Original Article

Indian Journal of Forensic Medicine and Pathology
Volume 10 Number 3, July - September 2017
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.10317.6

Descriptive Study of the Haematological Parameters with Special Reference to Eosinophil Count among School Going Children

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Abstract

Parasitic infections and allergies are the major contributing factors of eosinophilia. *Aims and Objectives:* To study the various haematological parameters of school going children and to find out the correlations between the haematological parameters. *Materials and Methods:* The study was carried out on 130 students of a secondary public school of rural area of Nashik district. The haematological samples were processed on fully automated 5-part haematology cell analyzer. Eosiniphilia was divided into: mild: 351-1500/mm3 of blood, moderate: 1500-5000/mm3 of blood, severe: >5000/mm3 of blood. Statistical analysis of the various haematological parameters was done subsequently. *Results:* Eosinophilia was present in 45.38% of children. Total leucocyte count (White blood cell count/ WBC/TLC) was normal in 95.38% children. Mild to moderate anaemia was seen in 66.9% children. *Conclusion:* Eosinophilia is common among the school going children in our study.

Keywords: Eosinophilia; Haematological Parameters; Children.

Introduction

The values of hematological parameters are affected by a number of factors even in apparently healthy populations [1]. It has been shown in several studies that some of the hematological parameters exhibit considerable variations at different periods of life. At birth, the total hemoglobin (Hb) level, red blood cell (RBC) count and packed cell volume (PCV) are shown to be higher than at any other period of life [2,3]. The levels of these parameters then decrease during the next few months after birth, some more steeply than others, with the cells becoming hypochromic with the development of "physiologic" iron deficiency anemia [4,5]. The hemoglobin content and the red cells then gradually rise to adult levels by the age of puberty [5,7]. The common childhood hematologic conditions are: iron deficiency anemia of infection, transient erythroblastopenia of childhood (TEC) immune thrombocytopenic purpura (ITP) benign neutropenia of childhood , minor transfusion reactions [8].

Eosinophils are terminally differentiated granulocytes that play a role in innate host defense against pathogens, particularly parasites and viruses. Eosinophils contain highly charged proteins in their granules, mediating toxicity toward pathogens and tissues and produce a variety of inflammatory proteins which further contribute to tissue pathology. Eosinophil accumulation in the airways in severe asthma correlate with markers of local tissue and extracellular matrix (ECM) remodeling. Eosinophilia is a marker of severe asthma and those at risk for more frequent exacerbations [9].

Parasitic infections are the most common cause of eosinophilia worldwide, although eosinophilia in the population of the United States is most often due to allergies [10]. Persistent significant eosinophilia should be regarded pathological and detailed investigations should be carried out to uncover a treatable cause. Mild or moderate increase in blood eosinophil counts detected from differential leucocyte counts may be encountered during routine health screening as an isolated laboratory abnormality without an apparent association with the disease or as an epiphenomenon during a diagnostic work up for an illness. Normal eosinophil count in the human

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Received on 07.07.2017, **Accepted on** 11.07.2017

blood varies from 0-350/ mm3 of the blood.This amounts to about 1-3% of the differential leukocyte count. According to Marc. E. Rothenberg classification eosinophilia is divided into mild: 351-1500/mm3 of blood, moderate: 1500-5000/mm3 of blood, severe: >5000/mm3 of blood [11].

Aims and Objectives

To study the various haematological parameters of school going children and to find out the co-relations between the haematological parameters.

Materials and Methods

A cross-sectional study was carried out among children of a secondary public school of rural area of Nashik district. The sample size was 130. Subjects who were on any kind of hematinic therapy or any other drugs were excluded from the study. Subjects having any known haematological disorder or having any known causes of eosinophilia like allergy, asthma etc. were also excluded from the study. Under all aseptic conditions, 2ml of venous blood was drawn in an ethylene diamine tetra-acidic acid (EDTA) vacutainer from each subject. Analysis of the blood on a 5- part automated cell counter analyzer was carried out. Subsequently, thin blood smears were prepared. The peripheral blood smears were stained with Leishman's stain.

Manual examination under a light microscope under high power (40x) and oil immersion (100x) lenses for red blood cell morphology, presence or absence of abnormal red blood cells, white blood cell differential count and abnormal morphology if present, and manual platelet count and morphology was done. The findings were recorded according to a pre-designed proforma.

This study was a part of school health camp conducted by a medical college, the consent for the blood collection and test was given by the Principal. Phlebotomy is a simple, safe and routinely performed procedure and poses practically no risk to the subjects.

Observation & Results

The study participants were of a secondary public school of a rural area in Nashik district. Sample size of 130 subjects was taken. Mean age group was 12years among which 80% were male and 20% were female. 66.8% children, mild to moderate anaemia was seen.

TLC was normal in 95.38% children. RBCs count was less than $4.5\times10^6/\mu L$ in 36.15% children. (Table 1& 2).

Eosinophilia was present in 45.38% children. (Table 3).

Table 1:

Haematological Parameters[12]	No.	%
Hb (gm%)		
<8	1	0.7
8 - 10	2	1.5
10 - 12	84	64.6
>12	43	33.07
WBC (/µL)		
<4,000	0	0
4500 - 11000	124	95.38
> 11000	6	4.61
RBC (10^6 / µL)		
< 4.5	47	36.15
4.5 - 5.3	61	46.92
> 5.3	22	16.92
Platelets (10^3/µL)		
< 150	0	0
150 - 450	125	96.15
> 450	5	3.84
MCV (fl)		
< 83	81	62.3
83 - 101	49	37.69
> 101	0	0.76
MCH (pg)		
< 27	88	67.69
27 - 32	41	31.53
> 32	1	0.76

Table 2:

Haematological Parameter	Mean Count	SD
Hb	11.64	0.98
WBC	7682.31	1765.89
RBC	4.72	0.51
Platelets	318.7	69.52
MCV	78.68	8.44
MCH	26.86	22.25

Table 3: Differential WBC counts

DLC	Mean Count	SD
Neutrophils	57.92	7.46
Lymphocytes	38.13	7.28
Monocytes	1.07	0.76
Eosinophils	2.84	3.03
Basophils	0	0

Table 4: According to Mark E Rothenburg's Classification

Eosinophil Count	No.	%
0 - 350	71	54.61
351 - 1500	59	45.38
1501 - 5000	0	0
>5000	0	0

Table 5: Co-relation co-efficient between various Haematological Parameters

Haematological Parameters	Pearson's Co-relation Co-efficient 'r'
Hb & MCV	0.55
Eosinophil & WBC	0.44

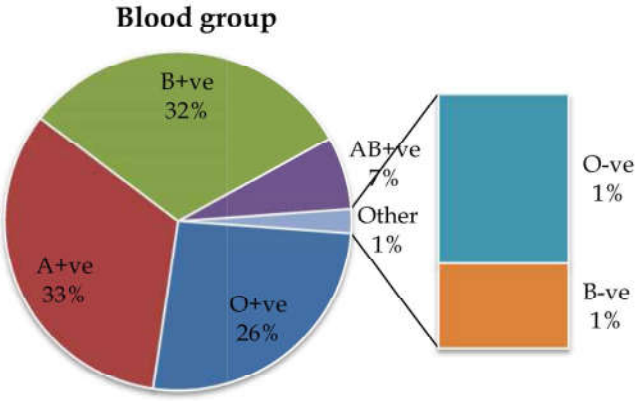

Fig. 1:

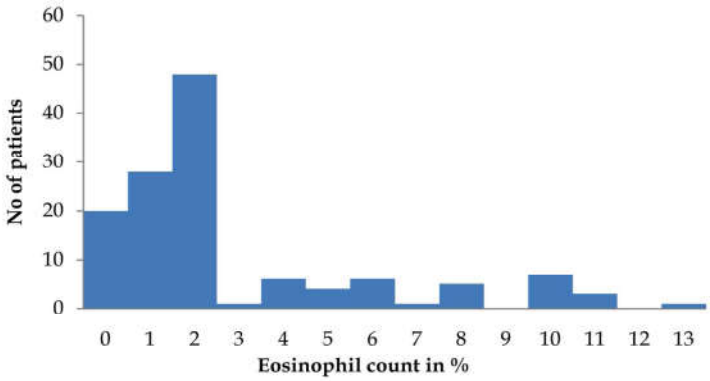

Fig. 2: Eosinophil counts

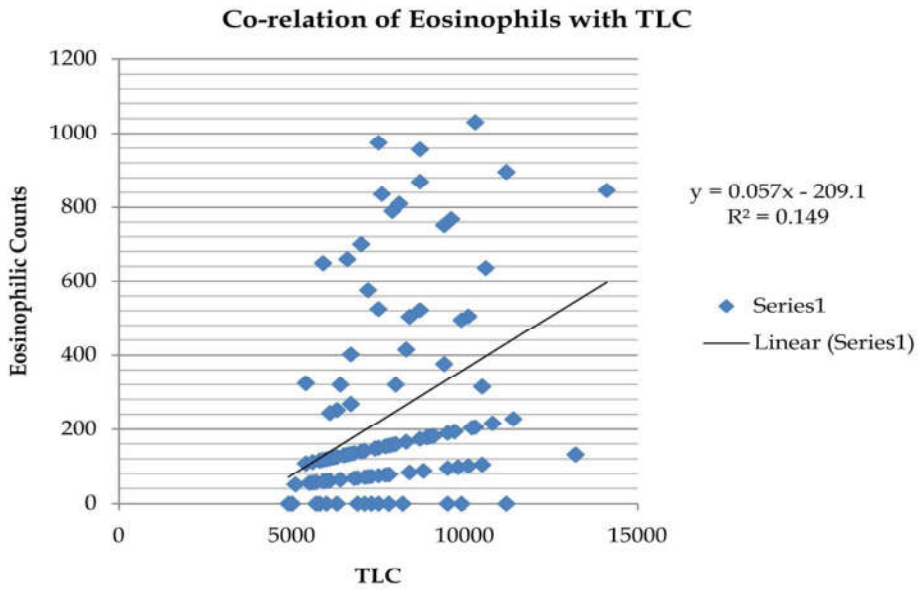

Fig. 3:

Eosinophilia was classified as Mild, Moderate and Severe on the basis of Mark E Rothenburg's classification (Table 4). Only cases of mild eosinophilia were noted which constituted 45.38% of the total subjects studied. No case of moderate / severe eosinophilia was seen.

Eosinophil counts with TLC showed an intermediate positive co-relation. Since Study participants were having either normal heamoglobin or microcytic anemia, hence the present study found the positive co-relation with Hb & MCV (Table 5).

Discussion

Intestinal parasitic infections constitute one of the major health problems in the world. Eosinophilia can arise from an extensive number of medical conditions, including allergic disorders, haematological and other neoplastic diseases and infections, particularly helminthic [9]. This study was conducted to find out the co-relations between various haematological parameters among secondary public school going children. In our study, mild to moderate graded anaemia was seen in 66.9% of children which is strongly supported by the DLHS-4 (District level health survey - 4) as it has shown anaemia in 64.3% among 10-19 year age group in Nashik district [13]. Pradhan P et al reported 23.71% of the rural public school children found to be harbouring one or more intestinal parasites [14]. Makkar A et al reported 52%, 34% and 14% patients with mild, moderate and severe eosinophilia [15]. The prevalence of eosinophilia was present in the current study, there were 45.38% of children having high eosinophil count. Eosinophil counts with TLC showed an intermediate positive co-relation (Figure 1). In majority of cases, microcytic hypochromic anaemia was found, which might be due to nutritional deficiency.

Conclusion

Eosinophilia is more common among children of Nashik district in our study. Though serological analysis could not be done, Allergic reactions are seem to be most common possible cause of eosinophilia. Serological analysis should be performed to reach the final conclusion regarding etiology.

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