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Original Research

A study to find the commonest plasmodium malaria in tertiary care hospital

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ABSTRACT:
Aim: A study to find the commonest plasmodium malaria in tertiary care hospital**. Materials and methods:** The parents of all participants provided informed written permission. This research included children, regardless of their gender, who were under the age of 12 and had clinical symptoms suggestive of malaria. Participants who were older than 12 years and whose parents did not provide informed written permission and were uncooperative were excluded from the study. This research covered all youngsters who met the specified inclusion criteria during the designated study period. The historical information and clinical examination results were documented. **Results:** This research included the recruitment of a total of 1024 individuals who were clinically suspected to have malaria. Among these cases, 601 individuals (59%) were confirmed to be positive for malaria. Out of the total sample size, a significant proportion of 93% (559) individuals were found to have positive results by blood smear examination (BSE), whereas a slightly higher percentage of 96% (579) individuals were identified as positive with the use of the rapid diagnostic method (RDT). According to statistical analysis, there was a notable and meaningful difference. A total of 31.1% (187) cases of Plasmodium falciparum were detected using blood smear examination (BSE), while 41.6% (205) cases were found by rapid diagnostic tests (RDTs). In contrast, a total of 69% (414) individuals were identified as belonging to different plasmodium species using blood smear examination (BSE), while 66% (396) were diagnosed using rapid diagnostic tests (RDT). **Conclusion:** We concluded that the Plasmodium falciparum is the predominant malaria causing agent in this area.
Keywords: Plasmodium, Malaria, Falciparum, Raid diagnostic technique

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INTRODUCTION

Malaria, caused by several species of the Plasmodium parasite, is considered one of the most ancient and very lethal illnesses [1]. The human-infecting members of the Plasmodium genus include Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae, Plasmodium ovale, and Plasmodium knowlesi. Falciparum malaria is associated with a high fatality rate due to its impact on the central nervous system [2]. According to estimates, India saw over one million fatalities due to malaria in the year 1935 [3]. As a result of the comprehensive and effective execution of the national malaria eradication programme (NMEP), there has been a significant reduction in malaria cases, approaching the stage of elimination. In this study, we aim to investigate the effects of a particular drug on the growth of In the year 2015, a total of 17 nations in the Asia Pacific region expressed their support for a comprehensive strategy aimed at eradicating malaria by the timeframe of 2030 [4]. It has been shown that all five species of plasmodium have the capability to infect youngsters [5]. According to a research from the World Health Organisation (WHO), the prevalence of P. falciparum is higher among diagnosed cases in India [6]. Severe malaria is often linked to infections caused by Plasmodium falciparum, as well as mono and mixed infections including Plasmodium vivax [5]. The typical symptoms of paediatric malaria include fever, chills,

headache, myalgia, vomiting, and anorexia. Malaria has the potential to resemble several viral illnesses, intestinal fever, and gastroenteritis due to the presence of non-specific symptoms [7]. Relying only on clinical symptoms for the diagnosis of malaria is deemed to be unreliable. The use of appropriate laboratory techniques for diagnosis is crucial not only for ensuring accurate therapy but also for mitigating the risk of drug resistance (DR). The primary challenge in the elimination of malaria is the development of drug resistance (DR) due to the incorrect utilisation of antimalarials. A research was done to determine the most prevalent parasite responsible for malaria in the paediatric population.

MATERIALS AND METHODS

The study protocol received approval from the institutional ethics committee. The parents of all participants provided informed written permission. This research included children, regardless of their gender, who were under the age of 12 and had clinical symptoms suggestive of malaria. Participants who were older than 12 years and whose parents did not provide informed written permission or were uncooperative were excluded from the study. This research covered all youngsters who met the specified inclusion criteria during the designated study period. The historical information and clinical examination results were documented.

The research participants provided a venous blood sample of 2 ml, which was obtained using normal aseptic techniques and then transferred to a sterile EDTA tube. Two smears were made from each sample, consisting of both a thick film and a thin film. A thin smear was subjected to the process of drying, fixing, and staining using the Giemsa staining technique. The thick smear was subjected to dehaemoglobinization using distilled water, followed by staining with Jaswant Singh Battacharya (JSB) stain. The process of preparing smears, staining them, and screening them under a microscope was conducted in accordance with the guidelines outlined in the National Malaria Elimination Programme (NMEP) [8]. As a component of internal quality assurance, a random selection of positive smears and 25% of negative smears were subjected to screening. In the event of any inconsistencies in the interpretation of smears, the ultimate authority was the professional view. The study used commercially accessible fast malaria Pan+Pf cards for the purpose of detecting malaria antigens. The test kits were allowed to reach room temperature prior to the commencement of the testing process. The sample dropper included in the kit was used to collect whole blood up to the designated mark, which was then transferred into the sample well S, following the instructions given by the manufacturer. Subsequently, three drops of buffer were added to well B. The findings were seen and recorded after a 20-minute interval. The identification of three distinct purple to pink bands in the F, P, and C areas of the sample suggests reactivity to Plasmodium falciparum, Plasmodium vivax, and other related species. The presence of a band in the C and F regions of the sample showed a positive result only for the presence of Plasmodium falciparum. The band seen in the sample from the genus C and species P was determined to be positive for all other members of the plasmodium genus. A negative test result is shown when there is the presence of just one band in the C area after a duration of 20 minutes.

STATISTICAL ANALYSIS

SPSS version 24.0 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).

Table1: Diagnosis of malaria among the study members

		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)
X^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).

Table2: Gender of the participants

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)
x^2value	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 of the participants

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 falciparum cases 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

		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)
x^2value		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 male members 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]. As per Trape JF 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 for more 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, 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). Several 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, BSE was 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]. WHO also 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]. 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.

REFERENCES

1. Bousema T, Okell L, Felger I, Drakeley C. Asymptomatic malaria infections: detectability, transmissibility and public health relevance. Nat Rev Microbiol. 2014;12(12):833–40.
2. Lindblade KA, Steinhardt L, Samuels A, Kachur SP, Slutsker L. The silent threat: asymptomatic parasitemia and malaria transmission. Expert Rev Anti-Infect Ther. 2013;11(6):623–39.
3. Sharma VP. Battling malaria iceberg incorporating strategic reforms in achieving millennium development goals & malaria elimination in India. Ind J Med Res 2012; 136: 907–25.
4. Owusu EDA, Brown CA, Grobusch MP, Mens P. Prevalence of *Plasmodium falciparum* and non-*P. falciparum* infections in a highland district in Ghana, and the influence of HIV and sickle cell disease. Malar J. 2017;16(1):167.
5. Browne EN, Frimpong E, Sievertsen J, Hagen J, Hamelmann C, Dietz K, et al. Malariometric update for the rainforest and savanna of Ashanti region, Ghana. Ann Trop Med Parasitol. 2000;94(1):15–22.
6. World Health Organization (WHO) Report. 2015
7. Crawley J, Chu C, Mtove G, Nosten F. Malaria in children. Lancet 2010; 375: 1468 – 81.
8. https://nvbdcp.gov.in/Doc/Malaria-Operational-Manual-2009.pdf
9. Trape JF, Rogier C, Konate L, Diagne N, Bouganali H, Canque B, et al. The Dielmo project: a longitudinal study of natural malaria infection and the mechanisms of protective immunity in a community living in a holoendemic area of Senegal. Am J Trop Med Hyg. 1994;51(2):123–37.
10. Collins WE, Jeffery GM. Plasmodium ovale: parasite and disease. Clin Microbiol Rev. 2005;18(3):570–81
11. Sharma RC, Gautam AS. Studies on outbreak of malaria in Muliad village of Kheda district, Gujarat. Ind J Malariol. 1990; 27: 157 – 62.
12. Srivastava HC, Sharma SK, Bhatt RM, Sharma VP. Studies on Plasmodium vivax relapse pattern in Kheda district, Gujarat. Ind J Malariol 1996; 33: 173 – 9.
13. Bryce J, Boschi-Pinto C, Shibuya K, Black RE. WHO estimates of the causes of death in children. The Lancet. 2005; 365: 1147 – 52.
14. WHO Malaria Policy Advisory Committee and Secretariat. Malaria policy advisory committee to the WHO: Conclusions and recommendations of fifth biannual meeting (March 2014). Malar J 2014; 13: 253.
15. Zimmerman PA, Ferreira MU, Howes RE, Mercereau-Puijalon O. Red blood cell polymorphism and susceptibility to Plasmodium vivax. Adv Parasitol. 2013;81:27–76.
16. Birhanie M. Comparison of Partec Rapid Malaria Test with Conventional Light Microscopy for Diagnosis of Malaria in Northwest Ethiopia. J Parasitol Res. 2016; 2016: 3479457.
17. Niangaly A, Gunalan K, Ouattara A, Coulibaly D, Sa JM, Adams M, et al. Plasmodium vivax infections over 3 years in Duffy blood group negative Malians in Bandiagara, Mali. Am J Trop Med Hyg. 2017;97(3):744–52.
18. Ngasala B, Mubi M, Warsame M, Petzold MG, Massele AY, Gustafsson LL, et al. Impact of training in clinical and microscopy diagnosis of childhood malaria on antimalarial drug prescription and health outcome at primary health care level in Tanzania: a randomized controlled trial. Malar J. 2008; 7: 199.
19. Dhanpat Kumar Kochar, Gajanand Singh Tanwar, Poonam Chand Khatri, Sanjay Kumar Kochar, Ghanshyam Singh Sengar, Anjana Gupta, Abhishek Kochar, Sheetal Middha, Jyoti Acharya, Vishal Saxena, Deepak Pakalapati, Shilpi Garg, Ashish Das. Clinical Features of Children Hospitalized with Malaria – A Study from Bikaner, Northwest India. Am. J. Trop. Med. Hyg. 2010; 83(5): 981 – 9.
20. Anupkumar R. Anvikar, Naman Shah, Akshay C. Dhariwal, Gagan Singh Sonal, Madan Mohan Pradhan Susanta K. Ghosh, Neena Valecha. Epidemiology of Plasmodium vivax Malaria in India. Am J Trop Med Hyg 2016; 95(6): 108 – 120.