International Journal of Contemporary Pediatrics
Goel A et al. Int J Contemp Pediatr. 2015 Aug;2(3):221-223
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291
DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20150531

Research Article

Changes in clinical manifestations in children with vivax malaria

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Received: 03 June 2015
Revised: 09 June 2015
Accepted: 21 June 2015

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ABSTRACT

Background: There is an increased concern about the increasing virulence of Plasmodium vivax. The disease which was associated with relatively benign illness previously, is now increasingly witnessed in severe forms and with complications. Therefore we decided to look at our data over last 13 years if there is an increasing trend with regard to severity and complications of vivax malaria.
Methods: The data from 133 children with vivax malaria diagnosed with thick and thin smear over a period ranging from2011 to 2013. For the purpose of comparison, we divided the data into 3 time periods A, B & C respectively. The data was analyzed to see if there is an increase in severity of vivax malaria.
Results: There was a general increase in incidence of complications in children with vivax malaria. Incidence of shock increased from 2.9% in time period A to 25.9% in time period B and 28.6% in time period C and the change was statistically significant. This increase was also observed in incidence of respiratory distress, acute lung injury, bleeding manifestations and disseminated intravascular coagulation. However none of these changes were statistically significant. There was no change in the incidence of cerebral malaria.
Conclusions: There appears to be an increase in severity and complications in vivax malaria in children. Clinicians need to be aware of this trend while managing children with vivax malaria.

Keywords: Vivax, Malaria, Complications

INTRODUCTION

Plasmodium vivax has been endemic in India, Southeast Asia, Africa and South America and puts a significant health burden on the countries affected by it.[1] It has been a common wisdom that vivax malaria, although, a significant illness, but was still relatively benign when compared to the other type of malaria, the falciparum malaria. How ever since last decade or two, vivax malaria too have seen severe forms with increased morbidity and mortality.[2,3] With these observations in mind, we decided to compare the clinical manifestations of vivax malaria in different time periods over last 13 years.

METHODS

The study was conducted in the department of pediatrics at Christian medical college & hospital, Ludhiana. The data from 133 children, ≤16 years of age, was collected who were admitted to our hospital with primary diagnosis of vivax malaria. All children who were positive for Plasmodium vivax on thick/ thin smear during the defined period were included in the study. The consecutive data was collected from hospital records with time period ranging from 2011 to 2013, a total of 13 years.

For the purpose of comparison, the data was divided into 3 time periods:

Time period A: May 2001 - June 2006

Time period B: July 2006 - June 2010

Time period C: July 2010 - July 2013

A descriptive statistical analyses and comparison was done according to 3 different time periods to evaluate any change in clinical trends over the period of 13 years.

RESULTS

Among 133 children with vivax malaria, the male:female ratio was 3:1 witch was reflective of general population of children admitted at our hospital. Majority of children were from the age group of >5 years. Among severe clinical manifestations/complications, we looked at the data with respect to cerebral malaria, shock, respiratory distress, seizures and bleeding manifestations and (DIC) disseminate intravascular coagulation (Table 1).

Table 1: Incidence of complications in children with vivax malaria during different time periods.

Clinical manifestation	Time periods		
	A (2001-2006) N=36	**B (2006-2010) N=27**	**C (2010-2013) N=70**
Cerebral malaria	3 (8.35)	4 (14.8%)	4 (5.7%)
Shock*	1 (2.9%)	7 (25.9%)	20 (28.6%)
Respiratory distress	4 (11.1%)	6 (22.2%)	15 (21.4)
Acute lung injury/ARDS	0 (0%)	2 (8%)	6 (8.6%)
Bleeding Manifestations	2 (5.6%)	7 (25.9%)	9 (12.9%)
Disseminated intravascular coagulation	2 (5.6%)	2 (7.4%)	8 (11.4%)

*Statistically significant

The incidence of cerebral malaria in children suffering from vivax malaria was maximum during time period B, with no statistical difference between 3 time periods. The proportion of children having vivax malaria with respiratory distress increased over time from 11.1% in time period A to 22.4% and 21.4% in time period B & C. However this difference was not statistically significant. Further among the children with respiratory distress, there were no children in time period A with acute lung injury/ARDS. The incidence increased to 8% in time period B and to 8.6% in time period C. This increase in proportion again was not statistically significant.

Shock as a complication of vivax malaria saw increase from 2.9% in time period A to 25.9% in time period B and 28.6% in time period C and change being statistically significant. The bleeding manifestations like skin bleeds epistaxis, upper or lower gastrointestinal bleeds, were seen in 13.6% of children with vivax malaria.

The incidence of bleeding manifestations increased from 5.7% in time period A to 25.9% and 12.9% in time periods B & C respectively. Though this change was again not statistically significant. DIC too was a major complication which increased from 2% in period at to 7.4% to 11.4%. This trend too was not statistically significant.

DISCUSSION

Vivax malaria is being increasingly recognized as an infection that is more frequently manifesting in severe forms. Shock is known to be a complication associated with poor prognosis in children with malaria. In the present study, shock was present in 21% of children with vivax malaria. When looked over different time periods, this was a statistically significant increase in incidence of shock from time period A to C (Table 1). Recent literature too suggests shock being a significant complication of vivax malaria.[3-5] Another study from the subcontinent, reported shock as a significant complication.[6] The patho-physiology of shock in vivax malaria appears to be primarily due to fall in peripheral vascular resistance rather than a fall in cardiac output.[4] Consequently the shock here behaves more like septic shock. Most of the patients with shock also have other sever manifestations like acute kidney injury, DIC, pulmonary complications, etc. and hence leading to poor outcome.

Children with vivax malaria are known to have some degree of respiratory distress.[7] Only recently, it is being realized that it can be as severe to leading to Acute Respiratory Distress Syndrome (ARDS) or acute lung injury.[8,9] In the present study, we also noted an increase in trend in pulmonary complications. Parasitized RBCs sequestration in pulmonary capillaries is thought to be one of the mechanism for this injury. Along with this a direct inflammatory response causes increased alveolar capillary permeability leading to fluid loss into the lungs[9] and ARDS like picture.

The hematological data from same set of patients published earlier[10] had clearly shown the increase in incidence and severity of anemia and thrombocytopenia. However when we looked at the bleeding manifestations including DIC in those children, the increase noted was not statistically significant. There is no correlation between the incidence of thrombocytopenia and the bleeding manifestations.[10] Most of the children who had bleeding were also having DIC. Hence pure thrombocytopenia is not the only factor predisposing these children to bleed.[11,12]

CNS (central nervous system) complications in malaria are the most dreaded complications and are associated with high mortality. CNS complications were considered as the hallmark of falciparum malaria. Recent studies and case reports are published with increasing association of CNS complications with vivax mono-infection.[13-15] Our study did not show any increase in incidence of cerebral malaria when compared between 3 time periods. However the recent literature[15,16] clearly points towards this complications and requires clinicians to be keep high degree of suspicion to manage this complication successfully and in time. The pathogenesis of CNS complications in vivax malaria is not very clear. Sequestration of parasitized RBCs in cerebral capillaries could be one of the mechanisms. The molecules like intercellular adhesion molecule 1 (ICAM-1) could be facilitating this sequestration.[17]

CONCLUSION

It is now a common knowledge that vivax malaria cannot be called as benign illness anymore. Coupled with the emerging drug resistance, it has a potential of becoming a major health concern. In the present study we tried to look for evidence if the severity and complication rate of this infection is increasing. Although the incidence of complications appears to be increasing in this study, we need larger studies to confirm these observations. Meanwhile, clinicians should be aware of this trend while managing children with vivax malaria. Early recognition would help in reducing the morbidity and mortality due to this infection.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: Not required

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Cite this article as: Goel A, Mangla A, Singh T. Changes in clinical manifestations in children with vivax malaria. Int J Contemp Pediatr 2015;2:221-3.