Pathology

A 7 Year Retrospective Study of Prevalence and Seasonal Trends of Different Malarial Species in District Bharatpur, Rajasthan

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Abstract: Malaria causes large socio-economic load on humanity. Malaria is one of the important community health problems and it is prevalent in 104 tropical and subtropical countries of the world. India alone contributes 76% of the total cases. Malaria is caused by *Plasmodium* parasite and spreads through the bite of female Anopheles mosquito, well-known vector for malaria. Objectives of the study were to know the prevalence of different malarial species and to know the seasonal trend of malaria. This study was done in Bharatpur district Rajasthan from Jan 2011 to December 2017. Total 2057847 samples were collected. Microscopic examination was used for the diagnosis of malaria by preparing thick and thin smears stained with JSB I & II. 2057847 samples wer collected out of which 12201 were found microscopically positive (0.59%). Among the cases found positive, only *Plasmodium vivax* and *Plasmodium falciparum species were found*. Prevalence of *P. vivax* (99.19%) was more as compared to *P. falciparum* (0.81%) and peak positivity rate was found from July to October period. In present study P. *vivax* was the most common species. This indicates that *P. vivax* is the most widespread malarial infection in India which results in a pronounced morbidity and the seasonal prevalence was observed high in July to October. In order to implement effective preventive measures, proper surveillance on the incidence and prevalence of malaria is required.
Keywords: *Plasmodium vivax*, *Plasmodium falciparum*, Malaria, Seasonal trends.

INTRODUCTION

Malaria is one of the important community health problems and it is prevalent in 104 tropical and subtropical countries of the world.

In tropics, it is a major cause of morbidity and mortality too. According to the World Health Organization Southeast Asia contributes to 2.5 million cases of malaria to the global burden. India alone contributes 76% of the total cases [1].

Malaria is caused by *Plasmodium* parasite and spreads through the bite of female Anopheles mosquito, well-known vector for malaria. There are mostly four species that cause human infection i.e. *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium malariae* and *Plasmodium ovale*. Among these *Plasmodium falciparum* and *Plasmodium vivax* are common in north India [2].

Though India is one of the known endemic countries, incidence of malaria is commonly influenced by environmental factors like climate, season, temperature and socioeconomic status [6]. Nowadays it is a problem of both rural and urban areas, so this study aims to find out the prevalence and surveillance of malaria in district Bharatpur of east Rajasthan, India [3].

Objective of the study is to know the prevalence of different malarial species and the seasonal trend of malaria in this region.

MATERIALS AND METHODS

This retrospective study was conducted from Jan 2011 to December 2017. Total 2057847 patients with complaint of fever were involved in present study. Patients with main complaint of fever who either had attended OPD or admitted in wards of different government hospitals of Bharatpur district have been

included in the study and were examined by central malaria laboratory of Bharatpur district.

Microscopic examination for the diagnosis of malaria was done by preparing thick and thin smears and stained using Jaswant Singh Bhattacharji Stain I & II (JSBS I & II). Smears were examined for detection of malarial parasite. Species identification and different forms of malarial parasites was also done.

RESULTS

A total 2057847 samples were collected and 12201 samples were found microscopically positive for malaria. In Bharatpur district only *Plasmodium vivax and Plasmodium falciparum* species were detected. So over all prevalence of malaria in this area was found to be 0.59%. From 12201 microscopically positive samples, prevalence of *P. vivax* (PV) was 99.19% and *P. falciparum* (PF) 0.81% (Figure 1) (Table 1). Month wise distribution of malarial infection in present study shows highest number of cases in September. There was increasing prevalence from June to October and after that declining trends were found (Figure 2).
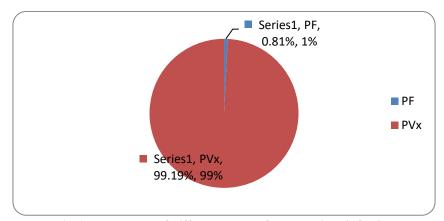

Fig-1: Prevalence of different types of plasmodium infection

Table-1: Year wise positivity rate of different malaria species

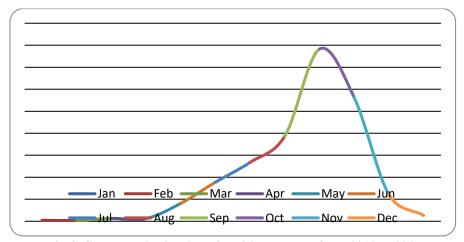| Year	Samples	Positive	%	PF	%	PVx	%
2011	284794	1816	0.64	31	1.71	1785	98.29
2012	268787	3096	1.15	34	1.10	3062	98.90
2013	310410	2993	0.96	13	0.43	2980	99.57
2014	299280	891	0.30	4	0.45	887	99.55
2015	318518	1200	0.38	8	0.67	1192	99.33
2016	344525	1257	0.36	4	0.32	1253	99.68
2017	231533	948	0.41	5	0.53	943	99.47
Total	2057847	12201	0.59	99	0.81	12102	99.19

Fig-2: Seasonal distribution of positive samples from 2011 to 2017

DISCUSSION

Malaria is a seasonal disease in most parts of India; the maximal prevalence is from July to October. Good rainfall, relative humidity of 60% and temperature between 20 and 30°C favour the spread of malaria [7] according to Park textbook of Preventive and Social Medicine[8]. In India, about 70% of the infections are reported to be due to *P. vivax*, 25-30% due to *P. falciparum*, 4-8% due to mixed infection and 1% due to *P. malariae*. We observed 99.19% of cases of *P. vivax* and 0.81% of total cases were due to *P. falciparum*, which correlated with Park textbook of preventive and social medicine stating that numbers of P. vivax cases are more than P. *falciparum* cases [4].

In study of Gujarat by Panchal *et al.* showed that *P. vivax* and *P. falciparum* accounted for 64% and 35% of cases respectively [5]. Study by Muddaiah M *et al.* demonstrated higher infection rate of *P. vivax* i.e. 52.54%, *P. falciparum* of 33.75%[6]. Similar findings of high *P. vivax* infection rate were observed in present study.

In present study month wise distribution of cases show that malaria cases start increasing from June every year and remain more or less high till October; thereafter it tends to fall gradually. Similar finding were also reported by Prajapati *et al.*[7] and Panchal *et al.*[5].

CONCLUSION

In present study, high prevalence of *P. vivax* infection as compared to *P. falciparum* infection might be due to environmental factors in eastern part of Rajasthan which may not be conducive to the spread of P. *falciparum* infection. Maximum number of cases was reported in month of September to October which concludes that malaria has its peak during rainy season. There was a substantial reduction in prevalence and incidence rates of both *P. vivax* and *P. falciparum* thereafter. Percentage of positive malaria cases in this seven year study in this region showed a decreasing trend in positive number of cases though there was slight increase in total number of cases in 2017 which might be due to improper fogging, anti larval measures and increased rainfall in this region in 2017. In order to implement an effective preventive measure, proper surveillance, timely fogging and anti larval measures, door to door sample collection and examination in highly affected areas as well as proper and timely radical treatment for malaria is required.

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