

Original Article

Frequency and Seasonal Distribution of Plasmodium falciparum and Plasmodium vivax in Children in Tertiary hospital Karachi - Pakistan

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ABSTRACT

Background Malaria vector born disease caused by Plasmodium species is transmitted through female anopheles mosquito. It is becoming a serious health challenge in Pakistan listed among top ten malaria endemic countries. In year 2012, 85,000 malarial cases reported across Sind province. Accumulation of water and poor public healthcare system in post monsoon season facilitates breeding of vector resulting in an increase prevalence of malaria. This study aimed to observe the rate of malaria in children (mean age 07 years) with fever, high temperature, headache and shivering who visited Civil hospital in year 2013. Evaluation of month wise and seasonal distribution of malarial species found to cause disease in Karachi-Pakistan was done. **Methods** Blood samples collected through finger prick observed by thick and thin microscopy. Immuno chromatography performed to confirm negative microscopy results. **Results** During period of twelve month, 5519 blood samples screened and 947(18%) found positive for malaria parasites. Most frequent species P. vivax (76%) followed by P. falciparum (24%). Seasonal distribution of malaria patients were 105 in winter, 306 in pre monsoon and 519 in post monsoon. In months of March to September 97-100 % P. vivax species documented and in October to February both P. falciparum and P. vivax found in ratio 1:1. **Conclusions** Proper awareness regarding wearing of proper protective clothing should be imparted to low socioeconomic people. Non-government and civilian bodies should encourage local population to actively participate in clearing mosquito breeding sites. As number of malarial patients are increasing it is recommended that malaria control programme should also focus on research regarding development of novel compound/synergistic combination effective against drug resistant plasmodium species and anopheles mosquito.

KEYWORDS

Antimalarial drugs, Insecticide resistant vector, Malaria Eradication, Monsoon rain, Anopheles mosquito

INTRODUCTION

Malaria is serious health challenge resulting in decrease of 1.3% of annual economic growth. Pakistan is among top ten malarial endemic countries of the world with approximately 50,000 deaths annually due to plasmodium infection. (WHO, 2010;Etard, 2003) Globally in year 2006 and 2010, 250 clinical cases of malaria with one million deaths and 219 million cases with 60,000 death respectively documented among young people and children under five years of age. (UK Aid, 2010;WHO, 2013)

Sporozoites from saliva of infected vector enter circulatory system of human host then it reaches liver to mature, reproduce and develop into merozoites. (Kramer, 2010) Symptoms of malaria include high temperature, headache, shivering and vomiting. They appear usually 10 –15 days after the infective mosquito bite. Five species of Plasmodium have been identified but in Karachi – Pakistan Plasmodium vivax and Plasmodium falciparum are the most dominating species. Former causes recurrent infection and 2.6 population of world are reported at its risk while latter is virulent causing most lethal form of disease. (Murtaza, 2009;CDC, 2012) WHO recommends that before administering antimalarial drugs, blood of the suspected patients should be screened for the presence of parasite except for infants, pregnant women and serious cases. (WHO, 2009;Khaton, 2009;Rathore, 2005)

In routine microscopy, Rapid diagnostic test ICT performed to detect malarial parasites in blood. Microscopic examination is important diagnostic tool it identifies plasmodium up to 0.001% parasitemia. It is essential for prescribing prompt and accurate dose of antimalarial drugs. But presence of antimalarial drug resistant mutant of plasmodium results in treatment failure and increase in

incidence of malaria. To combat this problem, Malaria control programme needs to encourage study of genetic profile of plasmodium species isolated from patient and local mosquito population. (Zakeri, 2011;Khaton, 2009;Rathore, 2005;Raza, 2013;KIM, 2006;Dhangadamajhi, 2010) Beside they should help in development of new synergistic antimalarial combination/insecticides and isolation of novel plant products that either act as therapeutic agent or used in mass fumigation. (Rathore, 1980) This study was carried out in year 2013 to evaluate prevalence of malaria in children (mean age 07years) with febrile fever who visited OPD of Civil Hospital Karachi-Pakistan and seasonal variation of different species of malarial parasites identified were evaluated.

METHODOLOGY

From finger prick blood sample of children (mean age 7 years) with febrile fever thin and thick blood films prepared and observed within 1 to 2 hr. Presence of trophozoites/ gametocyte of Plasmodium indicated positive results. Smear reported negative when parasite not seen in 10 examined fields. Negative results confirmed by ICT. (Zulueta, 1980)

RESULTS

Out of 5519 children with febrile fever 947(17%) had malaria. 718(78%) suffered from P. vivax and 229(22%) from P. falciparum infection. Throughout the year, P. vivax infection remained prevalent; maximum cases 97-100 % in spring. It declined to 48- 49% from October to January and P. falciparum 40-52% in the month of October to February. (Table 1, Fig 1)

Fig: 1 Incidence of Plasmodium vivax and Plasmodium falciparum

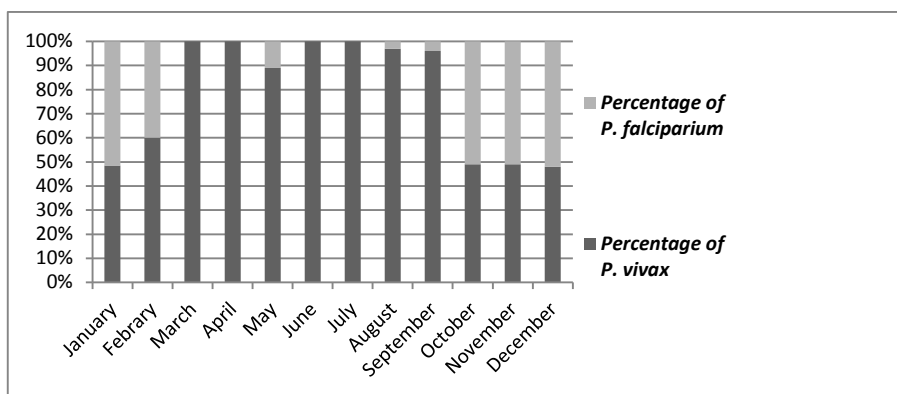


Fig: 1 Seasonal Variation of Plasmodium falciparum and Plasmodium vivax January to December 2013

Months 2013	Cases of Febrile fever Number (N)	Total Positive Malarial cases N (%)	Plasmodium vivax infection N (%)	Plasmodium falciparum Infection N (%)
January	249	27(11)	13(48)	14(52)
February	167	10(6)	06(60)	04(40)
March	182	18(10)	15(100)	00
April	319	41(13)	41 (100)	00
May	680	93(14)	82(88)	11(12)
June	788	72(9)	72(100)	00
July	842	102(12)	102(100)	00
August	562	74(13)	72(97)	02(3)
September	835	129 (15)	124(97)	05(3)
October	840	163(19)	80(49)	83(51)
November	653	153(23)	78(51)	75(49)
December	598	68(11)	33(48)	35(52)
Total	5519	947(17)	718(78)	229(22)

Table 01: Total malarial cases reported and type of infection reported in year 2013 Karachi- Pakistan

DISCUSSION

Malaria is endemic in Karachi the metropolitan city of Sind – Pakistan which is classified as malarial zone. In year 2013, 1,675 cases of malaria were detected in Karachi. Out of which 947 (57%) were recorded in children with mean age 07years at Civil Hospital-Karachi-Pakistan. A noteworthy observation is that number of children suffering from malaria documented in Civil hospital Karachi were 105 in winter, 306 in pre monsoon and 519 in post monsoon seasons. (Table I) *P. falciparum* was not recorded in our population during spring season March, April and summer June, July. *P. vivax* and *P. falciparum* ratio was 1:1 in post monsoon months of October, November and winter December, January and February. (Fig 1) Seasonal variation of both species during post-

monsoon and dry season has been reported earlier too. (Samuel, 2004;Yasin Zai, 2008;Zacarias 2010) *P. falciparum* emerged as predominant species during 1881-1985. (Rafi, 1994) Immigrants from Afghanistan (*P.falciparum* endemic) are responsible for its spread in Southern Punjab, Baluchistan and Sind provinces. (WHO, 2010, Atif,2009). In Karachi factors responsible for high incidence of malaria, a vector born disease are large accumulation of house hold garbage, old tyres, domestic waste, faulty sewage drainage system, streets flooded with dirty water pools, poor public health care system. They provide an excellent breeding ground for anopheles mosquito. (Kakar, 2010) Climatic condition humidity and high temperature aids in the development of sporozoites from gametocyte in vector body. (Kramer, 2010)

Besides children of our study group belong to low socioeconomic group. Majority of them resides in overcrowded, ill ventilated, open houses with nil mosquito netting and mosquito coils uncommon in their households. (Mukhtar, 2004) Mainly at night long hours of electric load shedding and hot weather compels them to sleep in an open space and children in particular are not dressed in full sleeves shirt and trouser or kept under mosquito netted bed as the consequences they become easy prey to infected mosquito bite and further serve to enhance rate of plasmodium transmission in population. (WHO, 2010) Another issue responsible for the propagation malaria is the development resistant among Anopheles to available applied insecticides. (Rathore, 1980) In similar pattern malarial parasites have also developed resistance against most of currently prescribed drug. (Zakeri, 2011; Khatoon, 2009; Rathore, 2005) For complete eradication of malaria control should also encourage development of new effective antimalarial drugs and insecticides for resistant mutants.

CONCLUSION

Proper awareness regarding wearing of proper protective clothing should be imparted to low socioeconomic people. Non-government and civilian bodies should encourage local population to actively participate in clearing mosquito breeding sites. As number of malarial patients are increasing it is recommended that malaria control program should also focus on research regarding development of novel compound/synergistic combination effective against drug resistant plasmodium species and anopheles mosquito.

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CONFLICT OF INTEREST

Authors declare no conflict of interest.

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