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

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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 15-29 years 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. 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. 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. 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. 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.

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 mid1960s, 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-Bhattacherji (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. 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.

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 for 76%. 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.

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, particularly in the year 2005.

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

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

TABLE 2: Smear positivity in relation to age.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Positive’s (out of 2,944)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-14 years</td>
<td>800</td>
<td>27.17</td>
</tr>
<tr>
<td>15-29 years</td>
<td>530</td>
<td>18</td>
</tr>
</tbody>
</table>
when other health care facilities like private hospitals are taken into consideration.7
Ethnic tribes in Madhya Pradesh, Chattisgarh, Jharkhand and Orissa inhabit vast lands, where malaria has remained deeply entrenched. Plasmodium falciparum preponderance is persistent.8 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 1991.9
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%).10,11 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.8,12-17 Our study shows higher prevalence in 5-14 years age group. Most of the studies on age and sex prevalence are arbitrary.18

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


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