An Analysis Of Malaria Diagnostic Methods - Microscopy And Rapid Diagnostic Test (RDT) In Gandhinagar – Gujarat

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Abstracts: Background & Objective: Malaria is one of the major public health problems in the developing countries. Rapid diagnosis and accurate quantification of Plasmodium falciparum parasitemia are important forthe management of malaria. The objective of this study was to measure prevalence of malaria and analyse the results of malaria diagnostic methods. Methodology: RDT and microscopy was carried out to diagnose malaria. Results were simply presented as percentage positive of total number of cases under this study. Results of microscopy were compared with RDT based on antigen detection for malaria diagnosis. Results: Total 503 cases were detected having infection of malaria. Out of them 405(80.52%) were positive for P. vivax, 73 (14.51%) were positive for P. falciparum and 25 (4.97%) were having mixed infection of P. vivax and P. falciparum. Sensitivity of RDTs was excellent as compare to microscopy. Conclusion: We can conclude based on the present study that sensitivity of RDT is very good as compare to traditional microscopy. But for the confirmation microscopy remains gold standard test for malaria identification. [Patel P NJIRM et al 2015; 6(3):64-66]

Key Words: Malaria, Rapid detection test, Microscopy, Malaria diagnosis.

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Introduction: Malaria is one of the major public health problems in the developing countries. Malaria, a disease of antiquity, has proved to be a formidable deterrent to the cultural andsocioeconomic progress of man in the tropical, sub-tropical and monsoon prone zones of the world. Wide distribution and its intensity of transmission in India were important factors for slow economic, scientific and industrial progress in the country during last two centuries[1]

Material and Methods: This study was conducted during time period between june 2014 to December 2014.We phased the study to include the peak malaria transmission season. Malaria screening data from 9961 patient in GMERS Medical College and Hospital were analysed to investigate the patterns of referral, temporal trends and geographical distribution of malaria in Gandhinagar. Patients attending medical indoor in medical department for malaria and patients attending Fever OPD were included in our study. Sample collection was done as part of routine laboratory investigational procedure. They underwent following investigation for malaria: (1) Thin film; (2) Thick film and (3) Rapid malaria antigen detection test kit. The results of RDT were compared with results of microscopy. Patients were considered positive for malaria only if they showed positive microscopy results.

Results: Malaria Rapid Diagnostic Tests (RDTs) are widely used for diagnosing malaria. The present study evaluated the BioLab Malaria HRP-2/pLDHPf/P.V (pan) Combo Test targeting the Plasmodium falciparum specific antigen histidine-rich protein (HRP-2) and the pan-Plasmodium antigen lactate dehydrogenase (pLDH) along with microscopy with thick and thin smear preparation.Total of 9961 patients were investigated for malaria having history of fever during June 2014 to December 2014. Out of these patients, 503 were confirmed having malaria parasites in their blood. Out 503 positive cases, 405(80.52%) were positive for P. vivax, 73 (14.51%) were positive for P. falciparum and 25 (4.97%) were having mixed infection of P. vivax and P. falciparum.

Table 1: Monthly variation in incidence of Malaria

Month	IPD					OPD					Total Samples	Positive
	Total Samples	Positive			Total Positive	Total Samples	Positive			Total Positive		
		PV	PF	Mixed			PV	PF	Mixed			
Jun-14	317	17	0	0	17	494	38	0	0	38	811	55
Jul-14	323	15	0	0	15	697	31	1	0	32	1020	47
Aug-14	895	40	12	2	54	1469	67	12	2	81	2364	135
Sep-14	914	35	8	6	49	1175	44	5	2	51	2089	100
Oct-14	850	15	9	3	27	731	34	6	2	42	1581	69
Nov-14	440	13	6	1	20	826	35	7	0	42	1266	62
Dec-14	332	5	3	5	13	498	16	4	2	22	830	35
Total	4071	140	38	17	195	5890	265	35	8	308	9961	503

Table 2: Gender variation in malaria incidence

Month	Male		Female	
	PV	PF	PV	PF
Jun-14	37	0	18	0
Jul-14	26	1	20	0
Aug-14	77	15	29	14
Sep-14	62	14	18	6
Oct-14	36	15	13	5
Nov-14	34	9	14	5
Dec-14	15	9	6	5
Total	287	63	118	35

Highest peak in cases of malaria was seen during month of August (135) and September (100). There was decline in cases of malaria as the winter season started.

Among indoor patients, Out of 195 positive cases, 55 (28.21%) patients had P. falciparum malaria. On contrast,Out of 308 positive OPD cases, 43 (13.96%) patients had P. falciparum malaria. Detection rate of P. falciparum among indoor patients was higher than OPD patients, as the case fatality and severity of malaria is higher in P. falciparum infection. All patients tested positive in microscopy also tested positive to RDTs based on antigen. Thus sensitivity of RDTs for detecting malaria was very good as compare to the microscopy results. Sensitivity of RDTsmight get lower if we can compare with molecular methods as both microscopy and RDTs might fail to detect low level Parasitemia in early period of infection.[4]15 cases were detected which were positive by RDTs but negative by microscopy. These cases might be considered as false positive or patients might be in convalescent period.

Discussion: One of the most pronounced problem in controlling the morbidity and mortality caused by malaria is limited access to effective diagnosis and treatment in areas where malaria is endemic.2This study analyses methodsof microscopy and rapid diagnostic tests (RDTs), the two malaria diagnostics that are likely to have the largest impact on malaria control today.This study was conducted from June 2014 to Dec 2014. From total 9961 patients, 503 (5.05%) were detected having infection of malaria. Among them 235 were in month August and September. This shows the correlation of malaria transmission with peak monsoon season with humid environment. Also the numbers of fever cases were also increased in this duration which reflects the presence of other seasonal infections. This results correlate with previous study conducted in same geographical area.[5]The prevalence of vivax malaria was 80.52% while falciparum malaria was 14.51%. 4.97% of patients were having mixed infections of Falciparum and vivax.Out of total 508 cases, 98 were positive for falciparum infection. This data is similar to previous study.[6]Both RDTs and Microscopy are having its own advantages and disadvantages regarding sensitivity and specificity. Sensitivity of RDTs was excellent which is similar to other studyas all positive malaria samples in this study were also positive for RDT.[7]RDT was easy to perform and results were excellent for detecting malaria antigen. But RDT positive and smear negative cases were also higher as total 15 samples positive RDT results (13 PF and 2 PV) but negative by microscopy. This is particularly more in case of falciparum infection. Because PfHRP2 clears very slowly from blood and takes one month for complete disappearance after acute infection.[8] so patients with fever having infection of malaria in last one month and patients having treatment of malaria can be positive for RDTs but negative for microscopy. So a positive case of RDT should be confirmed by microscopy as when required. On contrast microscopy provide confirmed diagnosis of malaria but species identification can be difficult in certain cases. Also it requires the training and skill for examination of peripheral blood smear for malaria.

Conclusion: This study clearly shows that RDTs if having better correlation with microscopy and clinical setting for detection of malaria. Still microscopy is the gold standard test for malaria for confirmation of malaria caseas there are rare chances of false positive diagnosis. RDTs can be optional test to microscopy in periphery area where skilled technician/doctors are not available and less experienced health workers can also screen the suspected malaria cases.

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