

Incidence and Pattern of Malarial Infection at a Tertiary Care Hospital of Hyderabad

¹Atif Sitwat Hayat, ²Farzana Memon, ²Naila Shaikh and ¹Abdul Fatah Dero

¹Department of Medicine, Liaquat University Hospital Jamshoro, Hyderabad, Sind, Pakistan

²Department of Pathology, Liaquat University of Medical and Health Sciences, Jamshoro, Sind, Pakistan

Abstract: Malaria is endemic especially in rural populations of the Hyderabad. Various species of malarial parasite are found in thick populated rural areas especially after rains and floods where stagnant water, overcrowding and improper sanitation predisposes to malaria. The present study was conducted to observe the incidence and pattern of malarial infection at a tertiary care hospital Hyderabad. This observational study included one thousand febrile patients during July 2007 to June 2008. Blood films were examined for the presence and species of the malarial parasite by light microscopy using oil immersion lens. Out of 1000 patients screened, 105 (10.5%) were found infected. *Plasmodium vivax* was seen in the majority (66.6%) of cases. *Plasmodium falciparum* was the second common species detected in (26.6%) cases. Mixed infection was noted in (6.6%) cases, while *plasmodium malariae* and *ovale* were not seen in this study. *Plasmodium vivax* was the commonest type of malarial infection diagnosed at a tertiary care hospital of Hyderabad during July 2007 to June 2008.

Key words: Plasmodium • Fields stain • Malaria • Anopheles mosquito • Malarial parasite

INTRODUCTION

Malaria is an important public health problem in our country. It is a global threat to health and socio-economic development. Worldwide an estimated 300-500 million people suffer from malaria each year with 1.5-2.7 million of deaths annually [1,2]. It is caused by a protozoon called *Plasmodium* which has four different species (*Plasmodium Vivax*, *Plasmodium Falciparum*, *Plasmodium Ovale* and *Plasmodium Malariae*) *Plasmodium vivax* and *falciparum* are commonly seen in the tropical countries like Africa, Indian sub-continent, the Middle East and South East Asia. *Plasmodium Malariae* and *Ovale* are less common causes of disease and generally do not cause severe illness.

Malaria can occur throughout the year in tropical countries. The prevalence of malaria shows seasonal variation. It is higher in autumn and spring [3]. Malarial parasite is mainly transmitted by the bite of an infective female *Anopheles mosquito*, but infections can also occur via exposure to infected blood products i.e horizontal transmission (called as transfusion malaria) and via vertical transmission during pregnancy (called as congenital malaria) [4]. Light microscopy of thick and thin stained blood films remain the standard method for

diagnosing malaria [5]. Various studies have shown that pregnant women in endemic areas are highly susceptible to malaria and both the frequency and the severity of the disease is higher in pregnant than non-pregnant women [6].

The human behavioural pattern is a major epidemiological factor that impacts on disease transmission and progression in Africa and there is growing evidence that with appropriate awareness, education, attitude, attention to and chemotherapy of, the key symptoms of malaria, the incidence of severe malaria can be drastically reduced especially in the rural and urban areas where most of the estimated 2-3 million deaths per year from malaria occur [7, 8].

For those living in malaria endemic countries, limited resources frequently makes malaria prevention very difficult to implement. Vector control (reducing the breeding grounds by spraying or destruction of habitat) has only had very limited success. More successful strategies include [9]:

- Use of insecticide-treated bed nets (ITNs)
- Indoor residual spraying
- Targeted chemoprophylaxis for those most at risk- for pregnant women and travellers

The present study was planned to observe the incidence and pattern of malarial infection at a tertiary care hospital of Hyderabad from July 2007 to June 2008.

MATERIALS AND METHODS

A total one thousand patients with signs and symptoms suggestive of malaria were screened by peripheral blood smear for malarial parasite (MP). Those patients with MP smear positive and duration of fever ranged from 3-17 days were included in the study. A written consent on prescribed proforma, along with detailed history followed by clinical examination, was undertaken in all patients. To rule out possible alternative diagnoses; blood, sputum, urine and stool cultures were done. Other laboratory tests like x-ray chest, CSF analysis, ultra sound abdomen and CT scan of brain, done when required.

Patient with acute febrile illnesses and negative MP on peripheral blood film on three consecutive samples at an interval of twelve hours and those who had taken anti-malarial drugs were excluded from the study. SPSS computer software was used for data analysis. Confidence level was set at $p=0.05$

About 2mls of venous blood was taken from all febrile patients with suspicion of malaria. Thin blood films were prepared and stained with Field's staining and examined for malarial parasite by light microscopy using $100 \times$ oil immersion. A blood smear was considered negative if no parasite seen after 10 minutes of search or examination under 100 high power fields of microscope.

RESULTS

A total 1000 patients with symptoms suggestive of malaria were screened from July 2007 to June 2008. One hundred and five patients (10.5%) were found infected.

Plasmodium vivax was noted in seventy patients (66.6%) and *Plasmodium falciparum* in twenty eight patients (26.6%). Mixed infection was acquired by seven (6.6%) cases. No case of *Plasmodium malariae* or *ovale* was found in our study.

During this study, males outnumbered females with male to female ration of 2:1. The malaria was predominantly observed among adults constituting 95 cases (90.46%). The infection rate was comparatively more in between 12-60 years contributing to 70 cases (66.6%). Majority of the patients came from rural areas of sindh (66.6%). Most of the victims of malaria were uneducated and they belonged to lower class families. About 65 cases

Table 1: Incidence of Malaria in 1000 Febrile patients

Number of Patients screened	Positive patients	Negative patients	Positive percentage
1000	105	895	10.5

Table 2: Frequency Of Species of the Malarial Parasite among MP positive cases (n=105)

Species	Number of Patients	Percentage
<i>Plasmodium vivax</i>	70	66.6
<i>Plasmodium Falciparum</i>	28	26.6
Mixed Infections	07	6.6

Table 3: Socio-demographic factors for Malaria Positive Cases (n=105)

Factor	No. of Patients	Percentage
1. Gender		
a. Male	70	66.66
b. Female	35	33.33
2. Age		
a. 12-35 years	40	38.09
b. 35-60 years	30	28.57
c. 60-70 years	20	19.04
d. > 70 years	05	04.76
e. < 12 years	10	09.52
3. Locality		
a. Rural	70	66.60
b. Urban	35	33.30
4. Educational Status		
a. Uneducated	75	71.42
b. Educated	30	28.57
5. Socio Economic Status		
a. Lower class	70	66.60
b. Middle class	30	28.57
c. Upper class	05	04.76
6. Outdoor patients	65	61.90
7. Indoor patients	40	38.10

Table 4: Factors leading to Development of Severe Malaria in the Adults

Epidemiological Factors	Odds ratio (CI=95%)	p-value
1. Closeness and accessibility of health centres	nd	nd
2. Lack of Knowledge of the early malaria symptoms	12.8	0.005
3. Use of wrong malaria medication and dosage	7.0	0.01
4. Inappropriate preventive measures against malaria	13.1	0.005

(61.90%) remain outdoor while 40 (38.10%) were hospitalized during this study. These findings are shown in the Table 3.

Epidemiological Factors: We studied the pattern and behaviour of patients in response to malarial infection using questionnaires and other information from the hospital records. A number of factors were observed (Table 4) which had important implications for the disease progression and development of severe malaria.

Firstly most of the patients were not willing to go to the health centres since they felt that the hospital

protocol was tedious and too long and did so only when other remedies had failed.

Secondly, inadequate knowledge of the early symptoms for malaria or any other infection. About 70% of the patients in rural areas went to local Hakeems and Quakes who gave symptomatic treatment with placebos and antipyretics and hence increasing the development of fatal malaria.

Thirdly, very few patients (less than 7%) used the right medication, neither in using the right drug for the illness suspected nor in enforcing the right dosage after leaving the hospital. Since majority of the patients were poor and uneducated, so they do not have good knowledge of home management skills for malaria. However, drug treatment and dosaging may have been complicated by the effect of fake drugs that were purchased and used by some patients.

Lastly, majority of the patients (80%) adopt inappropriate preventive measures against malaria. Since most of the patients were poor and uneducated, they live in mud-plastered houses and sleep in an open environment. In addition improper disposal of excreta, stagnant water near houses, working in fields bare-footed and without clothing were major factors leading to spread of fatal diseases.

To calculate odds ratio there would need to be a control group, but in our study there was no control study group (since it was an epidemiological survey and not a case control study). But what we can do is to control for affected subjects (those with severe outcomes) using the unaffected (subjects without complicated outcomes) with in the study group.

DISCUSSION

Malaria occurs almost exclusively in the tropics and sub-tropics [10] and approximately, 40% of the world's population, mostly those living in the world's poorest countries, are at risk of malaria. Every year, more than 500 million people become severely ill with malaria-most cases and deaths occur within sub-Saharan Africa [11].

Malaria is hyper-endemic in Pakistan, with majority of infections caused by *Plasmodium Vivax*, although infections with *Plasmodium Falciparum* are increasing day by day (i.e 35-40%) [12]. Malaria can affect all the age groups and both male and female sexes. Studies have also shown seasonal variations in the rate of infections and differences in the types of malarial parasite depending upon the geographical conditions [13]. In this study, *Plasmodium Vivax and Falciparum* were the commonest species detected while mixed infection was present in

small number of cases. This is slightly different than the results of earlier studies [14]. Prompt and accurate diagnosis of malaria is the key to effective disease management and therefore it is one of the main interventions of the global malaria control strategy [15]. Identification of the species of malarial parasite is very important for its effective and curative treatment as resistance to chloroquine and other anti-malarial drugs has been reported previously [16, 17]. Malaria in pregnancy is significantly associated with higher mortality and morbidity including cerebral malaria, maternal malaria, intrauterine growth retardation, abortions, still birth and premature labour [18, 19].

In our study, infection rate was higher among young adult males. Majority of the patients belonged to rural areas of Hyderabad and they were uneducated with lower socio-economic class. Most of the patients remain outdoor because of early diagnosis and specific treatment well in time. Blind treatment without species detection may not be effective as it can cause drug resistance and complications.

We recommend the following preventive measures for the future hospes [20] in the development of fatal malaria:-

- Reducing poverty and improving access to health care in malaria endemic regions.
- Malaria prevention includes measures taken both against mosquitoes vectors and against the malarial parasite. These include vector control programs managed by government health authorities, personal protection measures to avoid mosquito bites and the use of chemoprophylaxis. Due to the development of drug resistant parasites, drug side-effects and contraindications, the control of vector mosquitoes and avoidance of their bites have become increasingly important.
- The development of vaccines against malaria.
- The development of new anti-malarial drugs for prophylaxis and treatment (the Malaria Genome project will hopefully provide new targets for both drugs and vaccines).
- Molecular manipulation of the mosquito genome to produce transgenic mosquitoes that cannot infect humans.

CONCLUSION

Our study clearly showed that malaria is more common among male adults. Majority of the patients were uneducated and they belonged to poor families.

Plasmodium vivax and *Falciparum* were commonest species of malarial parasite detected. Most of the patients remain outdoor because of early diagnosis and specific treatment. Reduce poverty and improving sanitation and access to health care in malaria endemic regions.

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