12th International Conference on Laboratory Medicine & Pathology

Comparative evaluation of rapid diagnostic test, antibody ELISA and pLDH ELISA in detecting asymptomatic malaria parasitaemia in blood donors in an area of high transmission

Tebit Emmanuel Kwenti[1,2,3*], Longdoh Anna Njunda[1], Beltine Tsamul[1,3], Dickson Shey Nsagha[2], Jules-Clement Nguedia Assob[1], Kukwah Anthony Tufon[3], Henry Dilonga Meriki[2,3], George Enow Orock[4]

[1]Department of Medical Laboratory Sciences, Faculty of Health Sciences, University of Buea, P.B. 63, Buea, Cameroon,[2]Department of Public Health and Hygiene, Faculty of Health Sciences, university of Buea, P.B. 63, Buea, Cameroon,[3]Blood Bank, Regional Hospital Buea, P.B. 32, Buea, South West Region, Cameroon, [4]Department Medicine, Faculty of Health Sciences, University of Buea, Buea, Cameroon.

*Corresponding author: kwentitebit@yahoo.com; Tel: + (237) 697979776

Blood transfusion service, Regional Hospital of Buea

BACKGROUND

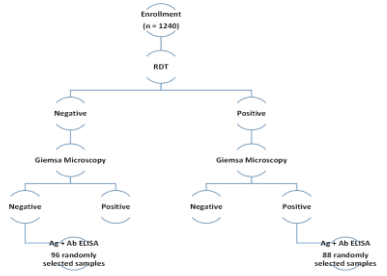
Malaria prevalence among potential blood donors in endemic areas range between 1% and < 50% (1-3). Infected blood donors serve as a source of infection to blood recipients, and this may affect their prognosis. Unlike light microscopy, mass screening of blood for transfusion is feasible with ELISA. Hence the need to evaluate the different types of malaria diagnostic assays used in screening potential blood donors in endemic areas.

OBJECTIVES

The purpose of this study was: to determine the prevalence of malaria parasite among blood donors in Buea; and to evaluate the performance of RDT, malaria antibody ELISA and pLDH ELISA in the detection of asymptomatic malaria parasites in the target population.

MATERIALS AND

1132 (91.3%) males and 108 (8.65%) females took part in the study. Mean age (±SD) = 32±7.81.



RESULTS

Malaria prevalence was 8.1% (95% CI: 6.6 - 9.7). No association with age (p = 0.794) or gender (p = 0.065).

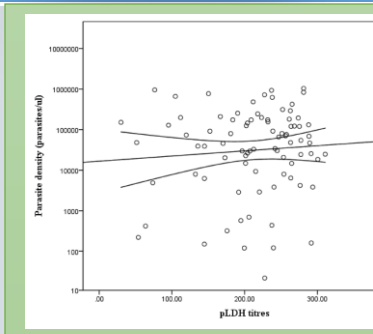
		Giemsa Microscopy		
		Positive	Negative	Total
		n (%)	n (%)	n (%)
RDT	Positive	88 (86.2)	14 (13.7)	102 (8.2)
	Negative	12 (1.1)	1126 (99.0)	1138 (91.8)
	Total	100 (8.1)	1140 (91.90)	1240 (100)
pLDH ELISA	Positive	69 (94.5)	4 (5.5)	73 (39.7)
	Negative	12 (19.8)	89 (88.1)	101 (54.9)
	Equivocal	7 (70)	3 (30)	10 (5.4)
	Total	88 (47.8)	96 (52.2)	184 (100)
Malaria antibody ELISA	Positive	68 (73.4)	24 (26.1)	92 (50)
	Negative	16 (19.8)	65 (80.3)	81 (44)
	Equivocal	4 (36.4)	7 (63.6)	11 (6)
	Total	88 (47.8)	96 (52.2)	184 (100)

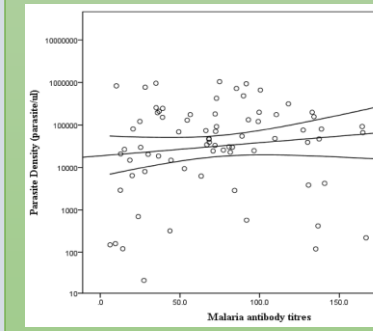
Parameter	pLDH ELISA % (CI)	Antibody ELISA % (CI)	RDT % (CI)
Sensitivity	86.0 (77.4 – 92.8)	69.9 (60.1 – 78.6)	88.0 (80.0 – 94.0)
Specificity	92.7 (85.6 – 97.0)	80.3 (69.9 – 88.3)	99.1 (98.0 – 99.3)
PPV	91.6 (83.4 – 96.5)	81.8 (72.2 – 89.2)	89.8 (78.0 – 92.3)
NPV	88.1 (80.2 – 93.7)	67.7 (57.4 – 76.9)	99.0 (98.2 – 99.5)
False positive rate	7.3 (5.8 – 9.1)	19.7 (17.3 – 22.3)	1.2 (0.6 – 2.1)
False negative rate	2.3 (1.5 – 3.4)	30.1 (27.3 – 33.1)	12 (6.4 – 20.0)
Agreement between tests	89.7 (84.4 – 93.7)	74.5 (67.5 – 80.6)	97.9 (96.9 – 98.6)

The performance of the pLDH ELISA which demonstrated the highest PPV (91.6%), was generally comparable to the RDT.

The sensitivity was lowest with the antibody ELISA (69.9%), which also demonstrated the highest FPR and FNR.

The detection threshold for the pLDH (3 parasites/µl) was lower compared to the RDT (50 – 60 parasites/µl).





Non-significant positive correlations observed between the parasite density pLDH titres or the malaria antibody titre

RDT: Rapid Diagnostic Test; pLDH: Plasmodium lactate dehydrogenase; PPV: positive predictive value; NPV: negative predictive value; Sensitivity = [true positive/ (true positive + false negative) x 100]; specificity = [true negative/(true negative + false positive) x 100; PPV = [true positive/(true positive + false positive) x 100]; NPV = [true negative/(true negative + false negative) x 100]; Agreement = [true positive + true negative/N x 100]; FPR = 1 - specificity; FNR = 1 - sensitivity

CONCLUSION

Overall, the RDT and the pLDH ELISA demonstrated a perfectly correlated agreement with GM meanwhile that of the antibody ELISA was substantial.

RECOMMENDATION

The pLDH is therefore recommended for mass screening of blood for transfusion in the study area. But where not feasible, an RDT will suffice.

REFERENCES

(1) Gelaw B, Mengistu Y. The prevalence of HBV, HCV and malaria p among blood donors in Amhara and Tigray regional states. Ethiop.J.Hea 2008; 22(1): 1 – 5. (2) Epidi TT, Nwani CD, Ugorji NP. Prevalence of ma blood donors in Abakaliki Metropolis, Nigeria. Sci Res Essay. 2008; 3(4 164. (3) Diop S, Ndiaye M, Seck M, Chevalier B, Jambou R, Sarr A [Prevention of transfusion transmitted malaria in endemic area] (in F Transfus Clin Biol. 2009; 16:454–459.