



ISSN NO. 2320-5407

Journal homepage: <http://www.journalijar.com>

INTERNATIONAL JOURNAL
OF ADVANCED RESEARCH

RESEARCH ARTICLE

TOTAL LEUKOCYTE COUNT AND ITS DIAGNOSTIC UTILITY IN PREDICTING MALARIAL INFESTATION IN ENDEMIC AREA

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Manuscript Info

Manuscript History:

Received: 15 June 2015
Final Accepted: 19 July 2015
Published Online: August 2015

Key words:

Malaria, Leukopenia, Leukocytosis

Abstract

This is a study conducted at malaria endemic area, comprised of 163 confirmed cases of malarial infestation in which Total Leukocyte Count was performed by an automated hematology analyzer before starting anti-malarial treatment. We analyzed and compared the WBC Counts of these malaria patients. Leukopenia was observed in 22.7% cases and Leukocytosis, on the other hand, was noted in 8.6% cases. 68.7% cases were found having normal Total WBC Count. Duration of Our Present Study is 12 months, from July 2014 to June 2015.

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INTRODUCTION

Hematological Abnormalities are observed in patients with malaria, Anemia and Thrombocytopenia being the most common [1]. WBC counts during Malaria are generally characterized as being either normal or low, a phenomenon that is widely thought to reflect localization of Leukocytes away from the peripheral circulation and to the spleen and other marginal pools, rather than actual depletion or stasis [2, 3]. Leukocytosis is typically reported in a fraction of cases and may be associated with concurrent infections and/or poor prognosis [2, 4].

MATERIALS AND METHODS:

This study was conducted at our Central Clinical Laboratory under the Department of Pathology, GMERS Medical College, Junagadh in Gujarat, a malaria endemic state like all other states of India. Study was conducted over a period of 12 months from July 2014 to June 2015. Total 163 confirmed cases of malaria were included in our study. Diagnosis of Malaria was confirmed by examination of Peripheral Blood Smears stained with Field's Staining Technique.

Blood Samples for Total Leukocyte Count were collected in EDTA Tubes and counts were performed by using an automated hematology analyzer. Blood Samples for Total WBC Count were collected before starting antimalarial treatment. Patients with abnormal counts were re-evaluated and confirmed by manual methods. Leukopenia was defined as Total WBC Count of less than 4,000 cells per cu mm and Leukocytosis was defined as Total WBC Count of more than 11,000 cells per cu mm of blood.

OBSERVATIONS:

Total 26,456 blood smears were examined for detection of malarial parasite over a period of 12 months. Out of them, 163 blood smears were found to be positive for the same. Out of these 163 confirmed cases, 81 cases (49.7%) were having infestation with Plasmodium Vivax, 74 cases (45.4%) were having infestation with Plasmodium Falciparum and 8 cases (4.9%) were having mixed infestation. The details are mentioned below in Table no.1.

Table No. 1 Month wise distribution of malaria positive cases

Month & Year	Total No. of blood smears	P. Vivax Positive Cases	P. Falciparum Positive Cases	Cases with Mixed Infestation	Total no. of Positive Cases
JUL-14	2,331	10	2	0	12
AUG-14	2,538	8	4	1	13
SEP-14	2,733	22	8	1	31
OCT-14	2,385	11	13	2	26
NOV-14	2,348	12	18	2	32
DEC-14	1,722	5	25	1	31
JAN-15	2,185	9	4	1	14
FEB-15	2,365	1	0	0	1
MAR-15	2,329	0	0	0	0
APR-15	1,619	1	0	0	1
MAY-15	1,918	0	0	0	0
JUN-15	1,983	2	0	0	2
TOTAL	26,456	81 (49.7%)	74 (45.4%)	8 (4.9%)	163

Patients of all ages and both genders were included in our present study. Age distribution is mentioned in Table no. 2 and Sex ratio is mentioned in Table no.3.

Table no. 2 Age wise distribution of the patients with malarial fever

Age of the Patient in years	No. of patients	Percentage
Below 10	46	28.2%
10-20	36	22.1%
20-30	27	16.6%
30-40	20	12.3%
40-50	15	9.2%
Above 50	19	11.6%
TOTAL	163	100%

Table no.3 Sex ratio of patients with malarial fever

Gender	No. of patients	Percentage
Male	98	60.1%
Female	65	39.9%
TOTAL	163	100%

From above mentioned tables, it is obvious that P.Vivax infestation is somewhat more common than P.Falciparum infestation in our country. Mixed infestation is also found but rare. All ages and both genders are involved but infestations are commonly found in young children and adolescents (below 20 years).

Out of 163 confirmed cases, 133 cases (81.6%) had thrombocytopenia, which was the most common hematological finding. Leukopenia was observed in 37 cases (22.7%), which were not apparently related to previous prophylaxis, therapy or other common causes of Leukopenia.

On the other hand, Leukocytosis was observed in 14 cases (8.6%). Majority of cases (112 cases, 68.7%) showed Total WBC Count within normal range (4,000-11,000 cells per cumm). Details are mentioned in Table no. 4.

Table no. 4 Total Leukocyte Count in Malaria

Total WBC Count	Number of Cases	Percentage
<4,000 cells per cumm	37	22.7%
4,000-11,000 cells per cumm	112	68.7%
>11,000 cells per cumm	14	8.6%
TOTAL	163	100%

DISCUSSION:

Findings of our present study are comparable with another similar study done by Vaidya KA & Vernekar P at SIMS & RC, Surathkal, Karnataka, India [5].

Details are mentioned in Table no. 5.

Table no. 5 Comparison of two similar studies

Total WBC Count	Our Present Study	Study by Vaidya KA et al [5]
<4,000 cells per cumm	37	35
4,000-11,000 cells per cumm	112	132
>11,000 cells per cumm	14	8
TOTAL	163	175

Hematological changes associated with malaria infestations are well recognized, but specific changes may vary with the level of malaria endemicity, nutritional status, demographic factors, and malaria immunity [6]. Malaria induced changes include Neutropenia, Neutrophilia, Immature Neutrophils, Neutrophil Toxic Granulations, Lymphocytopenia, Lymphocytosis, Monocytosis, Atypical Mononuclear Cells, Pre-treatment and Post-treatment eosinophilia as well as Leukemoid Reactions [7]. Malaria must always be a key differential diagnosis in acutely febrile patients with thrombocytopenia and leukopenia from endemic area [8].

CONCLUSION:

Leukopenia can be considered as a useful indicator of Malaria, particularly when it is associated with thrombocytopenia. It can help us in predicting the possibility of malarial infestation in endemic areas. However further studies are required to evaluate and support these findings.

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