have the highest share, and chronic lymphoid leukemia (46%) predominates among the types of leukemias.

In our group of investigated subjects, 95.72% of all cases of leukemia are diagnosed in adults.

The leukemic, neoplastic cells in the bone marrow are continuously dividing and "suffocating" by their number the other normal cells (the platelets and platelets) that are produced here resulting in a low number of peripheral blood red blood cells translated by anemia and a low number of thrombocytes leading to haemorrhage.

The number of patients with different forms of leukemia has increased considerably in recent years, possibly due to chemicals used increasingly in food, cosmetics, etc., of radiation, genetic or viral factors, but also smoking (which seems to reaches 20%).

ABSTRACT

A study was conducted in the period 2013-2016 on a staff of 70 patients from the Hematology Department of the "St. Pantelimon" Emergency Hospital in Focsani, Vrancea County, with a diagnosis of multiple types of leukemias. Laboratory determinations have been performed in the S.C. Medcenter, S.R.L. The samples examined were taken prior to the introduction of therapies or surgical interventions. In this study we aim to track the share of acute leukemia in relation to chronic lesions, the distribution of subjects by gender, age, urban / rural environment. Also, for a quantitative and qualitative assessment of haematological parameters, the following laboratory tests were performed: complete blood count, cytological blood smear test, medulogram and reticulocyte count. In our study, chronic leukemia (71%) has the highest weight, and chronic lymphoid leukemia (46%) predominates among leukemia types. Of the total leukemia cases investigated, 95.72% are diagnosed in adults.

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