INTERNATIONAL RESEARCH JOURNAL OF PHARMACY
www.irjponline.com
ISSN 2230 – 8407

Research Article

A RETROSPECTIVE EPIDEMIOLOGICAL ANALYSIS OF MALARIA IN SOUTH INDIAN TERTIARY CARE HOSPITAL

Narayana V[1], Das Acharya[2], Sucharitha Suresh[3], Chandrashekar R[4]*, Manohar V.R[5]
[1]Professor, Department of Community Medicine, Fr. Muller Medical College, Mangalore, Karnataka, India
[2]Ex-Professor of Community Medicine, Fr. Muller Medical College, Mangalore, Karnataka, India
[3]Biostatistician, Dept. of Community Medicine, Fr. Muller Medical College, Mangalore, Karnataka, India
[4]Faculty, A.J Institute of Medical Sciences and Research Centre, Kuntikana, Mangalore, Karnataka, India
[5]Professor, A.J Institute of Medical Sciences and Research Centre, Kuntikana, Mangalore, Karnataka, India
*Corresponding Author Email: chandumoon47@gmail.com

Article Received on: 12/08/14 Revised on: 23/09/14 Approved for publication: 07/10/14

DOI: 10.7897/2230-8407.0510160

ABSTRACT
Malaria is a vector-borne infectious disease caused by parasitic protozoa of the *Plasmodium* type. The objective of our study was to analyze the extent of malaria cases and also to assess the factors associated with the occurrence of disease in patients attending Urban Health Centre, Jeppinamogaru attached to Father Muller Medical College and Hospital, Manglaore, India. Among population of 17,622, the case records of fever who attended the centre were scrutinized from January to December 2013. Data were collected and analyzed. A total of 1,564 slides was taken and among them 405 slides were proved positive for malaria. About 299 cases were males and 106 cases were females. Among them, 65 cases belong to the paediatric age group between 0-14 years and 203 cases belong to adults between the ages 21-40 years. The peak cases were recorded in the month of July, August and November which was 51, 53 and 57 respectively. The minimum numbers of cases were recorded during the month of January, February and March which was 19, 15 and 18 respectively. Among all the recorded malaria cases, 380 were positive for *P.vivax* and 25 for *P.falciparum*. Religion wise distribution shows more number of cases from Hindu religion suffering from *P.vivax* with lesser percentage compared to the Christian religion with higher percentage, but none of the cases from Christian religion suffered from *P. falciparum* infection. Only one mixed infection case in male was recorded in the age group of 21-40 belonging to the Hindu religion, but no *P.ovale*, *P. malariae* or *P. knowlesi* infections were observed in our study.
Keywords: Malaria, Occurrence, *Plasmodium*, South India, Urban Health Centre

INTRODUCTION

Malaria is an illness or disease that is due to parasites of the genus *Plasmodium* in the blood or tissues. It is a generic term often used for protozoa of the genus *Plasmodium*, usually as part of the compound term 'malaria parasites'. Malaria transmission is a phrase utilizing this definition (malaria parasites are transmitted, malaria disease is not). The presence of parasites on any stage, in any part of the human body indicates the presence of malarial infection, which may or may not be causing disease. It is a public health problem afflicting a community, and consisting of the combined effects of the infection in the population as a whole[1]. Malaria occurs throughout most of the tropical regions of the world, with *P. falciparum* causing the largest burden of disease, followed by *P. vivax*. *P. falciparum* predominates in Africa, New Guinea, and Hispaniola (Haiti and the Dominican Republic); *P. vivax* is more common in the Americas and the western Pacific. The prevalence of these two species is approximately equal in the Indian subcontinent, eastern Asia, and Oceania. *P. malariae* is uncommon and is found in most endemic areas, especially in sub-Saharan Africa. *P. ovale*, even less common, is relatively unusual outside of Africa and, where it is found, comprises <1 percent of isolates. *P. knowlesi*, similar morphologically to *P. malariae*, has been identified by molecular methods in patients in Malaysia, Philippines, Thailand and Myanmar; this species have not yet been proven to be transmitted from humans to mosquitoes (i.e. a monkey reservoir may be required to infect mosquitoes[2-5]. The vectors involved in the transmission of malaria in this area were found to be mainly by female Anopheles Fluviatilis and Anopheles Stephensi. As the environment in the city has become conducive for the breeding of this vector, the density of the mosquito has increased substantially. The factors facilitating transmission of malaria in urban areas of Mangalore, India include following factors such as artificial collections of water (e.g.coconut shells, broken bottles, discarded plastic containers, used tyres of automobile vehicles, low lying areas of stagnant water collection, building construction sites with water storage tanks, open wells etc. which facilitate the growth of aquatic plants favouring a suitable environment for the breeding of mosquitoes. The signs and symptoms of malaria typically begin 8–25 days following infection[6]. However, symptoms may occur later in those who have taken antimalarial medications as prevention[7]. The presentation of the symptoms includes headache, fever, shivering, joint pain, vomiting, hemolytic anemia and jaundice, hemoglobin in the urine, retinal damage and convulsions. The classic symptom of malaria is paroxysm—a cyclical occurrence of sudden coldness followed by shivering and then fever and sweating, occurring every two days (tertian fever) in *P. vivax* and *P. ovale* infections, and every three days (quartan fever) for *P. malariae*. *P. falciparum* infection can cause recurrent fever every 36–48 hours or a less pronounced and almost continuous fever[8,9]. Severe malaria is usually caused by *P. falciparum* (often referred to as *falciparum* malaria). Symptoms of *P. falciparum* malaria arise 9–30 days after infection. Individuals with cerebral malaria frequently exhibit neurological symptoms, including abnormal posturing, nystagmus, conjugate gaze palsy (failure of the eyes to turn together in the same direction), opisthotonus, seizures or coma[10]. There are several serious complications of malaria.

Among these is the development of respiratory distress, which occurs in up to 25 % of adults and 40 % of children with severe *P. falciparum* malaria. Although rare in young children with severe malaria, acute respiratory distress syndrome occurs in 5–25 % of adults and up to 29 % of pregnant women. Renal failure is a feature of blackwater fever, where haemoglobin from lysed red blood cells leaks into the urine. Infection with *P. falciparum* results in cerebral malaria that involves encephalopathy associated with retinal whitening, which is a useful opthmological clinical sign in distinguishing malaria from other causes of fever. Splenomegaly, severe headache, hepatomegaly (enlarged liver), hypoglycemia, and hemoglobinuria with renal failure may occur. Malaria in pregnant women is an important cause of stillbirths, infant mortality and low birth weight, particularly in *P. falciparum* infection, but also with *P. vivax*. Malaria is a major health problem in much of the tropics and subtropics. The Centers for Disease Control and Prevention estimates that there are 300 to 500 million cases of malaria each year, and more than 1 million people die of it. Malaria is a major disease hazard for travelers to warm climates. In some areas of the world, mosquitoes that carry malaria have developed resistance to insecticides. In addition, the parasites have developed resistance to some antibiotics. These conditions have led to difficulty in controlling both the rate of infection and spread of this disease[11,12]. Considering the morbidity and mortality of malaria which is endemic in Mangalore, India the present retrospective epidemiological analysis was undertaken.

MATERIAL AND METHODS

A retrospective study was undertaken by scrutinizing the records registered in Jeppinamogaru Urban Health Centre area attached to Father Muller Medical College Hospital, Mangalore, India; having a population of 17,622. All the fever cases were taken for blood smear from January to December 2013. The referred cases to Father Muller Medical College and Hospital, Manglaore, India were also considered in our study.

Statistics

The data was analyzed and statistical tests applied for this study was expressed in the form of rates and proportions by considering chi-square test.

RESULTS

Data were collected and analyzed. A total of 1,564 slides were taken and among them 405 (25.8 %) slides were positive and 1,159 (74.19) were negative for malaria respectively (Table 1). About 299 (73.82 %) were males and 106 (26.17 %) were females (Table 2). About 65 (16.04 %) cases belong to age between 0-14 (pediatric age group) and majority of the cases occurred among adults (21-40 years) and it was 203 (51.4 %) (Table 3); religion wise distribution shows more number (297) of cases from Hindu religion suffering from *P.vivax* with lesser percentage (93.69 %) compared to number of cases (21) for Christian religion with higher percentage (100 %), but none of the cases from Christian religion suffered from *P. falciparum* infection (Table 4). Only one mixed infection case in male was recorded in the age group of 21-40 belonging to Hindu religion, but no *P. ovale*, *P. malariae* or *P. knowlesi* infections were observed in our study. The peak cases were recorded in the month of July, August and November and it was 51 (12.59 %), 53 (13.08 %) and 57 (14.07 %) respectively. The minimum number of cases were recorded during the month of January, February and March which were 19 (4.69 %), 15 (3.70 %) and 18 (4.44 %) respectively.

Table 1: The Number of Malaria Cases

No. of malaria positive slides	*P. vivax*	*P.falciparum*	*P. vivax* + *P. falciparum*
405	380	24	1

Table 2: Distribution of Malaria Cases according to Gender

Gender	*P. vivax*		*P. falciparum*		*P. vivax* + *P. falciparum*		Total
	Number	Percentage	Number	Percentage	Number	Percentage	
Male	277	92.30	21	7.35	1	0.33	299
Female	103	25.93	03	31.25	0	0	106

Table 3: Distribution of Malaria Cases according to Age and Species of the Parasite

	P. vivax		*P. falciparum*		*P. vivax* + *P. falciparum*		Total
Age (Years)	Number	Percentage	Number	Percentage	Number	Percentage	
0-14 Years	62	95.38	03	4.6	0	0	65
15-20 Years	78	92.85	06	7.14	0	0	84
21-40 Years	193	95.07	9	4.43	1`	0.49	203
40 Years and above	47	88.67	06	11.32	0	0	53

Table 4: Distribution of Malaria Cases according to Religion and Species of the Parasite

Religion	*P. vivax*		*P. falciparum*		*P. vivax* + *P. falciparum*		Total
	Number	Percentage	Number	Percentage	Number	Percentage	
Hindu	297	93.69	20	6.31	1	0.31	317
Muslim	62	92.53	05	7.46	0	0	67
Christian	21	100	0	NIL	0	0	21

DISCUSSION AND CONCLUSION

Knowing the number of malaria cases that occur annually in any country is an essential component of planning national health services and evaluating their effectiveness[13]. Reliable data from each endemic country are needed to assess progress globally towards the United Nations Millennium Development Goals. At present there are broadly two approaches to estimating malaria incidence country by country. One method uses routine surveillance reports of malaria cases compiled by health ministries, adjusted to take into account incomplete case detection by health facilities, the potential for overdiagnosis of malaria among patients with fevers and the way patients use public and private health services. The second, cartographic method uses population-based surveys of parasite prevalence and case incidence from selected locations to generate, by extrapolation, risk maps (i.e., maps of case incidence per 1,000 populations) across malaria endemic regions of the world. This second method is favored by the Malaria Atlas Project (MAP). A major challenge for malaria epidemiologists is to evaluate the strengths and weaknesses of both methods in estimating malaria incidence and time trends, especially as malaria control programmes are intensified worldwide[14-21]. Malaria is endemic in Mangalore, India which is rapidly undergoing industrialization, witnessing an unprecedented spurt in construction activities in recent years, thus facing the problem of mosquito breeding in man-made clear water sources like wells, overhead tanks, sumps, cisterns as well as other defective and illegal drainage systems[22]. It is observed that the number of cases belonged to migratory labors showing less resistance to malarial infection when compared to the local population, so it was difficult for us to discriminate the number of positive cases among migratory labor and local population as the occupational history in the record was not properly entered. We have seen a change in the pattern of malaria cases which may be due to variations in rainy season and climatic conditions. A number of construction sites in Mangalore city, India encourage constant breeding of Anopheles mosquitoes throughout the year. Hence the transmission of malaria occurs even outside the monsoon months. The control measures need to be concentrated on the construction sites and low level areas in the city where mosquito breeding is rampant. Hence we strongly suggest that entering the occupational history in the record for all cases of fever with blood screening, timely approach with right drug and the right dose for the right patient with advice for better precautions (mosquito net, coils, window mesh etc) against malarial infection would serve better improvement in our health care system.

ACKNOWLEDGEMENT

The authors are thankful to faculties of Urban Health Centre area attached to Father Muller Medical College Hospital, Mangalore, India; for providing medical record which enabled us to analyze the cases.

REFERENCES

1. Matola YG, Magayuka SA. Malaria in the Pare area of Tanzania. V Malaria 20 years after the end of residual insecticide spraying. Transactions of the Royal Society of Tropical Medicine and Hygiene 1981; 75: 811–813. http://dx.doi.org/10.1016/0035-9203(81)90418-1
2. Guerra CA, Gikandi PW, Tatem AJ, *et al*. The limits and intensity of *Plasmodium falciparum* transmission: implications for malaria control and elimination worldwide. PLOS Medicine 2008; 5: e38. http://dx.doi.org/10.1371/journal.pmed.0050038
3. Snow RW, Guerra CA, Noor AM, *et al*. The global distribution of clinical episodes of *Plasmodium falciparum* malaria. Nature 2005; 434: 214. http://dx.doi.org/10.1038/nature03342
4. Price RN, Tjitra E, Guerra CA, *et al*. Vivax malaria: neglected and not benign. American Journal of Tropical Medicine and Hygiene 2007; 77: 79.
5. Breman JG. Eradicating malaria. Science progress 2009; 92: 1. http://dx.doi.org/10.3184/003685009X440290
6. Fairhurst RM, Wellems TE. *Plasmodium* species (malaria). In Mandell GL, Bennett JE, Dolin R (eds). Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases 2. Chapter 275, 7th ed. Philadelphia, Pennsylvania: Churchill Livingstone/Elsevier; 2010. p. 3437–3462. http://dx.doi.org/10.1016/B978-0-443-06839-3.00275-7
7. Nadjm B, Behrens RH. Malaria: An update for physicians. Infectious Disease Clinics of North America 2012; 26(2): 243–59. http://dx.doi.org/10.1016/j.idc.2012.03.010
8. Beare NA, Taylor TE, Harding SP, Lewallen S, Molyneux ME. Malarial retinopathy: A newly established diagnostic sign in severe malaria. American Journal of Tropical Medicine and Hygiene 2006; 75(5): 790–7.
9. Ferri FF. Protozoal infections. In Ferri's Color Atlas and Text of Clinical Medicine. Elsevier Health Sciences. Chapter 332; 2009. p. 1159. http://dx.doi.org/10.1016/B978-1-4160-4919-7.50310-8
10. Bartoloni A, Zammarchi L. Clinical aspects of uncomplicated and severe malaria. Mediterranean Journal of Hematology and Infectious Diseases 2012; 4(1): e2012026. http://dx.doi.org/10.4084 /mjhid.2012.026
11. Fairhurst RM, Wellems TE. *Plasmodium* species (Malaria). In: Mandell GL, Bennett JE, Dolin R, eds. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 7th ed. Philadelphia, Pa.: Elsevier Churchill-Livingstone; 2009. Chap. 275.
12. Patel SS. Malaria. In: Auerbach PS. Wilderness Medicine. 6th ed. Philadelphia, Pa: Elsevier Mosby; 2011. Chap. 49.
13. Richard E Cibulskis Mail, Maru Aregawi, Ryan Williams, Mac Otten, Christopher Dye. Worldwide Incidence of Malaria in 2009: Estimates, Time Trends, and a Critique of Methods. Plos Medicine 2011; 8(12): e1001142. http://dx.doi.org/10.1371/journal.pmed.1001142
14. Snow RW, Craig MH, Newton CRJC, Steketee RW. The public health burden of *Plasmodium falciparum* malaria in Africa: deriving the numbers. Working Paper No. 11, Disease Control Priorities Project Bethesda, Maryland, U.S.A.: Fogarty International Centre, National Institutes of Health; 2003. p. 1-71.
15. Craig MH, Snow RW, Le Sueur D. A climate-based distribution model of malaria transmission in sub-Saharan Africa. Parasitol Today 1999; 15: 105–111. http://dx.doi.org/10.1016/S0169-4758(99)01396-4
16. Hay SI, Okiro EA, Gething PW, Patil AP, Tatem AJ, *et al*. Estimating the global clinical burden of *Plasmodium falciparum* Malaria in 2007. PLOS Medicine 2010; 7: e1000290. http://dx.doi.org/10.1371 /journal.pmed.1000290
17. Snow RW, Guerra CA, Noor AM, Myint HY, Hay SI. The global distribution of clinical episodes of *Plasmodium falciparum* malaria. Nature 2005; 434: 214–217. http://dx.doi.org/10.1038/nature03342
18. Guerra CA, Gikandi PW, Tatem AJ, Noor AM, Smith DL, *et al*. The limits and intensity of *Plasmodium falciparum* transmission: implications for malaria control and elimination worldwide. PLoS Medicine 2008; 5: e38. http://dx.doi.org/10.1371/journal.pmed.0050038
19. Hay SI, Guerra CA, Gething PW, Patil AP, Tatem AJ, *et al*. A world malaria map: *Plasmodium falciparum* endemicity in 2007. PLoS Medicine 2009; 6: e1000048. http://dx.doi.org/10.1371/annotation/a7ab5bb8-c3bb-4f01-aa34-65cc53af065d
20. Patil AP, Okiro EA, Gething PW, Guerra CA, Sharma SK, *et al*. Defining the relationship between *Plasmodium falciparum* parasite rate and clinical disease: statistical models for disease burden estimation. Malaria Journal 2009; 8: 186. http://dx.doi.org/10.1186/1475-2875-8-186
21. Murphy SC, Breman JG. Gaps in the childhood malaria burden in Africa: cerebral malaria, neurological sequelae, anemia, respiratory distress, hypoglycemia, and complications of pregnancy. American Journal of Tropical Medicine and Hygiene. 2001; 64: 57–67.
22. Sayantani Basu Roy, Ram Rup Sarkar and Somdatta Sinha. Theoretical investigation of malaria prevalence in two Indian cities using the response surface method. Malaria Journal 2011; 10: 301. http://dx.doi.org/10.1186/1475-2875-10-301

Cite this article as:

Narayana V, Das Acharya, Sucharitha Suresh, Chandrashekar R, Manohar V. A retrospective epidemiological analysis of malaria in South Indian tertiary care hospital. Int. Res. J. Pharm. 2014; 5(10):786-788 http://dx.doi.org/10.7897/2230-8407.0510160

Source of support: Nil, Conflict of interest: None Declared