Original Research Article

A study to find the commonest plasmodium malaria in Srikakulam district, Andhra Pradesh

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Abstract

Introduction: Due to thorough implementation of national malaria eradication programme, there was drastic decline in malaria. A study was conducted to find the commonest malaria causing plasmodium in paediatric age group. **Materials and methods:** Study was conducted in Great Eastern Medical School & Hospital, Andhra Pradesh from January to December 2019, approved by the institutional ethics committee. Children aged ≤ 12 years with clinical suspicion of malaria were included. Blood was collected following standard aseptic precautions in sterile EDTA tube, 2 smears were prepared. Thin smear was stained by giemsa and thick smear by Jaswant Singh Battacharya staining. As a part of internal quality control, all positive and 25% of negative smears were randomly screened. Commercially available, rapid malaria Pan+Pf cards were used for antigen detection. Chi square test was used to find statistical difference, P>0.05 was considered statistically significant. **Results:** Total601 (59%) were malaria cases, 559 were positive by blood smear examination (BSE) and 579 by raid diagnostic technique (RDT), male female ratio was 0.97. More cases were detected in 5 – 10 years. With BSE, 31.1% were identified as Plasmodium falciparum and 41.6% by RDT. **Conclusion:** Plasmodium falciparumis the predominant malaria causing agent in this area.

Keywords: Malaria, plasmodium, age, gender

Introduction

Malaria is one of the oldest and deadliest diseases caused plasmodium species[1].Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale and Plasmodium knowiesi are the human infecting plasmodium members. Due to the involvement of central nervous system, falciparum malaria is highly fatal[2].

It was estimated that in 1935, there were one million malaria deaths in India [3].Due to thorough and proper implementation of national malaria eradication programme (NMEP), there is drastic decline in malaria and almost reached the eliminating stage.[1]In 2015, 17 Asia pacific countries endorsed a plan to eliminate malaria by 2030[4]. All five plasmodium species are known to infect children[5].As per the world health organization (WHO) report, in India, among the diagnosed cases, the prevalence of P. falciparum is more[6].Severe malaria is associated with P. falciparum, P. vivax mono and mixed infection [5]. Fever, chills, headache, myalgia, vomiting and anorexia are the common childhood malaria symptoms.

Due to non-specific symptoms, malaria may mimic other viral infections, enteric fever, gastroenteritis etc [7].With this diagnosis of malaria based on clinical symptoms alone is unreliable. So laboratory diagnosis using proper technique is the way not only for correct treatment but also the drug resistance (DR) can be avoided. Because inappropriate usage of antimalarials causes DR, which is the major issue in the eradication of malaria. With these, a study was conducted to find the commonest malaria causing parasite in paediatric age group.

Materials and methods

It was a prospective, time bound study conducted in Great Eastern Medical School & Hospital, Srikakulam district, Andhra Pradesh. Study was conducted from January to December 2019, period of 12 months. Study protocol was approved by the institutional ethics committee. Informed written consent was taken from the parents of all the participants. Children of either gender, aged≤ 12 years with clinical suspicion of malaria were included in this study. Aged ≥ 12 years, those parents who did not submit informed written consent and who were not cooperative were not considered. All the children who satisfied the inclusion criteria during the study period were included in this research. Details of history and findings of clinical examination were recorded.

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From the study members, 2 ml venous blood was collected following the standard aseptic precautions and transferred to sterile EDTA tube. Two smears were prepared from each sample, one thick and another thin film. Thin smear was dried, fixed and stained by giemsa staining. Thick smear was dehaemoglobinised with distilled water, stained withJaswant Singh Battacharya (JSB) staining.

Smear preparation, staining and screening under microscope was carried as per the NMEP [8].As a part of internal quality control, all positive smears and 25% of negative smears were randomly screened. In case of any discrepancy in smear reading, expert opinion was considered final.Commercially available rapid malaria Pan+ Pf cards were used for antigen detection. The test kits were brought to the room temperature before the test procedure. Using sample dropper provided in the kit, whole blood was taken up to the mark and dispensed in the sample well S, as per the manufacture guidelines. It was followed by adding three drops of buffer to the wellB. The results were read after 20 minutes. Presence of three purple to pink bands in F, P and C regions indicated that the sample was reactive for P. falciparum, P. vivax and other species. Bandat C and F regions indicated that the sample was positive only for P.falciparum. Bandin C and P, considered that sample was positive to allother plasmodium members. Presence of only one band in C region after20 minutes indicatesthe test isnegative.

Statistical analysis

SPSS version 21.0 was used for statistical analysis. Chi square test was used to find the statistical difference. P>0.05 was considered statistically significant.

Results

In this study total 1024 clinically suspected cases of malaria were recruited, 601 (59%) were identified to be malaria positive. Among these, 93% (559) were positive by blood smear examination (BSE) and 96% (579) by raid diagnostic technique (RDT).Statistically there was significant difference (Table 1).

Table 1: Diagnosis of malaria among the study members; n (%)

		BSE		Total
		Positive	Negative	
RDT	Positive	553 (92)	26 (4.3)	579 (96.7)
	Negative	6 (1)	16 (2.7)	22 (3.7)
Total		559 (93)	42 (7)	601 (100)
χ^2 value		151.8279		
P value		0.000001		

In the positive cases, gender wise, 49.5% (297) were male and 50.5% (304) were female participant, the male female ratio was 0.97.Statistically there was no significant difference between the test results and gender (Table 2).

Table 2: Gender wise malaria cases among the study members; n (%)

Gender	Positive	Negative	Total
Male	297 (29)	204 (19.9)	501 (49)
Female	304 (29.7)	219 (21.4)	523 (51)
Total	601 (58.7)	423 (41.3)	1024 (100)
χ^2 value	0.1409		
P value	0.707433		

Age wise, more (26%) malaria cases were detected in 5 – 10 years followed by < 5 years (21%) and > 10 years group (12%) (Table 3).

Table 3: Age wise malaria cases among the study members; n (%)

Age	Positive	Negative	Total
< 5	219 (21)	144 (14)	363 (35)
5 – 10	263 (26)	121 (12)	384 (38)
> 10	119 (12)	158 (15)	277 (27)
Total	601 (59)	423 (41)	1024 (100)

Total 31.1% (187) Plasmodium falciparumcases were identified by BSE and 41.6% (205) by RDT. Whereas 69% (414) were diagnosed as other plasmodium members by BSE and 66% (396) by RDT. Statistically there was significant difference between the techniques (Table 4).

Table 4: Diagnosis of different plasmodium species among the study members; n (%)

		BSE		Total
		Plasmodium falciparum	Other plasmodium	
RDT	Plasmodium falciparum	181(30.1)	24 (4)	205 (41.6)
	Other plasmodium	6 (1)	390 (65)	396 (66)
Total		187 (31.1)	414 (69)	601 (100)
χ^2 value		474.5644		
P value		0.000001		

Discussion

Total 601 malaria cases were detected in this study. Gender wise, 49.4% (297) were male and 50.6% (304) were female participants.The male female ratio in this study was 0.97; statistically there was no significant difference (Table 2). In a study, out of 302 (100%) malaria cases, 115 (38%) were female and 187 (62%) were malemembers and

the male female ratio was 1.62, statistically there was no significant difference [10]. In one of our previous studies, gender wise, 51% (35) were male and 49% (34) were female participants[2]. Asper AbishaJaya Singh et al.report ,among the malaria cases, 80% were male and 20%were female [9]. It was mentioned in the literature that outdoor activity is the cause formore malaria cases among the male.But in this study, through there was no significant difference among the gender and these was slightly more malaria cases in the female. This study was conducted among the paediatric age group, all the study members were school going children and the reasons were more malaria cases among the female was not known.

Age wise, 21% cases were detected in < 5 years, 26% in 5 – 10 years and 12% malaria cases in > 10 years age group (Table 3). Patel A et al. showed that the maximum malaria cases were diagnosed in 5 – 10 years age group followed by 10 – 15 years group, statistically there was no significant difference[10]. In another Indian study from Gujrat state, the investigators reported that higher rate of malaria in 5 – 10 years age group[11, 12]. With our previous report [2], the current study and the other two Gujarat studies, it is clear that malaria is one of the common infectious diseases among the school going children. African study also reported that malaria is the leading cause of death among children below 5 years [13].

In this study, 93% malaria cases were diagnosed by BSE and 96.7% by RDT. Just 1% malaria cases were only missed by BSE (Table 1). Sveral studies mentioned that BSE is gold standard technique for the diagnosis of malaria [5, 14, 15]. Addition to this, low cost, to find the severity of the infection are added advantages of BSE [16, 17]. But requirement of the skilled microscopist is the major limitation. Ngasala et al. showed that BSE is useful in primary healthcare in the diagnosis of malaria [18]. Whereas, this is an epidemiological study conducted in a tertiary health care setup. So trained manpower such as microbiologists, pathologists are available. In this study, BSEwas done by microbiologist and pathologist without disclosing results. As a part of quality control, 25% of the negative and all the positive smears were screened again. With all these efforts, very few cases were only missed in the BSE, statistically there was significant difference.

Total 41.6% (205) falciparum malaria cases were detected in this study. With this it is clear that falciparum malaria is common in this area among the paediatric age group. Dhanpat Kumar Kochar et al. mentioned that the prevalence of falciparum malaria was 61.01%[19]. WHOalso reported more prevalence of P. falciparum in India [6].Odisha is reported to be the most malaria endemic state in India, accounting for quarter of all malaria cases and 47% of all falciparum malaria cases reported in India occur from this state [20]. Srikakulamdistrict where this study was conducted is very close to Odisha. Patients from Odisha also come to this tertiary care setup for treatment and the general public also move either way. These may be the contributing factors for more falciparum malaria cases in this study.

Conclusion

Plasmodium falciparum is the predominant malaria causing agent in this area. However long time studies with more sample size are recommended.

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