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HYPERSEGMENTATION OF NEUTROPHILS – STILL A HALL MARK OF MACROCYTIC ANEMIA?: A PROSPECTIVE STUDY

Pathology

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ABSTRACT

Hypersegmentation of neutrophils is defined as presence of 5% or more neutrophils with five or more lobes or single neutrophil with 6 lobes. It is an important haematological feature observed in cases of cobalamin or folate deficiency. In this study, we evaluated the presence of neutrophil hypersegmentation in all peripheral smears received in our hematology laboratory.

We included 150 samples which had peripheral smear findings of neutrophil hypersegmentation but without evidence of macrocytosis. Complete blood counts were obtained using automated haematology analyzers and peripheral smear study correlated with these counts. Peripheral smears were stained using Leishman Stain and observations documented. Hypersegmentation was found more commonly in men with normocytic normochromic RBC indices. Neutrophilia is the most commonest association with hypersegmentation.

Our study shows that neutrophil hypersegmentation is not specific for Vitamin B12/Folate deficiency anemias and are frequently observed in iron deficiency anemia. But, in the cases of iron deficiency anemia with neutrophil hypersegmentation co-existing folate/Vitamin B12 deficiency has to be ruled out.

KEYWORDS

Peripheral smears, neutrophil hypersegmentation, anemia

INTRODUCTION:

Hypersegmentation of neutrophils is defined as presence of 5% or more neutrophils with five or more lobes or single neutrophil with 6 lobes. It is an important haematological feature observed in cases of cobalamin or folate deficiency. In this study, we evaluated the presence of neutrophil hypersegmentation in all peripheral smears received in our hematology laboratory.

MATERIALS AND METHODS:

This was a prospective study from January 2016 to June 2016. EDTA blood samples received in Haematology laboratory at Sree Balaji Medical College and Hospital, Chromepet for complete hemogram are included in this study. We included 150 samples which had peripheral smear findings of neutrophil hypersegmentation but without evidence of macrocytosis. Complete blood counts were obtained using automated haematology analyzers and peripheral smear study correlated with these counts. Peripheral smears were stained using Leishman Stain and observations documented.

RESULTS:

The gender distribution of cases with anemia and hypersegmentation is shown in **Figure 1** Out of the 150 peripheral smears which had neutrophil hypersegmentation, microcytosis with hypochromia was observed in 39% of cases. **Images 1 & 2** Hypochromia only was noted in 31% of the cases. Normocytic normochromic anemic smears which showed hypersegmentation account to 18% of the cases. Normal smear study was reported in 12% of the cases. **Figure 2**

The changes in the counts of White Blood cells were also evaluated in the presence of hypochromia. Neutrophilia was observed in 24% of the cases. Eosinophilia was the next common association seen in 5.3% of the cases. Basophilia, monocytosis and lymphocytosis were observed in only 0.7% of the cases. **Figure 3** Thrombocytosis was observed in 4% of cases with hypersegmented neutrophils. None of these patients' smears had thrombocytopenia.

The presence of hypersegmentation of neutrophils in different age groups and anemia is as shown in the **Figure 4.**

The correlation of neutrophilic hypersegmentation with the RBC indices MCV, MCH, MCHC are shown in the **Figures 5,6,7**

FIGURE 1: GENDER DISTRIBUTION OF HYPERSEGMENTATION IN PATIENTS WITH ANEMIA

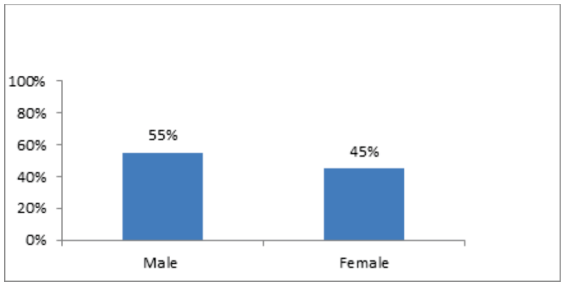


FIGURE 2: CORRELATION OF HYPERSEGMENTATION WITH RBC MORPHOLOGY

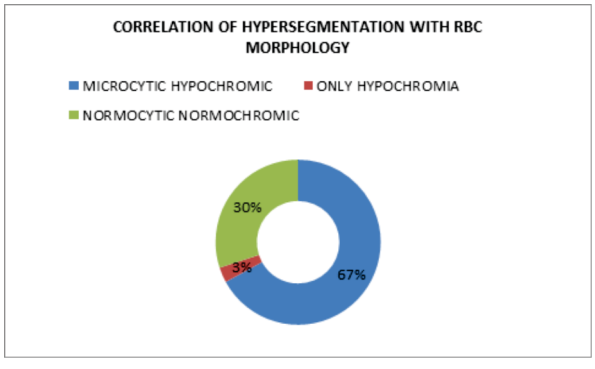


FIGURE 3: CORRELATION OF WBC COUNTS WITH HYPERSEGMENTATION

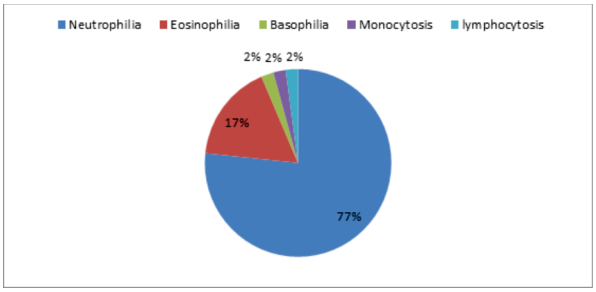


FIGURE 4: HYPERSEGMENTATION IN ANEMIA OF DIFFERENT AGE GROUPS

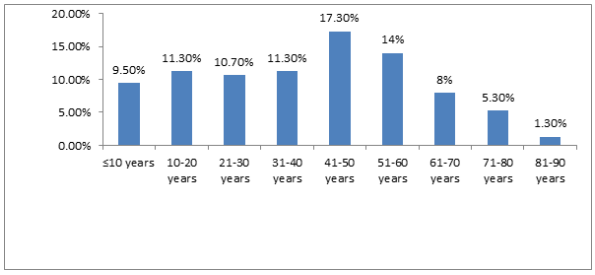
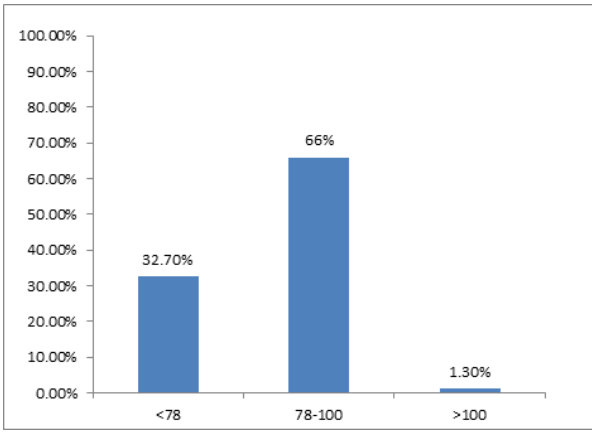


FIGURE 5: CORRELATION OF HYPERSEGMENTATION WITH MEAN RED CELL VOLUME



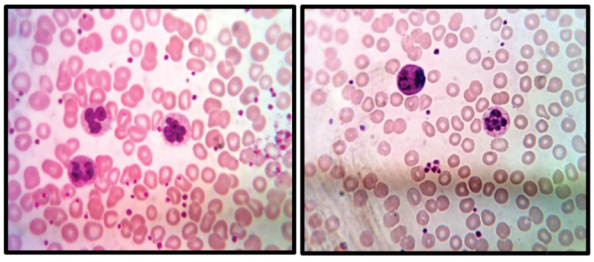


IMAGE 1 400 X LEISHMAN STAIN IMAGE 2 400X

FIGURE 6: MCH WITH HYPERSEGMENTATION OF NEUTROPHILS

Reference range 27-32 pg

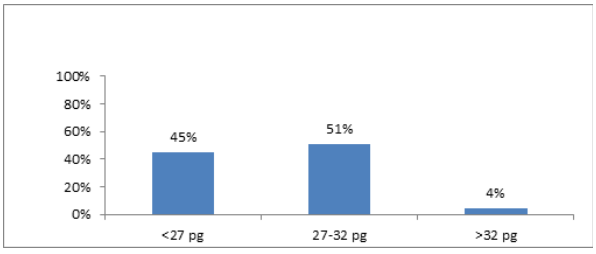
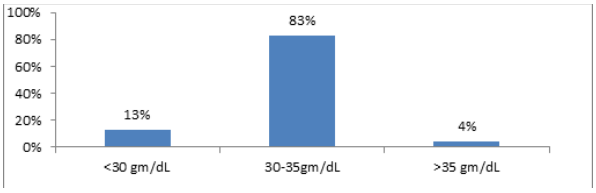


FIGURE 7: CORRELATION OF MCHC WITH HYPERSEGMENTATION

Reference range 30-35 gms/dL



DISCUSSION:

In this study of 150 patients' smears, the presence of hypersegmented neutrophil is not only observed in iron deficiency anemia, but also seen in normocytic normochromic anemia. The accepted mechanism for the morphological changes seen in megaloblastosis that results in hypersegmentation of neutrophil is associated with deficiency of or failure to utilize cobalamin or folate and impaired DNA synthesis. The patients included in the study had no history of any drug exposure or any underlying malignancies. Düzgün S, et al studied neutrophilic hypersegmentation and thrombocytosis in children with iron deficiency anemia1. Westernman D.A. et al have done a case control study on neutrophil hypersegmentation in iron deficiency anemia2. An association of iron deficiency with neutrophil hypersegmentation was first reported by Chanarin et al in 19653. Beard & Weintraub reported three patients with neutrophil hypersegmentation and iron deficiency anemia in whom an associated deficiency of cobalamin or folate was excluded, although one patient had a borderline serum cobalamin concentration of 107pmol/l4. NH was present in 20 patients and there was a high incidence of folate defciency as evidenced by low serum folate concentrations and excessive urinary formimino-glutamic acid (FIGLU) excretion. Das et al reported 10 patients with NH and IDA without conventional biochemical evidence of folate or cobalamin deficiency5. Six patients received therapy with iron alone, with persistence of NH in five. Siphahi et al studied the occurrence of NH in 94 children with iron deficiency anemia and observed that 81% of the smears showed NH6.

CONCLUSION:

Our study shows that neutrophil hypersegmentation is not specific for Vitamin B12/Folate deficiency anemias and are frequently observed in iron deficiency anemia. But, in the cases of iron deficiency anemia with neutrophil hypersegmentation co-existing folate/Vitamin B12 deficiency has to be ruled out.

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