

## Prevalence of Malaria from Blood Smears Examination: An Eleven –Year Retrospective Study from Kirodimal Government General Hospital, Raigarh

Apparao P<sup>1\*</sup>, Padmanabam Y<sup>2</sup>, Agrawal PC<sup>3</sup>

<sup>1</sup>Professor & Head, Department of Microbiology, <sup>3</sup>Associate Professor, Department of Pathology, Govt. Medical College, Raigarh, Chattisgarh, INDIA.

<sup>2</sup>Assistant Professor, Dept. of Microbiology, GEMS, Srikakulam, A.P, INDIA.

### Article History

Received: 16 Mar 2016

Revised: 20 Mar 2016

Accepted: 25 Mar 2016

### \*Correspondence to:

Patta Apparao  
Professor & Head,  
Department of  
Microbiology, Govt.  
Medical College,  
Raigarh, Chattisgarh,  
patta.apparao@gmail.com

### ABSTRACT

**Aim:** Malaria is a serious vector borne parasitic infection worldwide in distribution. Rapid diagnosis is prerequisite for effective treatment and reducing the mortality and morbidity of malaria. Microscopy is a gold standard for the diagnosis of malaria from decades. An attempt to study the smear prevalence rate of various species of malaria in patients attending tertiary care hospital, Raigarh has been made, starting from the year 2005 to 2015.

**Material and methods:** A total of 84,182 patients were tested for peripheral blood smear by JSB staining method.

**Results:** 2,944 among total tested, (i.e.3.5%) were positive for malaria. plasmodium falciparum was the predominant species (2,236-76%) followed by p. vivax (708-24%). Slide positive rate for both the species is showing a decrease over the succeeding years; except for the year 2006 in case of p. falciparum. The reason may be that Raigarh being a developing town; patients were diverted to private hospitals for testing. Age group of 5-14 years old were predominantly affected, (800-27.17%) followed by 15-29years old (530-18%).

**Conclusion:** The study reveals that both the number of smears examined and slide positive rate are decreasing year after year. There is a need from the hospital side to improvise the facilities by additional testing methods like QBC, HRP-II antigen test and plasmodium Lactate dehydrogenase tests.

**KEYWORDS:** Malaria; Peripheral blood smear; *P. falciparum* predominant.

### INTRODUCTION

Malaria is a major public health problem in India though it's both preventable and treatable disease. Along with diarrhea, HIV AIDS, Tuberculosis, Measles, Hepatitis B and pneumonia it accounts for 85% of global infectious disease burden.<sup>1</sup> In the south-east Asian Region of WHO, out of nearly 1.4 billion people living in 11 countries, 1.2 billion are exposed to the risk of malaria and most of whom live in India.<sup>2</sup> WHO South East Asia Regional (SEAR) Office estimates, conducted during 2000-2009, report malaria death rates between 3188-6978 in SEAR. The proportion of *P. falciparum* being 44-60% and more than 70% of these cases being reported from India.<sup>3</sup>

Based on clinical episodes, it has now been estimated with the help of epidemiological models, geographical and demographic data that *p. falciparum* estimates outside Africa, especially in south-east Asia are 200% higher than that reported by the World Health

Organization, i.e. 118.94 million out of global estimates of 515 million cases.<sup>4</sup> The burden of *P. vivax* in the world has been calculated at 71-80 million cases, of which south-east Asia and western pacific countries contributed 42 million cases.<sup>5</sup>

Malaria continues to be one of the leading public health problems of India. In 1935, it was estimated that 100 million malaria cases and 1 million deaths occurred in India. India achieved tremendous gains in malaria control during the 'Eradication Era' in the 1950s till the mid 1960s, when reported cases were reduced to 64,000. The diverse clinical presentation and limited access to effective diagnosis and treatment is an important constraint in India, for proper control of malaria. Availability of a rapid, sensitive and specific test at an affordable cost is a prerequisite for laboratory confirmation of malaria. Conventional method by smear microscopy remains the gold standard. However, the

microscopy requires technical expertise and the availability of a good quality microscope. Our malaria unit comprising of well trained technicians with proper referral authority has undertaken this project with a fruitful outcome.

**MATERIALS AND METHODS**

The study was conducted in Kirodimal Government Hospital, Raigarh based on data collected during the period 2005-2015. 84,182 patients with clinical suspicion of malaria presenting with chills and rigor or atypical presentation were taken for the study.

The smears were stained by Jaswant-Sing-Bhattacharji (JSB) method. The JSB stain is a fairly rapid staining method for the detection of malarial parasite. The stain is superior to Field’s stain, because the parasites stain clearer and both thick and thin smears can be stained. However, the preparation fades quite rapidly. Therefore, this stain is not recommended when permanent slides are desired.

**Peripheral smear preparation**

Thick and thin blood smears were prepared and stained with JSB stain according to the standard guidelines described elsewhere.<sup>3</sup> After staining, smears were examined at x 1000 magnification. Atleast 100-200 fields, each containing 20 WBCs were examined before thick smear was reported as negative for malaria. The red blood cells in the tail end of the thin smear were examined for the species identification and stages of the parasites.<sup>6</sup>

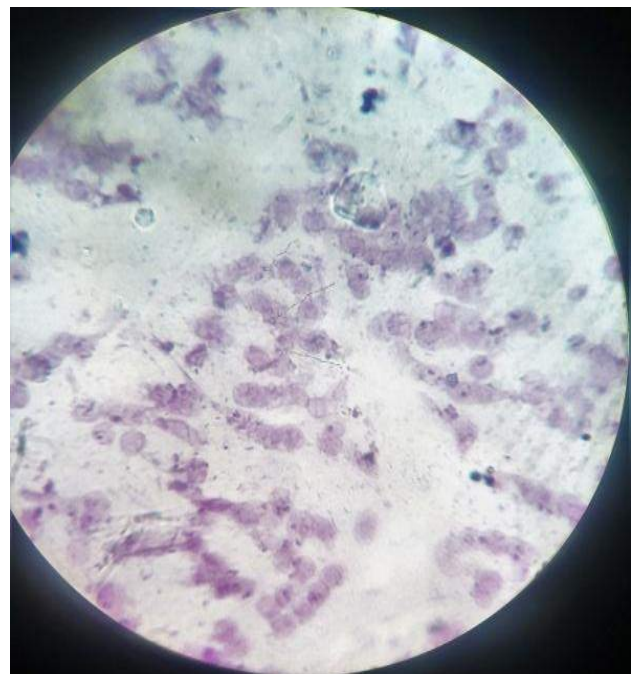
**Ethical clearance**

The data was collected after obtaining ethical clearance from government medical college ethics committee, Raigarh.

**RESULTS**

A total no. of 84,182 patients blood smears were tested for the identification of malarial Parasite. Out of them, 2,944 smears (i.e.3.5%) have shown various stages of the parasite. plasmodium *falciparum* has constituted the predominant species (2,236) accounting for76%. *P. vivax* being the next (708) contributing to 24%.

Table 2 shows age-wise distribution of malaria positive smears. 5-14 years old age group were highly affected, with 800 positives (27.17%); followed by 15-29 years old with 530 (18%). Remaining positives are distributed in various age groups.



**Fig 1: Ring forms of *P. falciparum* (Arrows)**

**Table 1: Year wise distribution of no. of smears examined; total positives and positive smear for *P.falciparum* and *P. vivax*.**

Year	Smears Examined	No. of positive	<i>P. falciparum</i>	<i>P. vivax</i>
2005	13,447	663	466	197
2006	11,616	763	602	161
2007	8,573	334	263	71
2008	6,860	232	175	57
2009	7,326	189	160	29
2010	8,706	244	196	48
2011	8,327	249	196	53
2012	4,877	85	54	31
2013	4,243	89	63	26
2014	5,033	63	46	17
2015	5,174	33	15	18
<b>Total</b>	<b>84,182</b>	<b>2,944</b>	<b>2,236</b>	<b>708</b>

**Table 2: Smear positivity in relation to age.**

Age group	Positive’s (out of 2,944)	Percentage (%)
5-14 years	800	27.17
15-29 years	530	18

**DISCUSSION**

Malaria is a burden of global importance and is a major public health problem in India. In the present study, the number of smears examined was showing a declining trend year by year starting from 13,447 in the year 2005 to 5,174 in 2015; the actual figure is definitely high,

when other health care facilities like private hospitals are taken into consideration.<sup>7</sup>

Ethnic tribes in Madhya Pradesh, Chattisgarh, Jharkhand and Orissa inhabit vast lands, where malaria has remained deeply entrenched. *Plasmodium falciparum* preponderance is persistent.<sup>8</sup> Clinical diagnosis alone is not a reliable indicator for treatment of malaria. Only 24% malaria cases were diagnosed based on clinical grounds, whereas the actual figure was 52% by microscopy, in a study conducted by Gautam et al 1991.<sup>9</sup> A study conducted in Jabalpur Medical College on patients admitted with complicated malaria has shown that, delayed diagnosis and comatose condition were the main determinants of death. In the present study, the overall slide positive rate of malaria was 2,944 (3.5%). This figure is very low when compared with similar studies done in Ethiopia (17%).<sup>10,11</sup> In India, the government health sector provides subsidy to 20% population mainly in rural areas, while the rest of the population seeks health care in private sector as their first point of contact, where bulk of malaria is generally treated empirically (Zwi et al 2001). *P. falciparum* preponderance in our study is in accordance with other studies.<sup>8,12-17</sup> Our study shows higher prevalence in 5-14 years age group. Most of the studies on age and sex prevalence are arbitrary.<sup>18</sup>

## CONCLUSION

Study reveals the importance of smear microscopy as suggested by Gautam et al. There is also a need, for the government clinical laboratory to perform additional testing methods to cater more public. Additional testing methods are also useful in the identification of *p. falciparum*, which is responsible for complicated malaria so that we can prevent the mortality and morbidity associated with *p. falciparum*. *Plasmodium malariae* was not found in our study, which is more common in tribal areas of Chattisgarh.

## REFERENCES

1. Sinton JA. What malaria costs India. Malaria bureau 13.Govt. of India press Delhi. Health Bull 1935;26.
2. Kondrachine AV. Malaria in WHO Southeast Asia Region. Indian J Malariol 1992; 29;129-60.
3. Kakkilaya BS. Malaria site-All about Malaria. [Monograph on the internet] India;2009. Available from: URL:http://WWW.malariasite.com.
4. Snow RW, Guerra CA, Noor AM, Myint HY, Hay SI. The global distribution of clinical episodes of plasmodium falciparum malaria. Nature 2005; 434: 214-7.
5. Mendis K, Sina BJ, Marchesini p. Carter R. The neglected burden of plasmodium vivax malaria. Am J of Trop med Hyg 2001; 64: 97-106.
6. Chakraborty p. plasmodium and Babesia. Textbook of medical parasitology. 1<sup>st</sup> edition. kolkata: New Central book agency (p) Ltd. 2004: 83-104.
7. Breman JG. The ears of the hippopotamus: Manifestations, determinants and estimation of malaria burden. Am J. of Trop. med Hygiene 2001; 64 (suppl.1) : 1-11 [pub med: 11425172].

8. Burden of malaria in India : Retrospective and prospective view. Aswanikumar, Neena valecha, Tanu jain and Aditya p. Dash. supplement to volume 77(6) of American journal of Tropical medicine and hygiene.

9. National Institute of Malaria Research Bulletin. A profile of National Institute of Malaria Research. Estimation of True Malaria Burden in India .clinical diagnosis alone is not reliable. .Research articles published by NIMR scientists.

10. A. Abebe, M. Dagnachew, M. Mikrie, A. Meaza, and G. Melkamu, "Ten year trend analysis of malaria prevalence in Kola Diba, North Gondar, Northwest Ethiopia," Parasites and Vectors, vol. 5, article 173, 2012.

11. K. Karunamoorthi and M. Bekele, "Prevalence of malaria from peripheral blood smears examination: a 1-year retrospective study from the Serbo Health Center, Kersa Woreda, Ethiopia," Journal of Infection and Public Health, vol. 2, no. 4, pp. 171–176, 2009.

12. Federal Republic of Ethiopia Ministry of Health, National Guide Lines, Federal Republic of Ethiopia ministry of health, Addis Abeba, Ethiopia, 3rd edition, 2012.

13. K. Y. Asnakew, G. Sucharita, T. H. Afework, O. D. Dereje, and P. P. Hrishikesh, "Spatial analysis of malaria incidence at the village level in areas with unstable transmission in Ethiopia," International Journal of Health Geographics, vol. 8, pp. 5–16, 2009.

14 D Sintasath, "National malaria survey (2000-2001)," Activity Report 134, The state of Ministry of Health of Eritrea, 2004.p.falciparum preponderance.

15. T. A. Ghebreyesus, M. Haile, K. H. Witten et al., "Household risk factors for malaria among children in the Ethiopian highlands," Transactions of the Royal Society of Tropical Medicine and Hygiene 2000; 94(1), 17–21.

16. J. M. Ramos, F. Reyes, and A. Tesfamariam, "Change in epidemiology of malaria infections in a rural area in Ethiopia," Journal of Travel Medicine, vol. 12, no. 3, pp. 155–156, 2005.

17. R. S. Bray and R. E. Sinden, "The sequestration of Plasmodium falciparum infected erythrocytes in the placenta," Transactions of the Royal Society of Tropical Medicine and Hygiene, vol. 73, no. 6, pp. 716–719, 1979.

18. Fauci AS, Kasper DL, Longo DL, Braunwald E, Hauser SL, Jameson JL, et al. Malaria. In: Osler W, editor. Harrison's principles of internal medicine. 17 ed. New York; McGraw Hill; 2008: 1280-93.

**Source of Support:** Nil.

**Conflict of Interest:** None Declared.

**Copyright:** © the author(s) and publisher. IJM RP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

**Cite this article as:** Apparao P, Padmanabam Y, Agrawal PC. Prevalence of Malaria from Blood Smears Examination: An Eleven –Year Retrospective Study from Kirodimal Government General Hospital, Raigarh. Int J Med Res Prof. 2016, 2(2); 97-99.