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Malaria diagnosis in private laboratories of Surat city: a laboratory based study

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Malaria still remains as one of the greatest challenges of public health. Nearly two million people die of malaria annually around the globe; at least one death occurs every 20 sec and another 200–500 million fall ill from it often severely[1]. In India the incidence of malaria has stabilised to around two million cases during the last decade[2,3].

Surat city is known world over for its glorious trade and commerce activities. Because of the migratory population in this city, malaria continues to be a major public health problem. There are urban health centres equipped with laboratory services and mobile units, which are providing free laboratory services to the community for the diagnosis of malaria. Apart from the urban health centres, there are private pathologists and self-employed technicians who are also providing laboratory services to the community. The present study was done during 1999–2000. Main aim of the study was to evaluate the technical skills of microscopists working under private pathologists, microbiologists and self-employed technicians in conventional microscopy and to know their knowledge about new methods in malaria diagnosis.

Two set-ups were selected for this study—private laboratories owned by pathologists of Surat city; and self-employed technicians.

Owners/Heads of 36 laboratories owned by pathologists and 36 laboratories owned by the self-employed technicians of Surat city were interviewed with the help of pre-designed questionnaire. Questions on use of new methods like dipstick/QBC for malaria diagnosis and malaria microscopy training/conferences attended by their microcopists, who were involved in malaria microscopy were included in the questionnaire. The microscopist, who was screening all PSMP (peripheral smear for malaria parasite) slides in the laboratory was shown three JSB/Giemsa stained slides selected randomly, diagnosed and confirmed by senior microscopists having more than 15 years of working experience in malaria laboratory, Department of Community Medicine, Government Medical College, Surat. The microscopist was asked to screen the slides and give result whether, it was positive/negative; and if positive, then to name the species of malaria parasite. As mentioned earlier, 36 microscopists working under 36 private pathologists and 36 self-employed technicians who were involved in malaria microscopy were asked to identify the species of malaria parasite.

Altogether 108 slides positive for malaria parasites (pre-examined) were shown to the microscopists working under pathologists and microbiologists. The details of their identification are presented in Tables

Table 1. Diagnostic report of microscopists working under pathologists and microbiologists

Type of slides	No.	*P. vivax*	*P. falciparum*	Mixed	Negative	Could not identify
P. vivax (*Pv*)	15	6	4	0	3	2
P. falciparum (*Pf*)	24	1	18	0	3	2
Mixed (*Pv+Pf)*	11	1	7	0	2	1
Negative	40	1	8	0	30	1
Refused to see the slides	18	0	0	0	0	0
Total	108	9	37	0	38	6

1 & 2. Results clearly indicate that the microscopists could identify only 46.2% of *P. vivax*, 81.9% *P. falciparum* positive slides correctly. They failed to identify the mixed infections and there was an error of 23% in identifying negative slides. This clearly shows poor diagnosis of malaria by microscopists.

In case of self-employed technicians the results were still poor. They could identify only 51.4% *P. vivax* and 11.1% *P. falciparum* positive slides correctly, further they showed 28.5% error in reporting negative slides. This clearly shows that many cases were ignored or misreported, especially in case of mixed infections.

In a similar study by Choudhury *et al*[4] and Sharma *et al*[5], laboratory microscopists could not identify positive smears. In case of microscopists working under pathologists, *P. vivax* species was wrongly identified as *P. falciparum*/negative. In case of self-employed technicians 11 respondents diagnosed *P. vivax* species as *P. falciparum*. In a similar study done by Beljaev *et al*[6] similar results were found, where the microscopists misdiagnosed negative slides as *P. falciparum*. In another study by Gautam *et al*[7] 2% of negative blood smears were labelled as positive and 6.7% positive blood smears were labelled as negative. In the present study, 35.7% slides in case of microscopists working under pathologists and 50% slides in case of self-employed technicians were diagnosed incorrectly. About 64.3% slides (Table 2) were identified correctly by microscopists working under pathologists whereas in case of self-employed technicians 50% slides (Tables 2–4) were identified correctly. Though knowledge of microscopists working under pathologists is better as compared to the self-employed technicians, microscopists of both the private set-ups had problems in identifying slides of *P. vivax, P. falciparum* and mixed infections.

Table 2. Results of microscopic diagnosis by microscopists working under pathologists and microbiologists

Type of slides	No.	Correctly identified (%)	Incorrectly identified (%)
P. vivax (*Pv*)	13	46.2	53.6
P. falciparum ((*Pf*)	22	81.9	18.1
Mixed (*Pv* + *Pf*)	10	0	100
Negative	39	76.9	23.1
Total	84	64.3	35.7

Table 3. Results of microscopic diagnosis by self-employed technicians

Type of slides	No.	Correctly identified (%)	Incorrectly identified (%)
P. vivax (*Pv*)	37	51.4	48.6
P. falciparum (*Pf*)	9	11.1	88.9
Mixed (*Pv* + *Pf*)	0	0	0
Negative	14	71.5	28.5
Total	60	50	50

Table 4. Diagnostic report of self-employed technicians

Type of slides	No.	*P. vivax*	*P. falciparum*	Mixed	Negative	Could not identify
P. vivax (*Pv*)	44	19	11	0	7	7
P. falciparum (*Pf*)	11	4	1	0	4	2
Mixed (*Pv* + *Pf*)	0	0	0	0	0	0
Negative	14	3	1	0	10	0
Refused to see the slides	39	0	0	0	0	0
Total	108	26	13	0	21	9

From the above results, it can be concluded that there is an urgent need of strengthening the laboratory services by periodic training and retraining of private microscopists on malaria microscopy. In another study by Clyde & Beljaev[8] it was found that the quality of microscopic diagnosis suffered a setback due to lack of supervision and support. Regarding use of other tests like dipstick/QBC (Quantitative buffy coat count) for malaria diagnosis, only 16 out of 72 microscopists said that they were using dipstick/QBC tests apart from conventional microscopy. A prominent finding was that 11 laboratories (6 laboratories of pathologists and 5 laboratories of self-employed technicians) were having dipstick and QBC facility in their laboratory but they were not using it because of high cost of maintenance and high cost of tests, which the patient could not afford. Rest of the laboratories who were not having dipstick/QBC facilities were also of the same opinion. About 61 respondents were of the opinion that though they were not using the tests in their laboratory but opined that both are highly sensitive in detecting malaria parasites and this has been substantiated by the work of others[9-11].

It may be concluded that though the newer tests like dipstick/QBC are quite sensitive and specific but they are not being used in private laboratories because of the cost factor. For diseases like Brucellosis and Kala-azar also, dipstick tests are present. It may be presumed that their use in private laboratories is also limited. At present these tests are not being done in the government laboratories of Surat city. Though the government makes these tests available in case of malaria epidemics it is suggested that dipstick strips and QBC test facilities should be made available at a cheaper rate so that the laboratory and the patients are able to afford them. These tests should also be made available in government laboratories.

When asked whether the microscopist involved in malaria microscopy had attended any training on malaria/ malaria microscopy, 23 out of 72 respondents quoted that they had never attended any training. A number of studies have shown and quoted that the microscopists involved in malaria microscopy should be regularly trained[12-16].

From the study it may be concluded that there is an urgent need for training and supervising the microscopists with emphasis on malaria microscopy. Training may be undertaken by National Vector Borne Disease Control Programme (NVBDCP). Private organizations themselves may also conduct module based malaria microscopy training for the microscopists registered in their organisation from time-to-time, to update their knowledge or the government may arrange for such training courses. Modern tests like dipstick and QBC should be made freely available and at a cheaper cost so that these may be within the reach of the laboratory as well as the patient.

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