Diagnostic accuracy of point of care tests for *Schistosoma haematobium*: a systematic review

P1
B12

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New innovations of rapid and field-based tests are available for the diagnosis of urogenital schistosomiasis. Of the 10 rapid tests analysed in this diagnostic test accuracy(DTA) review, the molecular LAMP and RPA tests have the highest accuracy (Sensitivity 99.0% and 94.1% , Specificity 76,2% and 96,6% respectively)

BACKGROUND

- Urogenital schistosomiasis (UGS) (bilharzia), caused by the blood parasite *S. haematobium* is a neglected tropical disease affecting 240 million people globally, 90% in sub-Saharan Africa[1].
- Infection occurs through exposure to water snails (fig1), that are intermediate hosts for *Schistosoma* species.
- UGS is associated with increased HIV acquisition and transmission in areas co-endemic to HIV and UGS[2].
- The prevalence of UGS in endemic areas of South Africa (Limpopo, Mpumalanga and KwaZulu-Natal) is **37,5%** in the general population, of which **52%** is school-children (9-15 yrs)[3].
- Accurate and accessible point-of-care testing for screening and diagnosis is vital for prevention and control of UGS.

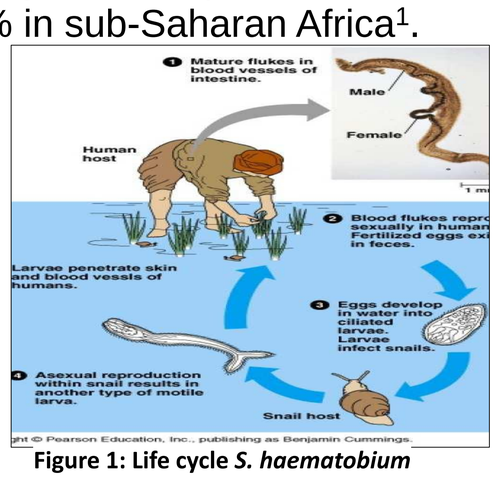


Figure 1: Life cycle *S. haematobium*

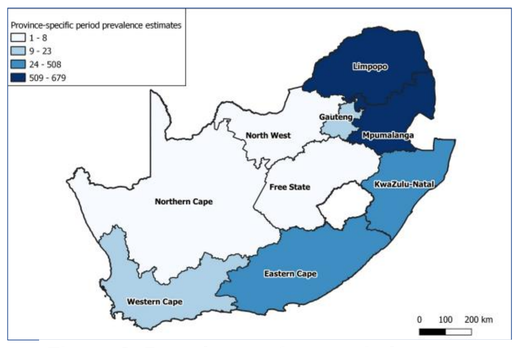


Figure 2: Prevalence of urogenital schistosomiasis in South Africa[4]

METHODS

- Four databases (PubMed, EBSCOHost, ProQuest and Web of Science) were searched for DTA studies for *S. haematobium* in endemic and non-endemic settings from 2000-2022.
- Studies were included if the results of an index test was compared to that of an appropriate laboratory-based reference standard in populations exposed to *S. haematobium* in Africa.
- The methodological quality and risk of bias of the studies was assessed using the QUADAS-2 critical appraisal tool.
- Meta-analysis was performed using bi-variate and HSROC modelling in STATA 17 and SAS statistical software. Subgroup analysis was done for those index tests with heterogenous studies, to investigate if certain co-variates affect diagnostic accuracy.

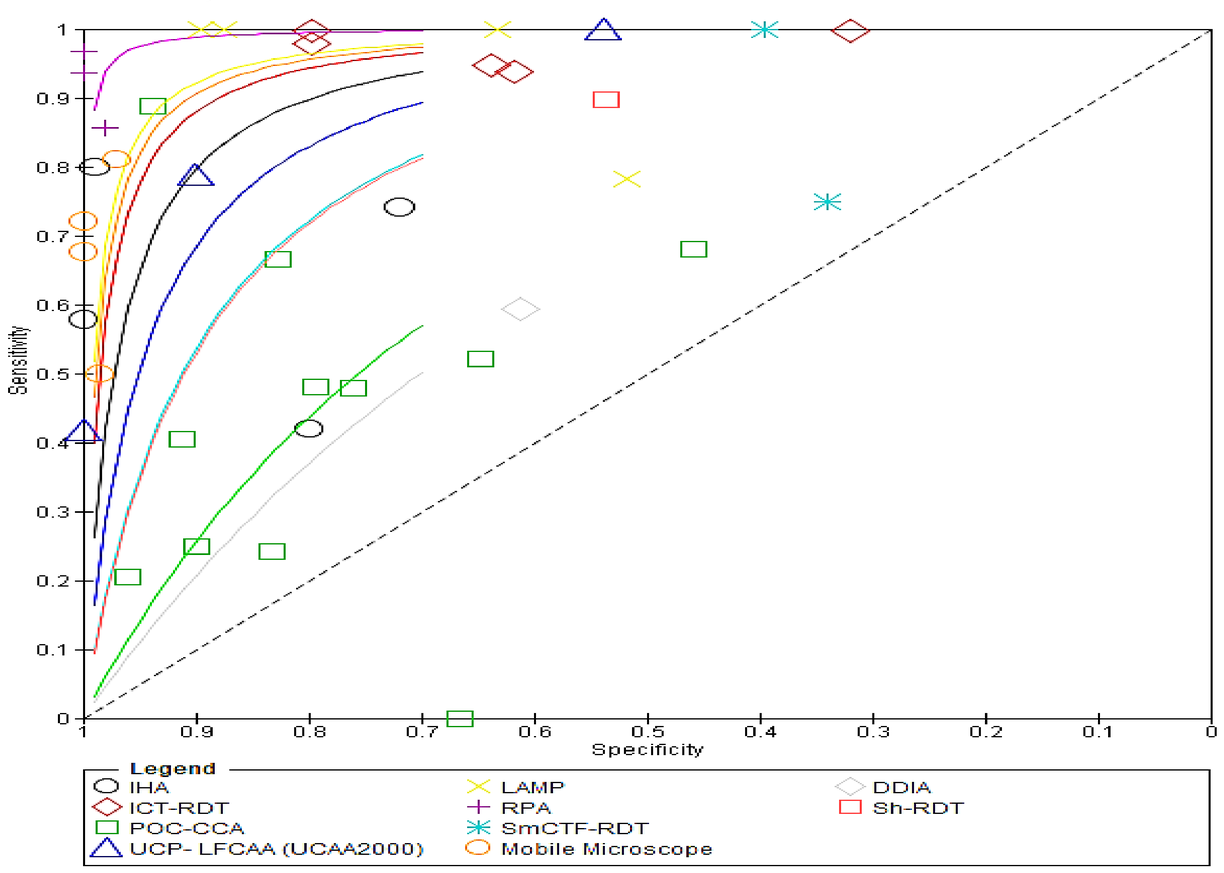
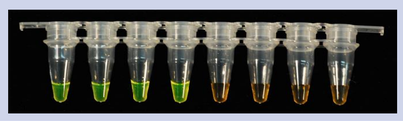
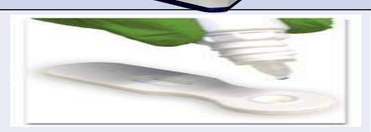
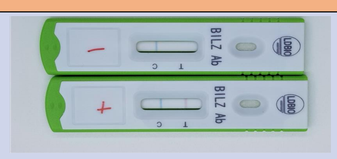
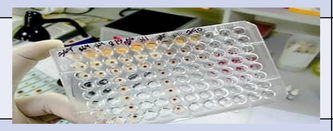
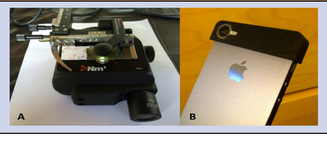


Figure 3. Summary ROC curve for all index tests: Higher accuracy is curve highest on top left corner

RESULTS

Table 1. Summary measures of diagnostic accuracy for index tests

Full name	Image	Diagnostic accuracy	
Molecular tests (DNA based)		**Sensitivity**	**Specificity**
Recombinase polymerase amplification (RPA)		94.1%	96.6%
Loop mediated isothermal amplification (LAMP)		99.0%	76.2%
Antigen tests:			
Up Converting Phosphor Circulating Anodic Antigen (UCP-CAA)		87.4%	86.4%
Point of care- Circulating cathodic antigen (POC-CCA)		48.9%	77.3%
Serological tests:			
Immunochromatographic-rapid diagnostic test (ICT-RDT)		96.3%	64.1%
Indirect haemagglutination assay (IHA)		64.8%	95.6%
Rapid diagnostic test- S. haematobium (RDT-Sh)		90.0%	54.0%
Dipstick dye immuno assay (DDIA)		60.0%	61.0%
S.mansoni-cercarial trans - formation fluid- RDT (SmCTF-RDT)		98.4%	36.7%
M Health:			
Mobile microscope (portable or cell phone-based microscope)		68.4%	98.1%

- Thirty-three studies were evaluated, where one POC test and 9 rapid tests were eligible, of which six tests had sufficient studies to be included in a meta- analysis.
- Two field-based molecular tests LAMP and RPA showed the highest diagnostic accuracy, while the POC serum-based test cassettes ICT-RDT and SmCTF-RDT showed high sensitivity, but low specificity.
- Overall, RPA is the most suitable test for prevalence estimation in both high and low prevalence settings, and for chronic infections.

CONCLUSIONS

- Summary results reveal that three tests (RPA, LAMP and UCP-CAA) are considered to be highly accurate with a good trade-off between sensitivity and specificity.
- Most tests eligible for this review are still not fully POC and require field- based laboratories for serum attainment.
- Further investigations with improved reference tests are needed

REFERENCES: 1.Colley CG, *et al* (2014) Human schistosomiasis. The Lancet 383(9936);

2. Patel P, *et al*.(2021) Association of schistosomiasis and HIV infections. Int Jour Infect Dis.1(102)

3. de Boni L *et al*. Trends in the prevalence of microscopically confirmed schistosomiasis in the South African public health sector, 2011–2018. PLoS Negl Trop Dis. 2021 Sep 1;15