Schistosomiasis in Africa is an ongoing public health problem which in recent times has attracted a major campaign to control the disease. It is caused by two major species, Schistosoma mansoni and S. haematobium, which often cause concurrent infections in the human population. Due to control efforts, the issue of diagnostic sensitivity has become more critical in the assessment of program effectiveness and the World Health Organization has drawn attention to the need for field-applicable tests with high specificity and sensitivity.

METHODS

LAMP amplification for QIAamp and LP is consistent with PCR. Chelex extraction is mostly in sub-Saharan Africa. Qiagen and LP extraction both detected 100% of positive schistosome parasites from field collected urine samples. LAMP can be used as a point-of-care (POC) test for surveillance and assessing success of control interventions in Zambia as part of their ongoing local schistosomiasis control program.

CONCLUSIONS

LAMP amplification was achieved for both species of schistosome for DNA extracted by four different methods. Qiagen and LP extraction both detected 100% of positive infections, but Qiagen extraction is more cost effective than LP. DNA extraction by LP is the fastest compared to other three methods, but it is the most expensive.

Schistosomiasis is caused by blood parasites called schistosomes.

At least 230 million people are currently infected, mostly in sub-Saharan Africa.

The most common species are Schistosoma mansoni and S. haematobium.

Children bear the highest infection prevalence and intensity and suffer from delayed physical and cognitive development as a result of infection.

A field-usable diagnostic test is needed to monitor disease prevalence, especially after Mass Drug Administration (MDA).

Loop-mediated isothermal amplification (LAMP) has been used for the diagnosis of malaria, tuberculosis, and other infectious diseases and is a highly sensitive, specific, and rapid isothermal test.

Using a strand displacement mechanism, LAMP can amplify DNA fragments at a constant temperature independent of expensive equipment.

There is a lack of data regarding LAMP’s cost-effectiveness, time requirement from extraction to detection, and amplification efficiency for different DNA extraction methods.

LAMP amplification requires the shortest time for extraction of a single sample.

Extraction by heating is fastest for a cluster of samples.

Qiagen extraction takes the longest during the quietest work period.

Simultaneous detection of dual schistosome for DNA extracted by four different methods.

Sensitivity

Specificity

Cost effectiveness

Reduced time

LAMP in primary health care clinic

Reduced cost

REFERENCES


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OBJECTIVE

Detect S. mansoni and S. haematobium infection via LAMP amplification from DNA extracted by four extraction techniques from a urine specimen.

Statistically evaluate sensitivity, specificity, cost effectiveness, and time requirement for LAMP amplification for four different DNA extraction methods.

RESULTS

LAMP-PURE requires the shortest time for extraction of a single sample.

Extraction by heating is fastest for a cluster of samples.

Qiagen extraction takes the longest during the quietest work period.

Table 2: Time requirement for DNA extraction for individual sample and cluster of samples by four different filter-based and non-filter-based extraction methods.

Table 3: LAMP amplification frequency for four different DNA extraction methods for Schistosoma mansoni and S. haematobium.