Prevalence and seasonal trends of malaria at general hospital, Palanpur Banaskantha, Western part of India

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Abstract

Aim: Malaria is one of the known endemic disease in India. Malaria is transmitted by infected female anopheles mosquito vector transmitting mainly two Plasmodial species named P. falciparum and P. vivax. Prevalence of malaria is affected by atmospheric and socioeconomic condition of geographical area. Aim of the study is to know the prevalence of malaria and the seasonal trend of malaria at general hospital Palanpur, Banaskantha in western part of India.

Material and Methods: This study was carried out at Central Laboratory, General Hospital, Palanpur, Banaskantha over period of July 2014 to June 2018. 41660 samples from fever patients were collected. We used Microscopic examination for the diagnosis of malaria by preparing thick and thin smears from these 41660 samples and stained using field stain.

Results: We had collected total 41660 samples of fever patients. Out of 41660 samples, 688 samples were detected positive for malaria. So prevalence of malaria in our hospital was 1.65%. Prevalence of P. Vivax, P. Falciparum and mixed (infection of P. Falciparum and P. Vivax at a same time) were found 77.90%, 21.80% and 0.30% respectively. Malaria was seen relatively higher in males and affecting 15-30 years of age group more. Most cases of malaria were found in months of September and October near the end of monsoon and post monsoon season.

Conclusion: From our study we concluded that there was high prevalence of P. vivax than P. Falciparum infection. Maximum numbers of cases were after major rainfall, reported in month of September and October. Morbidity and mortality of malaria must be reduced by strengthening Malaria Surveillance, risk factor assessment during pre and postmonsoon period. Premonsoon preventive actions need strengthening and strict monitoring of all these actions are needed.

Keywords: Prevalence, Plasmodium vivax, Plasmodium falciparum, Malaria, Thin and Thick smear, Seasonal trends.

Introduction

Malaria is a major public health problem in our country in spite of a preventable and treatable disease.[1] Malaria is caused by Plasmodium parasites. It spreads to people through the bites of infected female Anopheles mosquitoes, known vector for malaria. There are mainly four species that cause human infection i.e. Plasmodium falciparum, Plasmodium vivax, Plasmodium malariae and Plasmodium ovale. Amongst which Plasmodium falciparum and Plasmodium vivax are common in India. As well as Plasmodium falciparum is more fatal than Plasmodium vivax because of its complications.[2] Factors affecting the spread of malaria are atmospheric conditions that may affect the number and survival of mosquitoes, such as rainfall patterns, temperature, humidity and socioeconomic conditions. In some area, transmission of malaria is seasonal, with the peak during and just after the rainy season.[3,4] There were 2.5 million cases of malaria in Southeast Asia to the global burden of malaria. Of this, India had reported 76% of the cases.[5] Every year 0.7-1.6 million confirmed cases of malaria reported in India and out of these 400-1000 deaths occurred annually.[6] Now a days it is problem of both rural and urban areas so this study aims to know the prevalence of malaria and the seasonal trend of malaria at general hospital Palanpur, Banaskantha in western part of India.

Material and Methods

This study was carried out at Central Laboratory, General Hospital, Palanpur, Banaskantha over period a period of 4 years from July 2014 to June 2018. All the fever cases undergone investigations for malarial parasites were included in present study from defined time period. 41660 samples were collected from outdoor or indoor patients. We used Microscopic examination for the diagnosis of malaria by preparing thick and thin smears from these 41660 samples and stained using field stain. Malarial parasites with various forms were identified by thick smear and species identification by thin smear.

Results

41660 samples for malaria were tested for microscopic examination. 688 samples were positive for plasmodia. So prevalence of malarial parasite was 1.65%.

Table 1: Year wise positivity rate of different malarial parasite

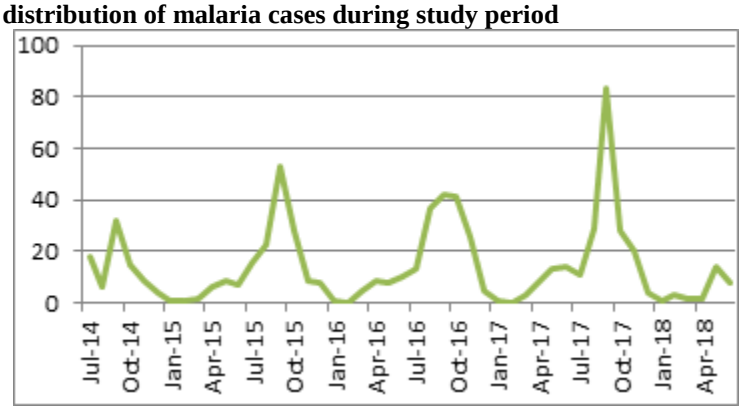
Year	Total Slide	Malaria Slide Positivity	P.vivax	P. Falciparum	Mixed
2014 (July-December)	5670	84(1.48%)	55(65.47%)	29(34.53%)	0
2015	8462	163(1.92%)	130(79.75%)	31(19.01%)	2(1.24%)
2016	11990	197(1.64%)	150(76.14%)	47(23.86%)	0
2017	10991	214(1.95%)	175(81.78%)	39(18.22%)	0
2018 (January To June)	4547	30(0.66%)	26(86.67%)	4(13.33%)	0
	41660	688(1.65%)	536(77.90%)	150(21.80%)	2(0.30%)

From Table 1, 536(77.90%) cases were positive for P.vivax, 150(21.80%) cases were positive for P.faciparum and 2(0.30%) cases were positive for mixed (both P.vivax and P.falciparum) infection. In year 2015 and 2017, prevalence of malaria were noted 1.92% and 1.95% respectively higher than average prevalence rate due to heavy rainfall and flood situation in Palanpur and Banaskantha district.

Table 2: Month wise positivity rate of malaria species

Month	Total samples	Total positive	P. vivax (%)	P. falciparum (%)	Mixed Infection
January	2976	4(0.13%)	4(100%)	0	0
February	3734	4(0.11%)	2(50%)	2(50%)	0
March	3260	12(0.37%)	12(100%)	0	0
April	2351	25(1.06%)	21(84%)	4(16%)	0
May	2341	44(1.88%)	42(95.45%)	2(4.55%)	0
June	2195	39(1.77%)	37(94.87%)	0	2(5.13%)
July	3182	58(1.82%)	47(81.03%)	11(18.97%)	0
August	4906	95(1.94%)	78(82.10%)	17(17.90%)	0
September	5695	210(3.69%)	169(80.47%)	41(19.53%)	0
October	4572	112(2.45%)	76(67.86%)	36(32.14%)	0
November	3622	64(1.76%)	39(60.93%)	25(39.07%)	0
December	2826	21(0.74%)	9(42.85%)	12(57.15%)	0
	41660	688(1.65%)	536(77.90%)	150(21.80%)	2(0.30%)

Graph 1: Month wise distribution of malaria cases during study period



From table no.2 and graph no.1, maximum numbers of malarial cases were noted in September(210), October(112) and August(95) months. Prevalence of malarial parasites in these months were 3.69%, 2.45% and 1.94% respectively higher than average prevalence rate. Lowest prevalence rate of malaria were found in February (0.11%) and January (0.13%) months.

Table 3: Age and sex wise distribution of malaria case

Age-Group(Year)	Male	Female	Total
0-1	2	5	7(1.01%)
1-4	14	20	34(4.94%)
5-9	43	31	74(10.76%)

10-14	38	26	64(9.30%)
15-30	193	98	291(42.30%)
31-45	85	36	121(17.59%)
46-60	44	20	64(9.30%)
>60	23	10	33(4.80%)
Total	442(64.24%)	246(35.76%)	688(100%)

From above table, 442(64.24%) cases of male and 246(35.76%) cases of female were found positive for malaria of total cases presenting with fever. Maximum numbers of positive malarial infection were found in 15-30(42.30%) and 31-45(17.59%) age groups.

Table 4: Season wise prevalence rate of malaria

Winter(November-February)	93(0.7%)	13158
Summer(March-June)	120(1.18%)	10147
Monsoon(July-October)	475(2.58%)	18355
Total	688(1.65%)	41660

The maximum cases of malaria were reported from July to November, with a peak in September (Table 4 and Graph 1) due to climate is favourable for vector breeding.

Discussion

Most of the areas in western India fall in an unstable malaria zone in the country. Malaria, a seasonal disease has a cyclic trend of low and high incidences and is often influenced by environmental factors and poor surveillance.[7-9] Good rainfall, relative humidity of 60% and temperature between 20 and 30°C favour the spread of malaria.[10] In India, about 65-70%, 25-30%, 4-8% and 1% of malarial infections are due to P. vivax, P. falciparum, mixed infection and P. Malariae respectively[11]. In present study, 77.80% was due to P. vivax, 21.90% due to P. falciparum and 0.30% due to mixed infection. From Table 5, this study was very much comparable to different studies which were done in different places of Gujarat and western region of India due to similar environmental condition, modernisation, and urbanisation. Our observation was also convinced by studies done by Upadhyayula et al.,[25] Chery et al.,[26] Rashmi Sharma et al[27] and Sharma et al.[28] The predominance of P. vivax cases can be due to different load of parasite, difference in density and capability of vector, host parasite relationship means new cases of P. vivax from migration of people to this area.[24]

Table 5: Comparison of Various Studies from Various Places

Study	Year	Place	P.vivax	P.falciparum
Sidhu et al.[12]	1991	Kerala	40.60%	50%
Anand et al.[13]	1999	North India	,-	85.36%
Muddaiah et al.,[14]	2006	Karnataka	52.40%	33.75%
B. Prajapati et al.,[15]	2006	Mahesana, North Gujarat	92%	8%
Amit et al.,[16]	2012	Rajkot, Gujarat	34%	66%
Kevadiya SM et al.,[17]	2012	Surat, Gujarat	60.68%	38.32%
Balpande et al.,[18]	2014	Madhya Pradesh	95.10%	4.80%
Sweta et al.,[19]	2015	Ahmedabad, Gujarat	95.83%	4.13%
Gurjeet Singh et al.,[20]	2015	Mumbai	54.76%	17.80%
Ruby Naz et al.,[21]	2016	Haryana	73.90%	24.60%
Sanjeev kumar et al.,[22]	2016	Udaipur	69%	31%
Panchal PD et al.,[23]	2016	Himmatnagar, North Gujarat	64%	35%
H. K. Namera et al.,[24]	2017	Rajkot, Gujarat	78.60%	21.40%
Present Study	2018	Palanpur, North Gujarat	77.90%	21.80%

We found maximum number of Malaria cases i.e. 291 (42.30%) in 15-30 years of age group comparable to H. K. Namera et al.[24] study. 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 behaviour.[20] 64.24% males were affected higher than females comparable to study done by H. K. Namera et

al.,[24] Kumar et al.,[29] Karlekar et al.[30] and Pathak et al.[31] There was male predominance in this study probably due to different in wearing pattern of clothes, movement of males in wider areas, more chances of mosquito bites, some unknown inherent susceptibility or more male patients attend the hospital.[20] It was observed from the study, that the disease transmission occurred throughout the year but, average to higher number of case were recorded in rainy season i.e. in July to October month and highest cases were reported in September month.[24] Maximum rainfall was seen during July month and rainfall occurred from July to September month.[24] According to WHO report, moderate rainfall, instead of high volume, was found to be more favourable for malaria incidence.[1] The factor of rainfall influences the transmission of malaria by creating the breeding sites and also increases the relative humidity, which is favorable for mosquito, parasite development and disease transmission.[25] On the other hand, abundant rainfall wash out the breeding sources which may lead to decrease in the mosquito population and reflects on decrease in number of malaria incidences.[25] In other than rainy season, malaria cases were also occurred. This is due to the availability of vector habitation, existence of permanent water bodies, such as slow-flowing rivers and lakes which provide suitable breeding sites for malaria vectors.[24]

Conclusion

From our study we concluded that there was high prevalence of P. vivax than P. Falciparum infection, higher in monsoon in comparison to other seasons. The present study reveals that rainfall and ambient temperature plays a key role in the malaria. These finding are alarming for us as despite of various programmes for prevention and control of malaria the incidence of malaria still remains major burden to our country. So morbidity and mortality of malaria must be reduced by strengthening Malaria Surveillance, risk factor assessment during pre and postmonsoon period. Premonsoon preventive actions need strengthening and strict monitoring of all these actions.

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