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Research Article

Complications of vivax malaria in Uttarakhand, India

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ABSTRACT

Background: Malaria is an important cause of mortality and morbidity in India. Many recent studies have shown that vivax malaria which was once thought to be a benign condition has emerged in a more virulent form causing many cases of severe malaria and life threatening complications. There is paucity of data on this topic from this region.
Objective: The present study was conducted to find out the clinical features, complications, response to treatment and outcome of patients suffering from vivax malaria. The study has also tried to find out severe malaria associated with *P. vivax* infection.
Methods: The study was performed at SGRR Institute of Medical & Health Sciences, Dehradun, which is a tertiary care hospital of Uttarakhand. The study period was of two years, from September 2011 to August 2013. Patients of 18 years of age or above it who were smear positive or antigen positive were included in the study. All such patients who were admitted in the hospital underwent detailed clinical examination and investigation.
Results: Plasmodium vivax infection was identified in 140 patients. Splenomegaly, hepatomegaly, and hepatosplenomegaly, were common findings. Renal, hepatic and cerebral dysfunctions were noted. Severe malaria was observed in 63(45.0%). Thrombocytopenia was the commonest hematological abnormality. Mortality was seen in 9(6.4%) patients. Cerebral malaria, shock and ARDS were associated with high mortality and poor outcome.
Conclusion: Vivax malaria may cause life threatening complications. The complications of vivax malaria are similar to those which have been traditionally described with falciparum malaria.

Keywords: Vivax malaria, Complications, Uttarakhand

INTRODUCTION

Malaria is a major public health problem in India and causes significant morbidity, mortality and economic loss. According to the world malaria report 2012 fact sheet, WHO estimated 219 million cases of malaria and 660 000 deaths in 2010.[1] In South East Asia, the second most affected region in the world after Africa, India has the highest malaria burden (an estimated 24 million cases per year).[1] Nearly half of the total reported malaria cases in India are from Jharkhand, Orissa, Chhattisgarh, Madhya Pradesh and West Bengal.[2] *Plasmodium vivax* is the most common of four human malaria species.[3] Traditionally vivax malaria has been considered to run a benign course and the serious complications associated with falciparum malaria were not expected to be found in vivax malaria. However recent studies show that 21-27% of patients with severe malaria have *P. vivax* mono infection.[4] The incidence of malaria is on rise in Dehradun because of factors like rapidly growing population, water logging and poor sanitation. Malaria patients can be seen throughout the years but the maximum number of cases emerges during the rainy season. This study aims to find out the clinical features, complications, response to treatment and outcome in patients suffering from vivax malaria.

METHODS

This prospective study was conducted at Sri Mahant Indiresh Hospital and Sri Guru Ram Rai Institute of Medical & Health Sciences, Dehradun. The hospital is a tertiary referral centre where the patients reach not only from Dehradun but also from the neighbouring districts and bordering states. The study was performed for a period of 2 years, ranging from September 2011 to August 2013. Patients of 18 years age or above it who were smear positive or antigen positive for plasmodium vivax were included in the study. All such patients who were admitted in the hospital underwent detailed history and examination. Routine hematological and biochemical investigations were done in all cases. Additional investigations like CT scan of head and X- ray chest were done whenever required. Patients who were smear negative or antigen negative for vivax malaria but were treated empirically for malaria were excluded from the study.

RESULTS

A total of 140 patients were identified as suffering from plasmodium vivax malaria. Out of these 140 subjects, 73(52.1%) were males and 67(47.9%) were females. Maximum number of cases was detected in the months of July to September which coincides with rainy season. All the patients presented with fever ranging from 2 day to 9 days with a mean duration of 4.5 +/- 2.1 days.

On examination all patients were febrile. Anemia was present in 60 (42.9%) patients. 17 (12.1 %) were having jaundice. Splenomegaly was present in 37(26.4%), hepatomegaly in 39 (27.9%) and hepatosplenomegaly in 22 (15.7%). Petechiae were noted in 16 (11.4%). Vomiting was present in 17 (12.1%) and loose stool was present in 11 (7.9%). Abdominal pain was complained by 19 (13.6%) patients. Mean hemoglobin level was 9.1 +/- 2.1 gm/dl. Severe anemia (Hb < 5gm/dl) was noted in 11 (7.9%). Leukopenia was noted in 41 (29.3%). Leukocytosis was not observed in any of the patients. Reduced platelet count (<1.5 lakh) was noted in 121(86.4%). Platelets counts were <1.0 lakh in 41(29.3%) and <50,000 in 13(9.3%). Liver function was deranged in 28(20.0%). Liver enzymes (SGOT, SGPT) were raised in all 28 patients while serum bilirubin was raised in 17(12.1%). Renal failure (serum creatinine > 1.5 mg/dl) was reported in 19 (13.6%) while severe renal failure (serum creatinine >3 mg/dl) was noted in 9(6.4%). Altered sensorium was noted in 27(19.3%) patients. All 140 patients were categorized as severe or non-severe malaria based on WHO classification.[5] Those with severe malaria were treated with artesunate and clindamycin. Total 9(6.4%) patients died. Causes of death were cerebral malaria in 5 patients, shock and circulatory collapse in 2 and ARDS in another 2 patient.

Table 1: Age and sex wise distribution of vivax malaria.

Age group	Male	Female	Total
18-30	21(15.0%)	19(13.6%)	40 (28.6 %)
31-40	19(13.6%)	17 (12.1%)	36 (25.7%)
41-50	13 (9.3%)	15(10.7%)	28 (20.0%)
51-60	9(6.4%)	8(5.7%)	17(12.1%)
61-70	8(5.7%)	7(5.0%)	15(10.7%)
71-80	3(2.1%)	1(0.7%)	4(2.9%)
Total	73 (52.1%)	67(47.9%)	140 (100 %)

Table 2: Month wise distributors of vivax malaria.

Month	No of Cases (%).
January	2(1.4%)
February	1(0.7%)
March	2(1.4%)
April	3(2.1%)
May	6(4.3%)
June	16(11.4%)
July	32(22.8%)
August	19(13.6%)
September	19(13.6%)
October	15(10.7%)
November	13 (9.3%)
December	12(8.6)
Total	140 (100%)

Table 3: Clinical manifestations in vivax malaria.

Criteria	No. of cases (n =140)
Fever	140(100%)
Pallor	60(42.9 %)
Jaundice	17 (12.1%)
Petechiae	16(11.4%)
Vomiting	17(12.1%)
Loose stool	11(7.9%)
Abdominal pain	19(13.6%)
Hepatomegaly	39(27.9%)
Splenomegaly	37(26.4%)
Hepatosplenomegaly	22(15.7%)
Headache	16(11.4%)
Seizure	10(7.1%)
Unconsciousness	21(15.0%)

Table 4: Laboratory findings in vivax malaria.

Criteria	No of Cases (%).
Anemia (Hb <10 g/dl)	60 (42.9 %)
Leucopenia (TLC <4000 / cu. mm.)	41(29.3%)
Thrombocytopenia	
<1.5 Lakh / cu. mm.	121(86.4%)
<1.0 Lakh / cu. mm.	41(29.3 %)
<50,000 / cu. mm.	13(9.3%)
Serum creatinine > 1.5 mg/dl	19(13.6%)
Serum bilirubin> 2.0 mg/dl	17(12.1%)
Hypoglycemia (blood sugar <40 mg/dl)	5 (3.6%)

Table 5: No. of cases of severe vivax malaria.

Criteria	No. of cases (%).
Cerebral malaria	27(19.3%)
Shock / circulatory collapse	13 (9.3%)
Severe anemia (Hb <5gm/dl)	11(7.9%)
Severe Renal impairment (serum creatinine >3mg/dl)	9(6.4%)
ARDS	3(2.1%)
Total	63(45.0%)

Table 6: Outcomes in vivax malaria.

Age group	Improved	Mortality	Total
18-30	39(27.9%)	1(0.7%)	40 (28.6 %)
31-40	34(24.2%)	2 (1.4%)	36 (25.7%)
41-50	26(18.6%)	2(1.4%)	28 (20.0%)
51-60	15(10.7%)	2(1.4%)	17(12.1%)
61-70	14(10.0%)	1(0.7%)	15(10.7%)
71-80	3(2.1%)	1(0.7%)	4(2.9%)
Total	131(93.6%)	9(6.4%)	140 (100 %)

DISCUSSION

Malaria is a multisystem infection. Vivax malaria has always been described as benign disease in the past. However in recent few years many cases of severe vivax malaria has been reported and some of them have resulted in death.[6-9] The present study also suggests that many of the cases of severe malaria are caused by *P vivax*. The exact cause of change in the presentation and complications of vivax malaria is not known. However various hypotheses may be change in the gene of the parasite or gradually developing resistance to commonly used drug chloroquine. Earlier it was thought that the severity of vivax malaria was actually due to coinfection with falciparum but now it is clear that vivax alone can cause life threatening complications.[10] Severity of vivax malaria is mainly because of inflammatory and immunological response.[11] Platelet abnormalities are both qualitative as well as quantitative. Thrombocytopenia in malaria is because of immune mediated hemolysis.[12] Low platelet count has been commonly reported in vivax malaria.[13-17] Though we also observed many cases of thrombocytopenia; no case of life threatening hemorrhage was noted. The platelet count increased with treatment as observed in earlier studies.[18,19] Leukopenia in malaria is due to sequestration of white cells in spleen. Leukopenia improves with treatment of malaria. Leukopenia in our study was similar to other earlier study.[20,21] Anemia in malaria is due to hemolysis and bone marrow dyserythropoiesis. The cause of hemolysis is increased fragility of both parasitized as well as non parasitized red blood cells.[22-24]

CONCLUSION

This study concludes that life threatening complications which were earlier known to occur only with falciparum malaria can also occur with vivax malaria. Findings of this study are consistent with the other studies concluding that vivax malaria has recently gained more virulence.

Patients suffering from vivax malaria should be monitored closely for the development of life threatening complications as their early detection and treatment could be life saving. Further research is required find out the reason behind this changing virulence.

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