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Malarial Parasitic Infection in Paediatric Age Group

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A B S T R A C T

Malaria is a disease causing high morbidity and mortality of patients. *Plasmodium falciparum* is a species causing serious fatal infections. The aim of this study was to find the prevalence of malarial infection in paediatric age group and to find the effect of malarial infection on blood cells. Total 500 children were selected for the study who suffered with fever and chills. Thick blood smear was performed using standard method. Out of 500 suspected cases of malaria, malarial parasites were detected in 74 blood smear (14.80%). Timely diagnosis and proper treatment may help to prevent mortality of children from malaria. Thick smear is useful to screen malarial parasites in large population of children and it is low cost to patient.

Introduction

Malaria infection is caused by a protozoan parasite of the genus *Plasmodium*. The species known as *Plasmodium falciparum* is the most common cause of malaria infection. Malaria kills many young children in sub-Saharan Africa. The disease leads to numerous complications in children such as anaemia, pulmonary oedema, renal failure, hepatic dysfunction and coma. Some of the symptoms of malaria infection are fever, vomiting, sweats, chills, cough and fatigue. Although governments of most sub-Saharan African countries and international community have continued to invest in prevention and management of malaria, the disease has remained a major public health problem in Africa.[1]

World Health Organization reported 219 million cases of malaria with an estimated 660,000 deaths. South East Asia is the second most affected region in the world after Africa, and India has the highest (61%) malaria burden in the region with an estimated 24 million cases per year. *Plasmodium falciparum* malaria continues to be a major public health threat in India, with nearly half (273 million) of the high risk population outside Africa residing in India. India contributes over one fifth (22.6%) of

clinical episodes of *P. falciparum* globally. About 80% of malaria cases reported in the country is confined to areas consisting of 20% of the total population, who reside in tribal, hilly, difficult and inaccessible areas.[2]

Malaria remains a leading cause of childhood morbidity and mortality worldwide, accounting for 7% of deaths in children younger than five years of age. In the past few years two of the largest clinical trials ever conducted in African children with severe malaria (SM) have concluded, both holding major implications for treatment guidelines.[3]

Malaria is an ancient scourge of humanity. Although almost eradicated from industrialized nations, malaria continues to take a heavy toll of life and health in a substantial part of the world. Almost half the world's population lives in countries where the disease is endemic, and almost every country in the world encounters imported malaria. Children are the worst affected, especially children aged 6 months to 5 years. In parts of the world where malaria is endemic, it may cause as many as 10% of all deaths in children. Malaria in children younger than age 5 years carries the worst prognosis in endemic areas. In a nonimmune population, malaria is equally deadly at all ages. Repeated attacks of malaria can lead to chronic anemia, malnutrition, and stunted growth. Acidosis, seizures, impaired consciousness, renal impairment, and pre-existing chronic diseases are associated with poor outcomes in children with severe malaria. Other markers of poor outcomes are hyperparasitemia, respiratory distress, young age, severe anemia, and hypoglycemia.[4]

Materials and Methods

This prospective and analytical study was carried out at Microbiology and Pathology Laboratory, Mahatma Gandhi Mission Hospital, Kalamboli, Navi Mumbai, India, over a period of one year from January 2013 to December 2013. Chi-square test, Z tests and SPSS (version 17) software was used for statistical analysis. A total of 500 samples collected from clinically suspected cases of malaria of all the paediatric age groups in both the sexes attending tertiary care hospital were included for study.

Ethical Clearance

Ethical clearance was obtained from the Institutional Ethical committee of MGM Institute of Health Sciences (Deemed University), Navi Mumbai before starting the project. Written consent was taken prior sample collection from each participant and mother / care takers under five years age

Sample Collection

The detailed history, clinical signs and symptoms were recorded in the proforma. 3-5 ml venous blood was collected into Ethylene diamine tetra acetic acid (EDTA) tube (Becton Dickinson) under sterile precautions.

Laboratory Method

Thick smears were prepared on a clean grease free glass slide. Dehaemoglobinized and stained with Leishman's stain (Lot No. 0000168288-HiMedia Laboratories Pvt. Ltd., India) according to standard procedure and observed under 100x oil immersion objective lens using paraffin oil. The numbers of malarial parasites (Plasmodium species) in thick smear were recorded. (Fig. 1 & 2).

Results and Discussion

Total 500 malaria suspected children were included in this study. Out of 74 positive samples parasitic index maximum found +

in 41 samples i.e. (Trophozoite 41 and gametocytes 15), ++ in 24 samples (Trophozoite 24 and gametocytes 10) and +++ in 9 samples (Trophozoite 9 and gametocytes 3).

Table.1 Showing Parasitic Index

Parasite intensity	+	++	+++
Trophozoites	41	24	9
Gametocytes	15	10	3

Table.2 Showing Age Wise Distribution of Malaria

Years	No. of Patient	Percentages
< 1	3	4.05%
1 - 3.	23	31.08%
4 - 6.	18	24.32%
7 - 9.	11	14.86%
10 - 12.	19	25.68%
Total	74	100%

Fig.1 Ring Trophozoite Stage of Malarial Parasites

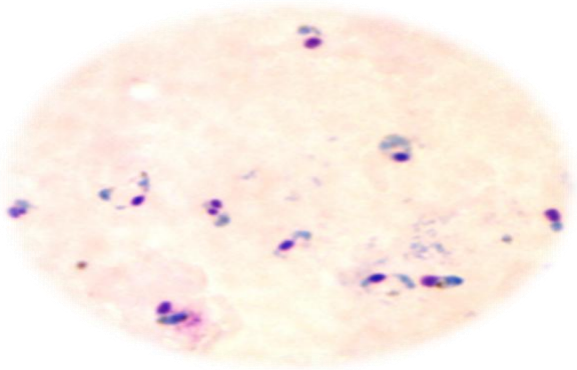


Fig.2 Gametocyte Stage of Malarial Parasites

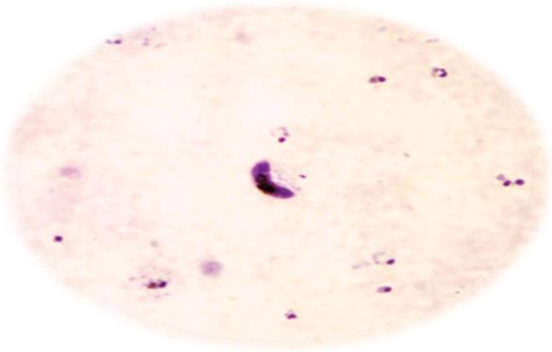


Fig.3 Prevalence of Malarial Infection in Children

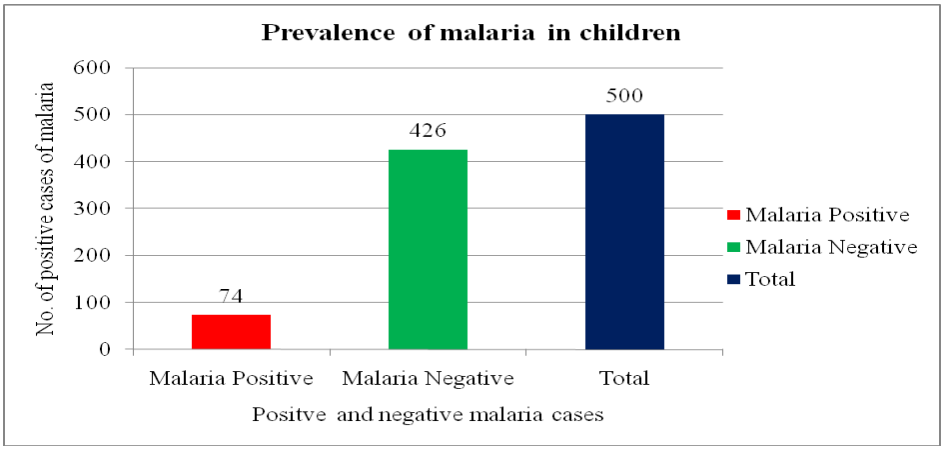


Fig.4 Parasitic Index of Malarial Parasites

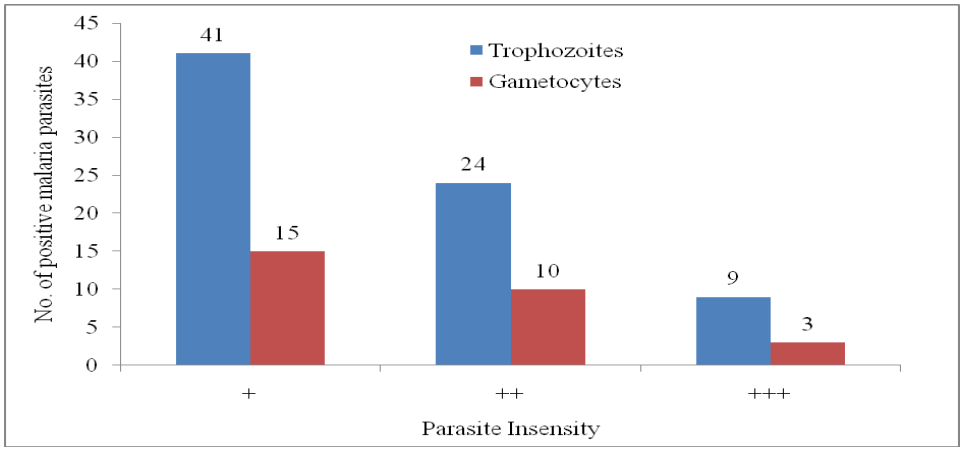


Fig.5 Age Wise Distribution of Malaria

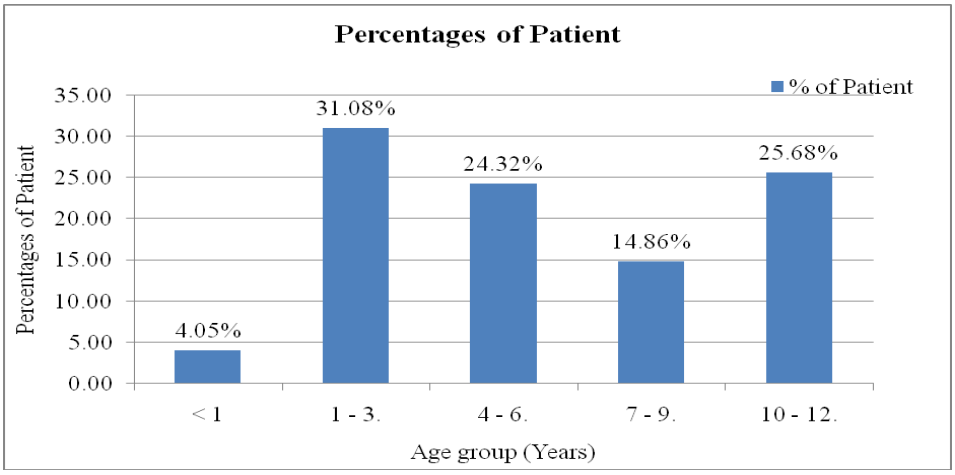
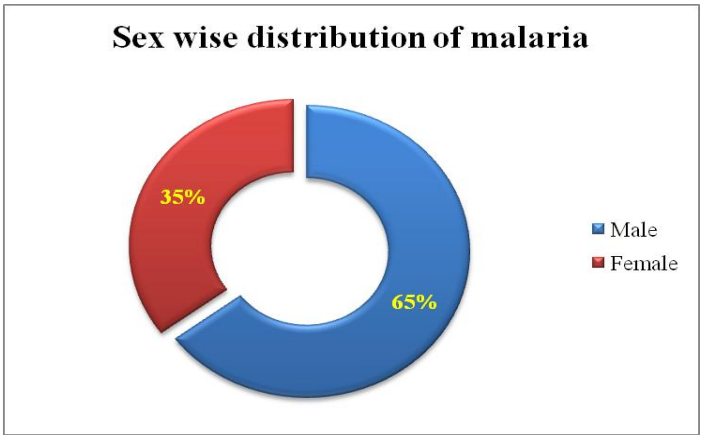


Fig.6 Sex Wise Distribution of Malaria



Intensity of Malaria Parasites in the Study

+ = 10 parasites per 100 thick film fields; ++ = 100 parasites per 100 thick film fields; +++ = 10 parasites, per one thick film fields; and ++++ = more than parasites per one thick film fields[5,6].

Malaria is one of the most important causes of direct or indirect infant, child, and adult morbidity and mortality in India. *P. vivax* malaria is considered to be benign malaria with a very low case-fatality ratio; it may still cause a severe illness similar to *P. falciparum* malaria, especially in children.[7,8] Studies from Asia and the Pacific region have showed that *P. vivax* malaria responsible for large number patients admitted in hospital.[9,10-13] *P. vivax* being a benign infection and causing severe form of infection reported from India,[14] Indonesia,[15,16] Papua New Guinea,[17] and Pakistan,[18] workers reported *P. vivax* causing severe disease including deaths in hospitalized patients. A study from Venezuela also showed *P. vivax* associated with increasing deaths, particularly in children.[19]

In our study 74 out of 500 samples were positive for malarial infection (14.80%). (Fig.3) Out of 74 positive samples parasitic index were maximum found + in 41 samples i.e. (Trophozoite 41 and gametocytes 15), ++ in 24 samples (Trophozoite 24 and gametocytes 10) and +++ in 9 samples (Trophozoite 9 and gametocytes 3). (Table 1 & Fig.4)

In our study maximum numbers of malarial infection were seen in age group 1 - 3 years (31.08%) followed by age group 10-12 years (25.68%) and 4-6 years (24.32%). (Table 2 & Fig.5) Sex wise distribution – more number of malarial parasites were seen in male 48/74 (64.86%) than female 26/74 (35.14%). The male to female ratio was 2:1. P value (< 0.05), statistically significant (Table 3 & Fig.6).

A study reported 102/179 (56.9%) prevalence in children. 64 (62.74%) were male and 38 (37.26%) were female. Male to female ratio 2:1.[20] Another study reported 38/1680 (2.26%) children tested positive for malaria on peripheral smear examination.[21] Another study reported that out of 5356 children suspected cases of malaria, 5100 (95.2%) were confirmed positive for malarial parasites by microscopic examination. Age wise 4119 (80.8%) were age group 0-6 years, with children aged 1 to 3 years being mostly affected.[22]

In conclusion, Malaria can cause severe and fatal condition encountered in all age groups if not properly diagnosed and untreated. Thick smear is a useful to screen malarial parasites in large population of children i.e. in school, villagers, camp and it is low cost to patient.

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