

Screening of Routine Peripheral Smear For Hyper Segmented Neutrophils, An Indicator of Megaloblastic Anemia.



Medical Science

KEYWORDS : Hypersegmented Neutrophils, Peripheral blood smear, Megaloblastic anemia.

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ABSTRACT

Background: Screening of hypersegmented neutrophil in blood smear is a cost effective alternative to vitamin B12 assay in megaloblastic anemia and is seen before changes in Hemoglobin and MCV occurs. Aim and objective:

The objective is to screen blood smear for the hyper segmented neutrophils as it is the earliest sign in Vitamin B12 deficiency. Method and Material: 2000 smears were studied at pathology department, Chengalpattu Medical College, during June to December 2015, and the results were compared with vitamin B12 levels.

The smears were stained with Leishman's stain and 150 neutrophils per slide were screened for Hypersegmented Neutrophils. Observation and Results: About 17% of the screened population had Hypersegmented Neutrophils. 15.7 % of antenatal mothers, 26.6% of geriatric population and 4.7% of children had Hypersegmented Neutrophils.

INTRODUCTION:

The vitamin, cobalamin and folic acid are essential for DNA biosynthesis. Deficiency of either of this results in asynchrony in the maturation of the nucleus and cytoplasm of regenerating cells of our body, resulting in megaloblastic anemia¹. Its etiology is multifactorial may result from dietary deficiency. In India with diverse ethnic populations, different dietary and social customs, the incidence of megaloblastic anemia and its associated problems have not been adequately documented. The average vegetarian diet is deficient in cobalamin²⁻³. A study has reported that 40% of normal Indian subjects with normal haemograms are cobalamin deficient⁴.

Thus, it is essential to detect vitamin B12 deficiency in the early stages itself before it leads to complications⁵⁻⁸.

Any anemia is assessed by Hemoglobin Concentration, Hematocrit, RBC Count, Blood Cell Indices and Vitamin Assays.

Hyper segmentation of neutrophils (when >5% of neutrophils show ≥ 5 lobes or even a single neutrophil with ≥ 6 lobes) is one of the earliest sign of megaloblastic hematopoiesis and can be detected even before anemia develops. Neutrophil hyper segmentation is an important hematological feature of cobalamin or folate deficiency. This method of screening of neutrophil hyper segmentation in peripheral blood smear is a cost effective alternative to vitamin B12 assay for early detection of megaloblastic anemia and to take appropriate corrective measures before the morbidity sets in.

In early vitamin B12 deficiency, both the Hb and mean cell volume (MCV) are within the reference range⁹⁻¹¹ and later the Hb remains within the reference range but the MCV is increased. As the extent of deficiency increases, there is a progressive reduction in Hb and increase in MCV and the blood film shows increasing macrocytosis. The blood film usually contains hyper segmented neutrophils and occasionally macropolycytes early, even when both the Hemoglobin and MCV are within the reference range

Hypersegmentation of neutrophils in the peripheral blood has long been recognized as a characteristic feature of megaloblastic anemia¹⁹, and it has consistently preceded the development of anemia when dietary folate deficiency has been induced experimentally in humans 13-15.

AIMS AND OBJECTIVES:

The principal objective of this present study is to evolve a simple and cost-effective method for early detection of megaloblastic anemia, among a segment of urban population in Tamilnadu, India, by screening for the neutrophil hyper segmentation in routine peripheral smear, which can be done periodically and hence is useful in early detection and prevention of morbidity.

MATERIAL AND METHODS:

The sample size of the study is 2000 individuals. These samples were studied from patients coming to the Chengalpattu Government Medical College Hospital, Tamilnadu, India during the period, and June to December 2015. The routine peripheral smear blood sample collected from these patients was screened for hyper segmentation of neutrophils. The details such as Name, Age, Sex, Occupation, Address and any significant Medical History was noted and taken into consideration for the selection process. The study included both sexes (including pregnant women).

People with following conditions like, previously known cobalamin deficiency, on cobalamin or folic acid supplementation or injections, who underwent Surgery of the stomach or small intestine, on Chemotherapy and/or Radiotherapy, were excluded.

The peripheral smears were stained with Leishman's stain and 150 neutrophils per slide were screened for Hypersegmented Neutrophils.

For the patients with the presence of hyper segmented neutrophils, vitamin B12 and folic acid assays were done for confirmation of megaloblastic anemia.

OBSERVATIONS AND RESULTS: Sample size of the study: 2000 patients

TABLE-1

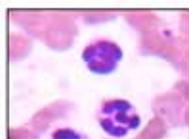
Distribution profile of the target group of study and Prevalence of hyper segmentation in population

SEX	TOTAL POPULATION SCREENED	NUMBER OF PATIENTS WITH HYPERSEGMENTED NEUTROPHILS
MALE	1030	190 (18.4%)
FEMALE	970	150 (15.8%)
This population includes:		
NUMBER OF ANTENATAL MOTHERS	190	30 (15.7%)
NUMBER OF CHILDREN	210	10 (4.7%)
GERIATRIC	450	120 (26.6%)

TABLE-2

AGE AND GENDER DISTRIBUTION AMONG THE PATIENTS WITH HYPERSEGMENTED NEUTROPHILS

AGE GROUP (YEARS)	<12	12-18	19-40	41-60	>60	Total
NUMBER OF PERSONS	210	120	790	430	450	2000
NUMBER OF PATIENTS WITH HYPERSEGMENTED NEUTROPHILS (% of total population)	10 (0.5%)	10 (0.5%)	140 (7%)	60(3%)	120 (6%)	340(17%)
MALES (%patients with hyper segmented neutrophils)	10	-	90	30	60	190 (55.9%)
FEMALES (%patients with hyper segmented neutrophils)	-	10	50	30	60	150 (44.1%)



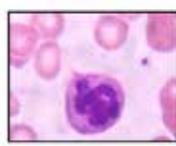
Picture 1



Picture 2



Picture 3



Picture 4

The total population screened was 2000. Out of 1030 were males and 970 were females (from table 1). About 17% of the screened population has hyper segmented neutrophils (340 persons out of 2000). Among the persons who have hyper segmented neutrophil 55.9% were males and the remaining 44.1% were females (from table 2). The number of children with hyper segmented is very low (10 out of 210 children screened showed hyper segmentation). About 15.7% of the antenatal mothers show hyper segmentation of the neutrophils. About 26.6% of geriatric population shows hyper segmentation of neutrophils (from table 1).

The vitamin B12 and folic acid levels of patients with hyper segmentation of neutrophils were assayed. All the persons with hypersegmented neutrophils had vitamin B12 deficiency and 30 of them had associated Folic acid deficiency.

DISCUSSION:

The study population consists of varying age groups. Among the given population, the age group of 19-40 (about 7% of the total

population), which is the economically productive group, was found to have hyper segmented neutrophils predominantly.

15.7% of the antenatal mothers were found to show hyper segmented neutrophils and were vitamin B12 deficient. This is indicative of that though there is supplementation of folic acid in mothers during pregnancy there must be equal importance given to vitamin B12 supplementation also.

Percentage wise the geriatric age group contains more number of patients with hyper segmented neutrophils (about 26.6% of the geriatric population).

More number of males shows hyper segmented neutrophils than females. This finding also different from the earlier study1, where higher percentage of females had hyper segmentation of neutrophils.

Number of Children with hyper segmented neutrophils was very less.

All these patients have either of the two vitamins (vitamin B12 or folic acid) deficiency or B12 vitamin deficiency.

comparison to previous study16 of 515 patients where the sensitivity was found to be 91%, in the present study all the patients with hyper segmented neutrophils exhibited vitamin B12 deficiency.

CONCLUSION:

The study re- established the fact that hyper segmentation of neutrophils and megaloblastic anemia go hand in hand in case of vitamin B12 or folate deficiency patients.

Diagnosis of peripheral blood smear for hyper segmentation of neutrophils is simple, fore - warning symptom for folate and Vitamin B12 deficiencies.

The study indicated that the deficiency was prevalent in the age group of 19-40, which is the economically productive group, in the place of study.

The study indicated sensitivity of hyper segmentation of neutrophils as an indicator of vitamin B12 / folate deficiency as confirmed by biochemical assay.

Based on this study, it is suggested that there must be regular peripheral blood smear study done in order to diagnose the megaloblastic anemia in its asymptomatic stage itself.

This study need to be carried out in different pockets of our country to check for the prevalence of megaloblastic anemia. In this study population there is massive prevalence of about 17% of total population with hyper segmented neutrophils. If this is left unnoticed it may lead to various morbidities.

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