Lymphocytic Count in Premenopausal Women with Iron Deficiency Anemia

Kanhaiya Lal Khanna[1]

ABSTRACT

Introduction: Iron deficiency anemia (IDA) is the most common nutritional deficiency worldwide. It can cause reduced work capacity in adults and impact motor and mental development in children and adolescents. Aim of the current research was to study the lymphocytic count in premenopausal women with iron deficiency anemia.

Material and methods: The study was conducted in the Department of General Pathology of the medical institution. For the study, we selected 100 pre-menopausal women between the age group of 18-40 years who were diagnosed with iron deficiency anemia and their hemoglobin level was less than 10 g/dL. 100 pre-menopausal women with normal hemoglobin level were recruited after matching with the subjects for control group. The patients with thalassemia, leukemia or any other chronic and autoimmune disease were excluded from the study. Laboratory evaluation of each subject was done.

Results: The mean age of the patients in study group was 32.67 years and in control group was 34.58 years. There were 100 subjects in each group. Table 2 shows the mean lymphocyte count in peripheral venous blood in pre-menopausal women with Iron deficiency anemia and normal healthy women. The mean CD3+, CD4+, CD8+, and CD19+ lymphocyte counts were 1.66, 0.71, 0.66, 0.41, 1.18 X 10^9/L, respectively, in study group, and 1.82, 0.59, 0.81, 0.31 and 1.59 X 10^9/L, respectively, for the control group.

Conclusion: Within the limitations of the study, this can be concluded that significant change in seen in the lymphocyte count in premenopausal women with iron deficiency anemia.

Keywords: Iron Deficiency Anemia, Cellular Immunity, Humoral Immunity

INTRODUCTION

Iron deficiency anemia (IDA) is the most common nutritional deficiency worldwide. It can cause reduced work capacity in adults and impact motor and mental development in children and adolescents.[1] There is some evidence that iron deficiency without anemia affects cognition in adolescent girls and causes fatigue in adult women.[2] IDA may affect visual and auditory functioning3 and is weakly associated with poor cognitive development in children.

There is a close relationship between iron level and the immunity of person. The growth of bacteria is reduced because of the regulation of iron flux to these organisms which is controlled by genes and proteins.[3] Cells from innate immunity such as Monocytes, macrophages, and lymphocytes, the movement of iron in to the bacterial cells; this flux is maintained through hepcidin and ferropotin.[3,4] The iron loading and depletion occurs by the regulation of effector molecules such as haem oxygenase, toll-like receptors, hypoxia factor-1, NF-kB. This could lead to harmful effect on the potential of cell in response to bacterial attack.[5] Due to the properties of iron such as growth-stimulating and differentiating, iron plays a key role in surveillance of immune cells, especially in lymphocytes. Iron is also required for the differentiation of monocytes and macrophages. On the other hand, it is observed that humoral immunity is minimally affected by the low level of iron level as compared to its effect on cellular immunity.[6] Hence, the present study was planned to study the lymphocytic count in premenopausal women with iron deficiency anemia.

MATERIAL AND METHODS

The present study was done in the Department of General Pathology of the medical institution after it was approved from the ethical board. A total of 100 pre-menopausal women between the age group of 18-40 years who were diagnosed with iron deficiency anemia and their hemoglobin level was less than 10 g/dL were enrolled in the study. 100 pre-menopausal women with normal hemoglobin level were recruited after matching with the subjects for control group. We excluded any subjects who had any systemic disease which could impair the results of the study such as diabetes mellitis, leukemia, sickle cell anemia, were excluded from the study. Each patient was sent to the labs for blood work. Each patient submitted 10 mL venous blood at the labs for estimation of cytometric analysis. The blood sample was stored in a sterile tube with EDTA.

STATISTICAL ANALYSIS

The statistical analysis of the data was done using SPSS version 11.0 for windows. Chi-square and Student's t-test were used for checking the significance of the data. A p-value of 0.05 and lesser was defined to be statistical significant.

RESULTS

In the current study, 200 subjects were selected, 100

[1]Assistant Professor, Department of General Pathology, Career Instiutute of Medical Sciences and Hospital, Lucknow, India

Corresponding author: Kanhaiya Lal Khanna, Assistant Professor, Department of General Pathology, Career Medical College, Lucknow, India

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Variables	Study group	Control group	p-value
No of patients	100	100	0.31
Mean age (years)	32.67	34.58	0.44
Mean Hb level	7.9	12.02	0.9

Table-1: Demographic data

Lymphocytes	Mean lymphocytic count in peripheral venous blood ($nX10^9/L$)		p-value
	Study group	Control group	
CD3+ lymphocytes	1.66	1.82	0.02*
CD4+ lymphocytes	0.71	0.59	0.005*
CD 8+ lymphocytes	0.66	0.81	0.71
CD 19+ lymphocytes	0.41	0.31	0.21
CD4/ CD8 ratio	1.18	1.59	0.77

Table-2: Mean lymphocytic count in peripheral venous blood sample of study group and control group

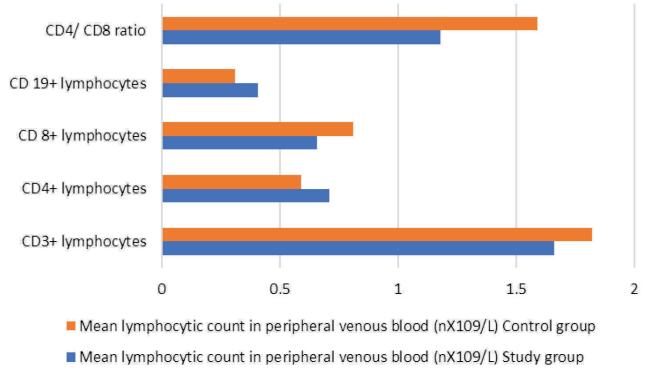

Figure-1: Mean lymphocytic count in peripheral venous blood of study group and control group

premenopausal women and 100 healthy control subjects. Table 1 depicts the demographic details of the subjects in both the groups. The mean age of premenopausal women with iron deficiency anemia was 32.67 years and of control subjects was 34.58 years. Table 2 depicts the comparison of mean lymphocytic count in both the groups.

Table 2 shows the mean lymphocyte count in peripheral venous blood in pre-menopausal women with Iron deficiency anemia and normal healthy women.

The comparison of CD3+ lymphocytes and CD4+ lymphocytes between statidvis statistically significant. The number of CD8+, CD 19+, and CD4/CD8 ratio were statically non-significant. The CD3+, CD8+ lymphocyte count, CD19+ lymphocyte count and CD4/CD8 ratio was statistically non-significant ($p>0.05$).

DISCUSSION

In the present study, we observed significant decrease in total CD3+ and CD3+/CD4+ lymphocytic population in peripheral blood. These results were consistent with some earlier studies.

In study conducted by Sadeghian MH et al, they checked whether iron deficiency anemia is responsible for change in serum immunoglobulins. In their study, 45 iron deficient patients and 45 healthy patients were included. To measure the serum IgA, IgG and IgM, nephelometry method was employed. Results indicated that there was non-significant difference in the serum immunoglobulins between both the groups. They concluded that deficiency in iron is not responsible for decrease in serum immunoglobulin levels.

Study conducted by Hassan TH et al monitored the effect of iron deficiency anemia on humoral, cellular, non-specific immunity, and cytokines. In the study, they included 40 pediatric patients with iron deficiency anemia and 20 healthy children. After evaluating blood work, they observed that iron deficient patients had significant lower level of serum IgG, IL-6, phagocytic activity, and oxidative burst of neutrophils than controls, although there was no significant difference between patients and controls with regard to other immunoglobulins and CD4/CD8 ratio. They observed a significant correlation between serum iron level and IL-6 level. It was concluded that IL-6 is affected by iron deficiency.[7,8]

Reza Keramati M et al investigated lymphocyte subsets in pre-menopausal women with iron-deficiency anaemia; 50 normal subjects and 50 IDA (hypochromic microcytic) cases were enrolled. Experimental and control anticoagulated blood samples were evaluated using flow cytometry to determine the absolute and relative numbers of various lymphocyte subgroups. Finally, the results of the patient and control groups were compared. The results showed significant differences between case and control groups in mean absolute counts of lymphocytes, T lymphocytes, helper T cells, and cytotoxic T cells. This study showed that absolute counts of peripheral blood T lymphocytes as a marker of cell-mediated immunity may be decreased in pre-menopausal women with iron-deficiency anaemia, and that these patients may be more prone to infection. Mullick S et al conducted a study to aim of documenting the changes in T cell subsets in children in the age group of 1 to 5 yr with iron deficiency. The levels of T lymphocytes, their CD4+ and CD8+ subsets and the CD4 : CD8 ratio were evaluated in 40 iron deficient and 30 healthy children. The impact of oral iron supplementation for three months on the same parameters was also noted in 30 children. Significantly lower levels of T lymphocytes as well as CD4+ cells was observed in the iron deficient children. The CD4 : CD8 ratio was also significantly lower in this group ($P<0.05$). Iron supplementation improved the CD4 counts significantly. Their study demonstrated quantitatively altered T cell subsets in iron deficiency in children, and a relationship between the severity of haematological and immunological compromise. The clinical and epidemiological implications of this relationship have topical relevance since ID is the most common micronutrient deficiency worldwide.[9,10]

CONCLUSION

Within the limitations of the study, this can be concluded that significant change in seen in the lymphocyte count in

premenopausal women with iron deficiency anemia.

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