East Africa Medical Journal Vol. 89 No. 6 June 2012
ANTIMICROBIAL PROPERTIES OF HUGONIA CASTENEIFOLIA AND ITS POTENTIAL USE FOR THE CONTROL OF OPPORTUNISTIC INFECTIONS
K. Korir, Kenya Medical Research Institute P. O. Box 54840-00200, Nairobi, Kenya, C. Mutai, Kenya Medical Research Institute P. O. Box 54840-00200, Nairobi, Kenya, J. Nandako, Catholic University of Eastern Africa P. O. Box 62157-00200, Nairobi, Kenya and C. Bii, Kenya Medical Research Institute P. O. Box 54840-00200, Nairobi, Kenya

Dear Editor-in-Chief,

ANTIMICROBIAL PROPERTIES OF HUGONIA CASTENEIFOLIA AND ITS POTENTIAL USE FOR THE CONTROL OF OPPORTUNISTIC INFECTIONS

K. KORIR, C. MUTAI, J. NANDAKO and C. BII

INTRODUCTION

Hugonia castaneifolia belongs to the family Linaceae and is commonly known as 'Mukuro' by the Giriama people of Kenya. As a traditional medicine among this community, the roots concoctions are used for treating and managing intestinal worms (Kokwaro, 1996). Antimicrobial activities of other species of *Hugonia* have been studied (Baraza, 2007 and Maundu, 2005). They include *H. mystax* which has been tested against *E. coli*, *Bacillus subtilis*, *S. typhosa* and *Trichophyton mentagrophytes*, (Ahamed *et al*., 1993). *Hugonia mystax* is also used as an antihelminthic and anti-inflammatory agent (Maundu, 2005). *Hugonia castanea* in Madagascar is used for general fatigue (Kokwaro 1996). There is no documented scientific report of the antimicrobial activities of *H. castaneifolia* in Kenya. The current treatment for opportunistic infections such as *S. aureus*, *Candida* spp and dermatophytes is limited and complicated by emerging antimicrobial resistance. Thus there is an urgent need for new therapeutic alternatives and medicinal plants present potential candidates.

The plant samples of *H. castaneifolia* were collected from the Coast Province of Kenya. Plants materials including leaves, roots and stem bark were air dried and separately grounded into fine powder before extraction in Hexane, dichloromethane and methanol. The isolates used for the study were *Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922, *Candida albicans* ATCC 90028 and clinical isolate of *Microsporum gypseum*. *In-vitro* antimicrobial assay was performed using disc diffusion method while minimum inhibition concentration was determined using broth micro-dilution methods. Overnight cultures of bacterial and yeast were used to prepare 0.5 McFarland suspensions. Fresh cultures of molds were used to prepare 1.0 McFarland suspension. The suspension was inoculated onto appropriate media by spreading uniformly using sterile cotton wool swap. Sterile 6 milliliters paper disc impregnated with 10μl of test extracts were applied on the surface of the inoculated plated media. The plates were incubated at 37^0 C for 12 - 16 hours for both bacteria and yeast. Molds were incubated at 30^0C for 3 – 7 days. Inhibition zone diameters were measured as indication of activity. Fluconazoles and chloramphenicol were used as positive controls while extraction solvents were used as negative controls. The tests were done in triplicates and the average result was calculated and recorded.

Studying the bioactive constituents of *H. castaneifolia* showed that dichloromethane stem bark extract was active against *Staphylococcus aureus* and *Microsporum gypseum* (MIC 0.0008 and 0.02443mg/ml resspectively). It had no activity against *E. coli* and *Candida albicans*. It was active against *Staphylococcus aureus* with MIC of 0.0061mg/ml. Hexane stem bark extracts was active against *Staphylococcus aureus* at 0.0031mg/ml. On the other hand, the DCM leaves extracts had no activity against *E. coli* and *Candida albicans*. It had low activity judged by zone diameters against *Staphylococcus aureus* with MIC of 0.031mg/ml. The hexane leaves extracts had no activity against *E. coli* and *Candida albicans*. It was active against *Staphylococcus aureus* and *Microsporum gypseum* The DCM root extracts had no activity against *E. coli*. It had low activity against *Staphylococcus aureus*, *Candida albicans* and *Microsporum gypseum* judged by low inhibition zone diameters. The MeOH extracts had no activity against *E. coli*.

DISCUSSION

Hexane and DCM root bark extracts of *H. castaneifolia* were very active against fungi and bacteria with MIC values of 0.0002246mg/ml and 0.00017mg/ml on root bark against *S. aureus* and *M. gyepseum*, respectively. The *S. aureus* is mainly very resistant to common antibiotics while *M. gypseum* is very pathogenic. The DCM extract was more potent of all the tested crude extracts. The methanol extract, which usually contain a lot of compounds found in water extract (a decoction) prescribed by the

traditional healers was not active. All the extracts were not active against *E. coli*. There was different range of activities judged by the presence of zones of inhibition in different plant parts as well as in different extraction solvents (Baraza, 2007). The isolate tested against *H. casteneifolia* normally causes opportunistic infection, therefore these plants extracts can be used to treat and manage opportunistic infections. Ethnobotanical information on the plant shows that it is used by the Giriama people of Kenya in managing and treating worm infections and the results have proved that the plant extracts can also be used on bacterial and fungal infections as well.

CONCLUSION/RECOMMENDATION

The results validate the ethnobotanical use of the studied medicinal plant. The H. castaneifolia crude extract was active against fungi and bacteria and therefore apart from being used in treating intestinal worms, it may also be used to treat infections caused by common opportunistic pathogens. Further work should be done especially phytochemical analysis and isolation of the compounds present as well as determination of their bioactivity.

REFERENCES

1. Kokwaro, O. J. *Medicinal Plants of East Africa*. East Africa Educational Publishers.
2. Baraza, L. D., Cosam, J. C, Munissi, J. J .E, *et al*. Antifungal rosane diterpenes and other constituents of *Hugonia casteneifolia*. Phytochemistry **69**: 2000-2005.
3. Ahamed, A. A., Mahmoud, A. A., Williams, H. J., *et al*. *New sesquiterpene α-ethylene lactones from the Egyptian plant Jasonia candicans. J. Nat. Prod*. 56.
4. Maundu, P. and Tengas, B. *Useful Trees and Shrubs for Kenya*. World Agroforestry Centre-Eastern and Central Africa Regional Programme. English Press Limited. Nairobi-Kenya. Technical Handbook No.35.