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SPECTRUM OF MALARIA
(Six months hospital based cross sectional descriptive study)

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ABSTRACT

OBJECTIVE: *To determine the spectrum of malaria at Liaquat University Hospital.*
PATIEHTS AND METHODS: *This descriptive type cross sectional study was conducted at tertiary care hospital. All patients above 12 years of age, of either gender present with shaking chills, high grade fever, sweating and are often associated with fatigue, headache, dizziness, nausea, vomiting, abdominal cramps, dry cough, muscle or joint pain, back ache or fever with unconsciousness and febrile seizers were enrolled and evaluated for presence of malaria through thick and thin blood smear slides. The spectrum was identified by the number of malarial cases and type of malarial species.*
RESULT: *Out of 114 suspected cases of malaria, 92(81%) were found to be positive for malarial parasite on blood smear slides with mean age 37.23 ± 8.51 (SD).The plasmodium vivax was identified in 43(47%) patients while plasmodium falciparum was in 49(53%) subjects. The fever was observed in all subjects, chills in 65(71%) patients, nausea and vomiting in 55(60%) subjects, abdominal pain and cramps in 15(16%) patients, diarrhea in 20(22%) patients, headache in 70(76%) patients, sweating in 65(71%) patients, hamaturia in 8(9%) patients, seizures in 15(16%) patients, fatigue in 50(54%) patients, backache in 42(46%) patients, and joint pain in 18(20%) patients. Out of ninety two, 30(33%) patients were unconscious, 14(15%) were semiconscious and 48(52%) patients were conscious.*
CONCLUSION: *Plasmodium vivax and falciparum were common species identified in our study. The findings provide a baseline for evidence-based planning and implementation of malaria control activities.*

KEY WORDS: Malaria, Plasmodium vivax, Plasmodium Falciparum

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INTRODUCTION:

Malaria (also called paludism, ague or miasma) is a vector-borne infectious disease caused by a eukaryotic protist of the genus Plasmodium. It is widespread in tropical and subtropical regions, including parts of the Americas, Asia, and Africa. Each year, there are approximately 350–500 million cases of malaria,[1]killing between one and three million people, the majority of whom are young children in Sub-Saharan Africa.[2]Ninety percent of malaria-related deaths occur in Sub-Saharan Africa. Malaria is commonly associated with poverty and a major hindrance to economic development.[3]

Malaria is one of the most common infectious diseases and an enormous public health problem. Five species of the plasmodium parasite can infect humans; the most serious forms of the disease are caused by Plasmodium falciparum. Malaria caused by Plasmodium vivax, Plasmodium ovale and Plasmodium malariae causes milder disease in humans that is not generally fatal. A fifth species, Plasmodium knowlesi, causes malaria in macaques but can also infect humans.[4-6]This group of human-pathogenic Plasmodium species is usually referred to as malaria parasites. Symptoms of malaria include fever, shivering, arthralgia (joint pain), vomiting, anemia (caused by hemolysis), hemoglobinuria, retinal damage and convulsions.[7]The classic symptom of malaria is cyclical occurrence of sudden coldness followed by rigor and then fever and sweating lasting four to six hours, occurring every two days in P. vivax and P. ovale infections, while every three for P. malariae. [8]P. falciparum can have recurrent fever every 36–48 hours or a less pronounced and almost continuous fever.

The most economic, preferred and reliable diagnosis of malaria is microscopic examination of blood films because each of the four major parasite species has distinguishing characteristics. Two sorts of blood film are traditionally used. Thin films are similar to usual blood films

and allow species identification because the parasite's appearance is best preserved in this preparation. Thick films allow screening larger volume of blood and are about eleven times more sensitive than the thin film, so picking up low levels of infection is easier on the thick film. In areas where microscopy is not available or where laboratory staff is not experienced at malaria diagnosis, there are antigen detection tests that require only a drop of blood.[9]Immunochromatographic tests have been developed, distributed and field-tested. These tests use finger-stick or venous blood, the completed test takes a total of 15–20 minutes.

Active malaria infection with P. falciparum is a medical emergency requiring hospitalization.[10]Infection with P. vivax, P. ovale or P. malariae can often be treated as outpatient basis. Treatment of malaria involves supportive measures as well as specific antimalarial drugs. When properly treated, someone with malaria can expect a complete recovery. By keeping and considering all such debate in mind the present study was conducted at tertiary care 1500 bedded teaching hospital by focusing on spectrum of malaria. The present study will provide the local updated information and knowledge in relation to spectrum of malaria. The current study will occupy and make the weight in the field of epidemiology and medicine.

PATIENTS AND METHODS:

This cross sectional descriptive study was conducted in the department of medicine at Liaquat University Hospital Hyderabad, Pakistan from November 2006 to April 2007. All patients above 12 years of age, of either gender present with shaking chills, high fever, and sweating, and are often associated with fatigue, headache, dizziness, nausea, vomiting, abdominal cramps, dry cough, muscle or joint pain, back ache or fever with unconsciousness and febrile seizers came through outdoor patient department (OPD), indoor patient and causality outdoor department (COD) were evaluated and enrolled in the study. The referred suspicious patients of malaria referred from different departments were also included in our study. The technique used for sample collection was non probability purposive. The data was collected through a pre-formed proforma / questionnaire. The detail history of all such patients was taken; complete clinical examination and routine investigation were performed. For the evaluation of malaria all such subjects were screen for malarial parasite by taking 2cc venous blood sample and sent to laboratory for analysis through thick and thin blood smear slides. Immunochromatographic tests was also performed (whenever need). The exclusion criteria were; (i) The patients with meningitis, encephalitis, pharyngitis and urinary tract infections. (ii) The non cooperative patients or who refused to participate in the study. The informed consent was taken from every patient or from attendant of patients after full explanation of procedure regarding the study, and all such maneuvers were under medical ethics. The data was collected, saved and analyzed in SPSS version 10.00. The frequency and percentage of malaria was calculated by detecting the number of positive and negative cases. The frequency and percentage was also calculated for gender distribution. The mean and standard deviation was calculated for age.

TABLE: 01

FREQUENCY AND IDENTIFIED SPECIES OF MALARIA

Specie	*n* = 92
Plasmodium Vivax	43 (47%)
Plasmodium Falciparum	49 (53%)

TABLE: 02

GENDER DISTRIBUTION OF PATIENTS WITH MALARIA

Specie	Gender (*n* = 92)	
Plasmodium vivax	**Male**	**Female**
	28 (30%)	15 (16%)
Plasmodium falciparum	30 (33%)	19 (21%)

RESULTS:

Out of 114 suspected cases of malaria, 92(80%) were found to be positive for malarial parasite on blood smear slides with mean age 37.23 ± 8.51 (SD) and observations of the study are mentioned in Table: 01. Of ninety two 60(65%) patients presented through causality outpatient department (COD), 20(22%) through outpatient department (OPD) and 12(13%) were referred from different wards i.e. Gynaecology & Obstetrics and Surgery where they were initially admitted but during hospitalization they were developed fever and non specific symptoms and after evidentially diagnosed as malaria were referred to medical department for specific management. The gender distribution is shown in Table: 02. The fever was observed in all subjects, chills in 65(71%) patients, nausea and vomiting in 55(60%) subjects, abdominal pain and cramps in 15(16%) patients, diarrhea in 20(22%) patients, headache in 70(76%) patients, sweating in 65(71%) patients, hamaturia in 08(9%) patients, seizures in 15(16%) patients, fatigue in 50(54%) patients, backache in 42(46%) patients, and joint pain in 18(20%) patients. Out of ninety two, 30(33%) patients were unconscious, 14(15%) were semiconscious and 48(52%) patients were conscious. Clinically 78(85%) patients were anemic, 15(16%) patients had yellow discoloration of sclera (jaundice), hepatomegally was identified in 10(11%) patients while spleenomegally was detected in 62(67%) patients and hepatospleenomegally was in 06(7%) patients. Of ninety two, 13(14%) patients had raised serum urea and creatinine level and after initial and specific management 02/13(15%) were referred to nephrology ward for haemodialysis. Four patients were expired, 15(16%) patients left ward against the medical advice (LAMA), 20(22%) patients left the ward on request (discharge on request) while 53(58%) patients were recovered and discharged from hospital.

DISCUSSION:

In order to implement an effective malaria control program in Pakistan, accurate information on the incidence and prevalence of malaria is required. In this study, the malaria prevalence survey was conducted to provide the baseline parasitological information for population living in the urban as well as rural areas of province Sindh. This cross-sectional survey provides point prevalence data on malaria in these areas. The current data will also be a massive help of global initiatives of malaria mapping. In our study we identified total 81% prevalence for both plasmodium vivax and plasmodium falciparum, however it is 69% in the study by Shargie et al.[11]An Africa study shown the mean prevalence rate of Plasmodium falciparum infections (as assessed by the blood smears) was twice as high in Pouma compared with Dienga (45.2% versus 26.8%), whereas the monthly

malaria attack rate (as assessed by the daily surveillance) was twice as high in Dienga compared with Pouma (21.5% versus 41.4%).[12]The possible implications of several parameters were the malaria transmission level, the economical and social status of the inhabitants, the characteristics of infecting parasite strains, and the genetic background of the population.[12]In a study conducted on students by Anumudu et al the symptoms experienced by students during their malaria episodes include headache, bitter taste, loss of appetite, joint pain, dizziness, vomiting, nausea and diarrhea. The most common symptoms experienced by the subjects were headache (80%) followed by bitter taste (53%), although most of the subjects experienced several symptoms during one malarial episode, similar pattern of the symptoms experienced by the 22 subjects (10.1%) who claimed to have malaria at the time of sampling, although microscopic results showed 86% volunteers to be parasitaemic.[13]A number of malaria-related symptoms particularly fever, shivering, chills, loss of appetite and headache were presented, which taken together may approximate a clinical diagnosis of malaria although using these symptoms, particularly fever, as a proxy for malaria appears to be neither sensitive nor specific when compared to parasitologically confirmed diagnosis.[14-15]In the present study think and thin blood smears were used to identify malarial parasite because at health centers and hospitals level malaria usually diagnosis through blood smear examination and is usually recommended, but there are occasions that these facilities might not provide blood testing services due to patient overload or shortage of supplies.

The present study was conducted during winter season because malaria transmission is usually peak in this season; however a study conducted in the Butajira demonstrated 75% sensitivity and 60% specificity using a combination of fever, previous attack of malaria, or the absence of cough during high transmission season.[16]Self/family diagnosis was uncommon among all age groups of our study population and majority of subjects in our study were belonged to rural areas and hardly access health facilities for better clinical or laboratory diagnosis. Nevertheless, fever serves as a proxy for malaria at household level management and peripheral health facilities where diagnosis is made presumptively upon the presence or history of fever.[17-18]However, a recent change of first-line treatment of malaria to artemisinin-based combination therapies (ACTs) in many countries has highlighted the potential cost implications of malaria over-diagnosis based upon clinical signs and symptoms.[19]Use of a rapid diagnostic test would help in identifying malaria parasites especially in areas with seasonal malaria transmission where presumptive diagnosis of the disease may be inaccurate but the magnitude of asymptomatic carriers is assumed to be low.

P. falciparum is the dominant species in the malaria endemic districts of Bangladesh, with the highest prevalence occurring in the Chittagong Hill Tracts (CHT) districts.[20]This is of high concern since P. falciparum is known to be the most deadly and drug resistant worldwide problem.[21]Risk factors regarding the use of bed nets had been shown by study conducted in Somalia.[22]Whereas a study conducted in Vietnam shown that the households having two or more than two bednets are more protective.[23]The use of two or more than two bednets in a household is an effective malaria control intervention in Pakistan. Efforts should be focused to increase the supply of at least two bednets in the malaria endemic areas of Pakistan. Therefore longitudinal studies are needed to assess the variation of asymptomatic parasite carriage over time and its exact contribution in transmission. Population-based prevalence studies on a regular basis are required to understand the burden of disease. Advanced health care providers and clinicians can play a vital role in the eradication of the disease as they prepare themselves and others who travel to malaria endemic areas, as they treat peoples who live in endemic areas and as they help shape international health policy that recognize the global importance of the disease. Therefore in future more similar and related studies should be conducted at different heath care setups in an extensive and advanced mode to focus the changing malaria epidemiology in Pakistan.

CONCLUSION:

The most common malarial species identified in our study were plasmodium vivax and plasmodium falciparum. The global picture of malaria is widespread, yet most endemic areas are poor communities, therefore education on the prevention of malaria is greatly needed. The systematic use of microscopy-based diagnosis and/or rapid diagnostic tests should be considered as appropriate measure in the management of malaria.

REFERENCES:

1. Snow RW, Guerra CA, Noor AM, Myint HY, Hay SI. The global distribution of clinical episodes of Plasmodium falciparum malaria. Nature 2005; 434 (7030):214–7.
2. Beare NA, Taylor TE, Harding SP, Lewallen S, Molyneux ME. Malarial retinopathy: a newly established diagnostic sign in severe malaria. Am J Trop Med Hyg 2006;75 (5):790–7
3. Boivin MJ. Effects of early cerebral malaria on cognitive ability in Senegalese children. J Dev Behav Pediatr 2002;23 (5): 353–64.
4. Holding PA, Snow RW. Impact of Plasmodium falciparum malaria on performance and learning: review of the evidence. Am J Trop Med Hyg 2001;64 (1-2 Suppl): 68–75
5. Maude RJ, Hassan MU, Beare NAV. Severe retinal whitening in an adult with cerebral malaria. Am J Trop Med Hyg 2009;80 (6): 881
6. Beare NAV, Taylor TE, Harding SP, Lewallen S, Molyneux ME. Malarial retinopathy: a newly established diagnostic sign in severe malaria. Am J Trop Med Hyg 2006;75(5):790–79
7. Trampuz A, Jereb M, Muzlovic I, Prabhu R. Clinical review: Severe malaria. Crit Care 2003;7(4):315–2
8. Mockenhaupt F, Ehrhardt S, Burkhardt J, Bosomtwe S, Laryea S, Anemana S, et al. Manifestation and outcome of severe malaria in children in northern Ghana. Am J Trop Med Hyg 2004;71 (2): 167–72
9. Kain K, Harrington M, Tennyson S, Keystone J. Imported malaria: prospective analysis of problems in diagnosis and management. Clin Infect Dis 1998;27 (1):142–9.
10. Águas R, White LJ, Snow RW, Gomes MG. Prospects for malaria eradication in sub-Saharan Africa. PLoS ONE 2008;3(3):e1767
11. Shargie EB, Gebre T, Ngondi J, Graves PM, Mosher AW, Emerso PM, et al. Malaria prevalence and mosquito net coverage in Oromia and SNNPR regions of Ethiopia. BMC Public Health 2008, 8:321
12. Deloron P, Ringwald P, Luty AJ, Renaut A, Minh TN, Mbessy JR, et al. Relationships between malaria prevalence and malaria-related morbidity in school children from two villages in central Africa. Am. J. Trop. Med. Hyg 1999;61(1):99-102
13. Anumudu CI, Adepoju A, Adediran M, Adeoye O, Kassim A, Oyewole I, et al. Malaria prevalence and treatment seeking behaviour of young Nigerian Adults. Annals of African Medicine 2006;5(2):82-89
14. Font F, González MA, Nathan R, Kimario J, Lwilla F, Ascaso C, et al. Diagnostic accuracy and case management of clinical malaria in the primary health services of a rural area in south-eastern Tanzania. Trop Med Int Health 2001;6:423-428.
15. Amexo M, Tolhurst R, Bamish G, Bates I. Malaria misdiagnosis: effects on the poor and vulnerable. Lancet

2004;364:1896-1898
16. Muhe L, Oljira B, Degefu H, Enqusellassie F, Weber MW. Clinical algorithm for malaria during low and high transmission seasons. Arch Dis Child 1999, 81:216-220
17. Mutabingwa TK. Artemisinin-based combination therapies (ACTs): best hope for malaria treatment but inaccessible to the needy. Acta Trop 2005, 95:305-315
18. Williams HA, Jones COH. A critical review of behavioural issues related to malaria control in sub-Saharan Africa: what contributions have social scientists made? Soc Sci Med 2004, 59:501-523.
19. Espino F, Manderson L. Treatment seeking for malaria in Morong, Bataan, the Philippines. Soc Sci Med 2000;50:1309-1316
20. Haque U, Ahmed SM, Hossain S, Huda M, Hossain A, Alam MS, et al. malaria prevalence in endemic districts of Bangladesh. PLoS One 2009;24;4(9):23-25
21, Geoffrey. The treatment of complicated and severe malaria. Br Med Bull 2006;75–76: 29–47.
22. Noor AM, Moloney G, Borle M, Fegan GW, Shewchuk T, et al. The use of mosquito nets and the prevalence of Plasmodium falciparum infection in rural South Central Somalia. PLoS ONE 2008;7;3(5):e2081
23. Erhart A, Thand ND, Ky PV, Tinh TT, Overmeir CV, Speybroeck N, et al. Epidemiology of forest malaria in central Vietnam: a large scale cross-sectional survey. Malaria Journal 2005;4:58-60