Original Article

"Prevalence of malaria in a tertiary care centre at Kanpur"

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Abstract

Background: Malaria is a major public health problem in India though it is both a preventable and treatable disease. The species of malaria parasite vary with the environmental conditions at different regions. This study was undertaken to study the prevalence and pattern of this disease at a tertiary care centre, Kanpur. **Material & Methods:** A retrospective study was conducted over a period of one year July 2014 to June 2015. in Rama Medical College Hospital & Research Centre at Kanpur. Blood samples from suspected cases of fever for malaria were included, and tested for presence of the malaria parasite by rapid card test and peripheral blood smear. **Results:** A total of 3149 samples were tested for malaria, 78(2.47%) cases were positive for malaria. Plasmodium vivax was seen in 72(92.30%) cases and Plasmodium falciparum in 4(5.12%) cases, mixed infection was seen in (2.56%) seasonal variation was seen in the months of July and September, and the age group of 21-30years were the commonest group to get investigated 890 out of 3149 and positive patients of 29 of 76 were in this group, there was no significant prevalence in infections between the males and females in this region. **Conclusion:** We conclude that there is a seasonal variation, along with geographical and demographic variation in our study as compared with other endemic areas in India and we emphasize to take proper measures to control the infection.

Key words: Infection, Malaria parasites, Prevalence.

Introduction

Malaria is a major cause of morbidity in the tropics, this disease is of global importance that result in 300-500 million cases and 1.5-2.7 million deaths yearly[1]. Approximately 2.48 million malarial cases are reported annually from South Asia, of which 75% cases are contributed by India alone[2]. According to the world malaria report-2014, 22% (275.5m) of India's population live in high transmission (>1 case per 1000 population) areas, 67% (839.9m) live in low transmission (0-1 cases per 1000 population) and 11% (137.7m) live in malaria free (0 cases) areas. In 2013 , 0.88 million cases have been recorded , with 128 million tests being conducted on suspected cases, with P.falciparum causing 53% and P. vivax causing 47% of the infections. The incidence of malaria in India accounted for 58% of cases in the South East Asia region

of WHO[3]. At present official figures for malaria in India, available at National Vector Borne Disease Control Programme (NVBDCP)[4], indicate 0.7-1.6 million confirmed cases, and 400-1000 deaths annually. However, according to recently published studies, the burden of malaria appears to be much higher than there previously reported figures[5,6], other notable epidemiological feature of malaria in India include the increasing proportion of Plasmodium falciparum from 10% in the 1970s to around 50% in 2010, because of emerging chloroquine resistance, complications due to Plasmodium vivax, and emergence of a fifth species P.knowleski from nearby countries like Malasiya & Europe[7] since the symptoms are non specific for malaria like fever, headache, control and eradication of malaria has been very challenging issues and require prompt treatment, to save patent's life therefore a rapid and accurate diagnosis is necessary. There are various, techniques for the diagnosis, peripheral blood smear (PBS) of thick and thin smear, qualitative buffy coat test (QBC), rapid diagnostic techniques based on histidine rich protein-2 (HRp-2) and plasmodium lactate dehydrogenase (pLDH), PCR, specific complementary biotinylated probes[8,9]. The present study was under taken to understand the prevalence of malarial parasite in our region.

Materials and Methods

This retrospective study was carried out at Department of Microbiology, Central Laboratory, Rama Medical College Hospital and research center, Kanpur, over a period of one year from July 2014 to June 2015. A total of 3149 samples from clinically suspected cases of malaria from various OPD and IPD at tertiary care hospital were included in this study. Exclusion criteria: patients with other positive laboratory test results i.e. for typhoid fever and dengue fever. Ethical clearance was obtained before starting the project. Three to five milliliter blood specimens were collected from cubital vein of all patients by taking sterile precaution.

Sample processing

Microscopy: Thick and thin smear were prepared. Thick smears were stained with Leishman's stain. After drying, the slides were examined under a light microscope using an oil-immersion lens (100X magnifications) after putting a drop of paraffin oil. Positive result of malaria given if at least one asexual form of parasite was detected in 100 microscopic fields in thick blood film otherwise the report was given as negative. Blood parasite density per microlitre of blood (parasitic index) was determined from the thick films by counting the number of parasites in relation to 200 white blood cells (WBCs).

After thick smear examination, thin blood smears were also examined for speciation of malarial parasites and their infective stages. Morphology of malarial parasites was examined in detail in parasitized red blood cells. Minimum 100 fields were examined.**[Fig 1- Fig 3]** Antigen detection was performed using a commercially available antigen detection kit (Satya 2.0 Pf/Pv Malaria Antigen Detection, Tulip group, Viola Diagnostics System) detecting

P. falciparum HRP-2 and P. vivax pLDH malaria antigen in human blood as per manufacturer's instructions. Briefl y, this consisted of adding the sample (using a calibrated dropper provided with the kit) and the Assay Buffer to their corresponding wells on the test card and allowing the reaction to occur for 20 min. The appearance of three pink coloured lines one each in P.v. region (V), P.f. region (F) and control region (C) indicated that the sample was reactive for both P. vivax and P. falciparum (mixed infection). Appearance of two pink coloured lines one each at V and C region indicated that the sample was reactive for P. vivax only and appearance of two pink coloured lines one each at F and C region indicated that the sample was reactive for P. falciparum only. For analysing the results, we used the antigen test as the gold standard since the PBS is a direct detection method and hence can be compared against another test utilizing a different principle.

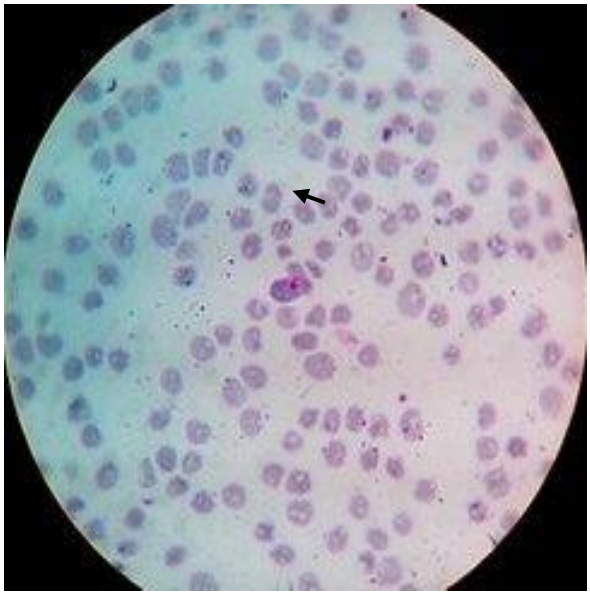


Fig-1 Gamitocyte of P.vivax

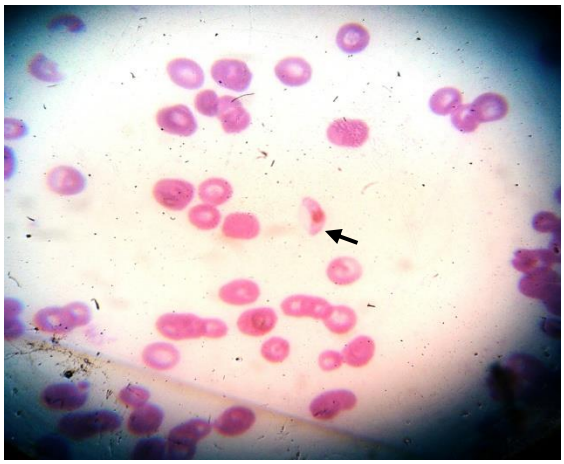


Fig- 2 Gamitocyte of P.falciparum

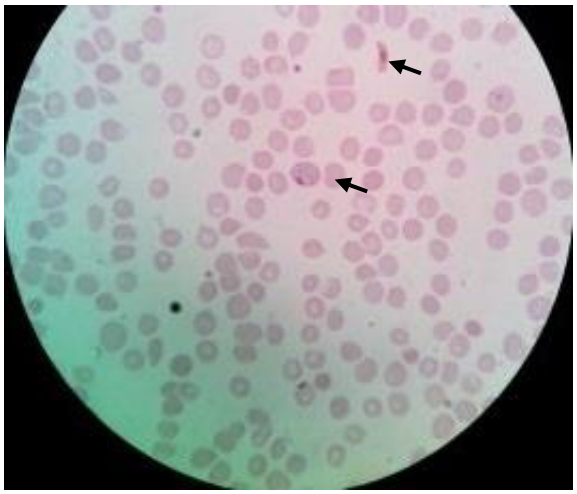


Fig-3 Mixed species (Plasmodium vivax and Plasmodium falciparum)

Results

This study was carried out at Microbiology laboratory to find the prevalence of malarial infection at a tertiary care centre. Total numbers of suspected cases 3149 were studied. Out of which 78 cases were positive for malaria. Prevalence rate were 2.47% **(Fig-4)**. Among malarial parasites positive cases, Plasmodium vivax was predominant (92.30%), Plasmodium falciparum (5.12%) and mixed species (Plasmodium vivax and Plasmodium falciparum) were 2.56%. **(Fig-**

5) There were no significant different in prevalence of malaria in males and female. In P.falciparum infection males were predominant infected as compared to females. **(Table-1)** With regard to infections in different age group due to P. vivax, P. falciparum and mixed species, most of the cases occurred in the age group 11-40 years with peak at 21-30 years (P.vivax 26.92%, P.falciparum 3.84% and mixed infection 2.56%). **(Table-2)** Maximum number of malaria cases was seen in the months of July to September. **(Fig-6)**

Fig-4: Prevalence of malaria infection

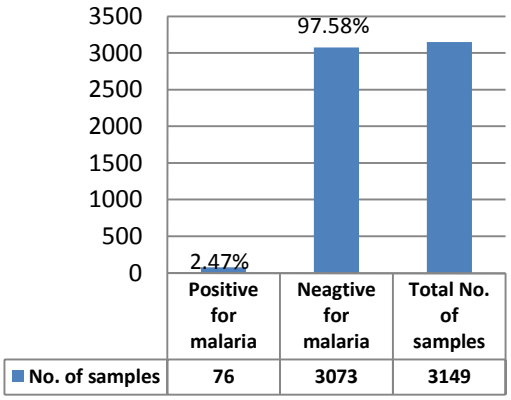


Fig-5: Distribution of Malaria Infection

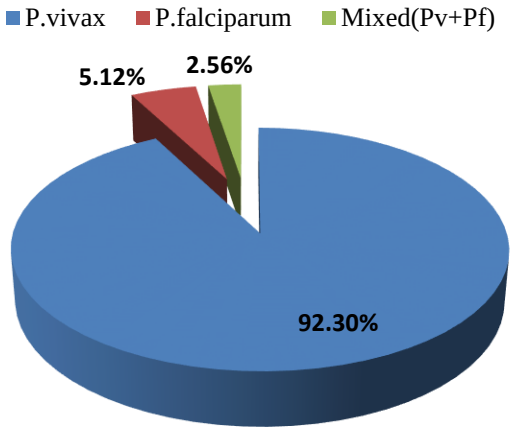


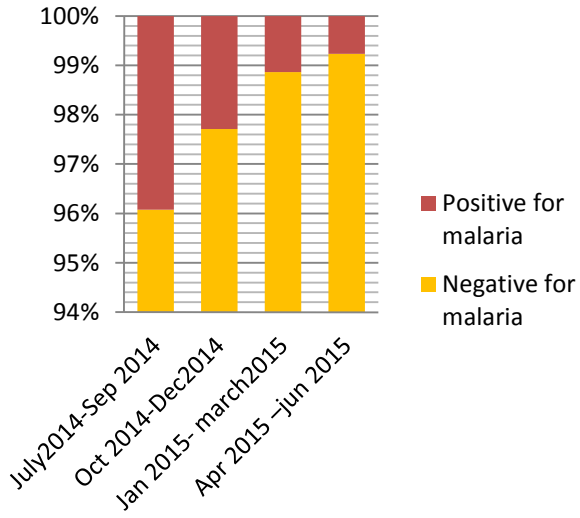
Table 1: Sex wise distribution of Plasmodium species

Sex	*P. falciparum*-malaria	*P. vivax*-malaria	Mixed malaria
Male	3 (75%)	36(50%)	1 (50%)
Female	1 (25%)	36 (50%)	1 (50%)
Total	4(100%)	72 100%)	2(100%)

Table 2: Age wise distribution of Plasmodium species

Age group (in years)	*P. falciparum*-malaria	*P. vivax*-malaria	Mixed malaria
0-10	-	21(26.92%)	-
11-20	-	16(20.51%)	-
21-30	3(3.84%)	19(24.35%)	
31-40	1(2.58%)	9(11.53%)	-
41-50	-	6(7.6%)	-
51-60	-	4(5.12%)	-
>61	-	3(3.84%)	-

Fig-6: Distribution of Malaria infection in different months



Discussion

Prevalence of malarial parasitic infection in our study was found to be 2.47%. Species distribution was Plasmodium vivax (92.30%), Plasmodium falciparum (5.12%) and mixed species (2.56%). Among Male and female no much of difference was noted. Malaria occurred in all age groups with maximum prevalence in 11-20 years and 21-30 years.There is a wide variation of reports of prevalence of malarial infection in India and other countries. This can be due to differences in geographical and climatic condition which affect mosquito breeding, socio-economic conditions of patients, knowledge about healthcare and public health practices.

Prevalence of malarial infection in our study was 2.47% which is closer to However Jivabhai et al.[10] from Gujarat and Karlekar et al.[11] from Gadchiroli (Maharashtra)reported prevalence of 2.10% and 4.28% respectively. And lower than Sachin P et al.[12] of Bilaspur (24.74%).This difference could be due to summer season in which study was carried out.

Regarding prevalence of species, Plasmodium vivax was 92.30%, Plasmodium falciparum 5.12% and mixed species 2.56%. Our Study reported high prevalence of P.vivax as compared to Jivabhai et al.[10] and Karlekar et al. [11] who reported 61.41% and 33.8% respectively while prevalence of P. falciparum in our study was low as compared to others 38.56%[10], 66.6%[11]. Idris et al.[13] from Pakistan reported prevalence of 72.47% for Plasmodium vivax, 24.1% Plasmodium falciparum and 3.44% mixed species, which is similar to our findings. Igbeneghu et al.[14] from Nigeria reported much higher prevalence of Plasmodium falciparum 93.3%, Abdallah et al.[15] from Sudan reported P.falciparum 81.3% which explains high mortality in these areas, as P.falciparum infection is associated with many complications. The difference in prevalence of P.vivax and P.falciparum in different areas can be due to presence of endemicity of particular type and higher relapses in vivax type.

There was no difference in male and female patients in our study ratio were approx 1:1, while Karlekar SR et al.[11] from Gadchiroli (Maharashtra) reported 2:1. The difference in M:F ratio could be due to various reasons like body odour, which may attract mosquitoes, movement of males in wider areas, more chances of mosquito bites and some unknown inherent susceptibility.
Maximum number of cases of malaria occurred in the age group 21-30 years (26.94%) followed by age group 11-20 years (24.35%). Our finding correlates with S.R. Karlekar et al.[11] who reported mean age group of 24.8 years and Sahar S et al. [16] reported 16-30 years of age. The reason of higher prevalence in this age group could be due to movement in wider areas possibly endemic, more chances of exposure to mosquito bites and most of carefree behavior.

Regarding seasonal variation, maximum numbers of cases were found in the months of July to September. Similar findings are reported by Sachin et al.[12], Jivabhai et al.[10]. The high prevalence of malaria in this

period could be due to collection of water in rainy season and mosquito breeding which continues till November.

Conclusion

Our study reveals a significant rate of malarial infection (2.14%) in tertiary care hospital. Prevalence of malarialin fection showed seasonal variation, more in rainy and winter season which corresponds to period of mosquito breeding and tendency of people to stay indoors. Malarial infections were more in males than females and infection occurred in age group 11 to 30 years. This finding could be due to more chances of exposure of mosquito bites in endemic areas. Lower prevalence of malaria after 30 years of age could be attributed to development of immunity (resistance) due to clinical or subclinical exposures.

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