

A comparative evaluation of three methods for the rapid diagnosis of cryptococcal meningitis (CM) among HIV-infected patients in Northern Malawi

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Abstract

Introduction

four different diagnostic tests (Gram stain, India ink, and two types of commercial lateral flow assay [LFA]) to identify CM-positive patients and to compare the sensitivity and specificity of these tests

Methods

HIV-infected adult patients presenting with features of meningitis. Four types of diagnostic tests were conducted: India ink, Gram stain, and two types of commercial lateral flow assay (LFA) (Immy, Inc., OK, USA and Dynamiker Biotechnology (Tianjin) Co., Ltd),

Results

A total of 265 samples were collected. The rate of positive CM detection ranged from 6.4% (using India ink) to 14.3% (using LFA). India ink exhibited the lowest sensitivity of 54.8% (95% confidence interval [CI]: 36.0%–72.7%), followed by Gram stain (61.3%; 95% CI: 42.2%–78.2%). The Dynamiker LFA exhibited the highest sensitivity of 100.0% (95% CI: 90.0%–100.0%) but a lower specificity (97.0%; 93.9%–98.8%) compared to the Immy LFA (98.3%; 95% CI: 95.7%–99.5%).

Conclusion

LFA diagnostic methods have the potential to double the detection rate of CM-positive patients in resource-limited countries such as Malawi. As such, LFAs should be considered to become the main diagnostic tests used for CM diagnostics in these countries. Our data indicate that LFAs may be the best method for diagnosing CM and exhibits the highest diagnostic accuracy as it has shown that it

Key Words:

Introduction

regards to sensitivity and specificity
 cryptococci in CSF, particularly in resource-limited countries
 (93%–100%) and specificity (93%–98%); however, this form
 stain for the direct detection of cryptococci in CSF samples, particularly in patients infected with HIV. Furthermore, there
 ink stain, and two forms of lateral flow assay (LFA) (Immy
 cerebrospinal fluid (CSF). Even though India ink is rated

Figure 3 shows the rate of positive-CM identification. The positive-CM identification rate ranged from 6.4% (using India ink) to 14.3% (using LFA). Both LFA tests identified more standard. The Dynamiker LFA produced the highest rates

sensitivity, specificity and accuracy, is shown in Table 2. India ink (54.8% and 61.3%) but the highest specificity (100%) in the diagnosis of CM. Both LFA tests showed 100% sensitivity and high specificity of up to 98.3%, with the Immzy LFA

Discussion

samples of CSF show fungal growth in almost all cases of

management of CM. Furthermore, in situations like Malawi,

this difference was not tested for statistical significance. Our findings show lower levels of sensitivities for the Gram stains

laboratory technologists; the coq

India ink test. Bottone was the first to describe the role of

established that the Gram stain identified 50% more cases of . Other studies have

all of these findings, it is surprising that most developing

blinding of results in this study; this may affect the results

sensitivity and specificity, hence we believe that the tests

Conclusion

Our research found that the Gram stain was more sensitive

LFA was clearly the best method for diagnosing CM, and showed the highest levels of sensitivity and specificity. They

LFA diagnostic methods have the potential to double the

As such, LFAs may be considered to be the main diagnostic

Acknowledgements

Authors' contributions

Study conception: Master Chisale, Dikani Salema, Pocha Kamudumuli; study design: Master Chisale, Dikani Salema, Frank Sinyiza, Judith Mkwaila, Pocha Kamudumuli, Hsin-yi Lee; data collection: Master Chisale, Dikani Salema, Frank Sinyiza, Judith Mkwaila, Pocha Kamudumuli, Hsin-yi Lee; data analysis: Master Chisale and Hsin-yi Lee; manuscript preparation: Master Chisale, Dikani Salema, Frank Sinyiza, Judith Mkwaila, Pocha Kamudumuli, Hsin-yi Lee. All the

Funding

Funding was obtained from the Pingtung Christian Hospital (PTCH) Research Capacity Building Program, grant number:

Availability of data and materials

Competing interests

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