

5.0 CHAPTER 5: SUMMARY, CONCLUSION, RECOMMENDATIONS

AND SUGGESTIONS FOR FURTHER STUDIES

This research study was envisaged to provide information on the phytochemistry and the bioactivity of *L. eriocalyx*, *A. ovalifolius* and *E. abyssinica* all belonging to the family Fabaceae. From the results obtained, the following summary, conclusion and recommendations could be inferred.

Summary

Preliminary bioassay analysis was done on all parts of the three plants under study as explained in **section 4.2.1**.

The antiplasmodial activity of the DCM extract of the leaves of *E. abyssinica* was significantly high ($p \leq 0.05$) against W2 and D6 clones of *P. falciparum* with IC_{50} values 165.1 and 215.1 $\mu\text{g/mL}$, respectively. Similarly, the DCM extract of the stem bark of *L. eriocalyx* showed high activity ($p \leq 0.05$) of 423.0 and 365.2 $\mu\text{g/mL}$ against the two clones. Likewise, the DCM extract of the root bark of *A. ovalifolius* also exhibited high activity against the W2 clone ($p \leq 0.05$) with IC_{50} value of 234.0 $\mu\text{g/mL}$.

Moderate larvicidal activity against *A. gambie* was shown by the DCM extract of *L. eriocalyx* with $53.0 \pm 0.02\%$ mortality whereas the DCM and MeOH extracts from *A. ovalifolius* were highly active in larvicidal and mosquitocidal assays with a knock down of **87.7 ± 0.01** and **88.5 ± 0.01** % mortality, respectively. Likewise, the larvicidal and mosquitocidal activities of the DCM and MeOH extracts of *E. abyssinica* were moderate with **65.1 ± 0.4** and **$65.5 \pm 0.14\%$** mortality, respectively.

For antifungal assays, the MeOH extract of *L. eriocalyx* showed mild activity against *A. niger* with inhibition zone of **8.5±0.4 mm**, the MeOH extract of *A. ovalifolius* had intermediate activity against *C. albicans* with an inhibition zone of **11.2±0.1 mm**, while the MeOH extract of *E. abyssinica* also has intermediate activity against *C. albicans* with a zone of inhibition of **13.2±0.1**. The antibacterial assay revealed that the DCM extracts of both *A. ovalifolius* and *E. abyssinica* had intermediate activity against *S. aureus* **15.3±0.1** and **11.3±0.1** mm zones of.

Results from preliminary bioassay analysis of the crude extracts of the three plants informed the plant parts that were subjected to chromatographic separation. Twelve compounds were isolated from *L. eriocalyx* namely; lupeol (**27**), quercetin (**65**), apigenin (**68**), friedelin (**133**), β -sitosterol (**134**), lupenone (**135**), β -sitosterol stigmasterol (**136**), chrysin (**137**), morinhydrate (**138**), quercetin-3-*O*-glucoside (**139**), 4',5-dihydroxystilbene-3-*O*-glucoside (**140**) and rutin (**141**). From *A. ovalifolius* eight compounds were isolated namely; plumbagin (**142**), orientin (**143**), mohanimbine (**144**), koenimbine (**145**) and koenidine (**146**) together with compounds **65**, **68** and **139**, while from *E. abyssinica*, two compounds namely; 7-Hydroxy-4'-methoxy-3-prenylisoflavone (**147**).and erythrininate (**148**) were isolated.

Lupeol (**27**) showed the highest antiplasmodial activity against the W2 and D6 clones of *P. falciparum* with IC₅₀ values of 104.4±0.4 and 109.9±0.4 μ g/mL, respectively. Mohanimbine (**144**) showed high activity against *A. gambie* larvae with **82.3±0.01%** mortality and a corresponding LC₅₀ value of 5.56 μ g/mL at a concentration of 125 μ g/mL. Koenimbine (**145**) showed intermediate activity against *C. albicans* with 13.5±0.1 mm zone of inhibition while rutin (**141**) showed intermediate activity towards *K. pneumoniae*, *S. typhimurium* and *P. aeruginosa* with inhibition zones of **9.1±0.2**, **11.3±0.3**, **9.8±0.3** and **mm**, respectively.

5.2 Conclusion

- The crude extracts showed weak to moderate activities against the entire test organisms used in bioassay analysis.
- Major compounds isolated from the three plants were terpenoids, carbazole alkaloids, flavonoids, flavone glycosides and a prenylated flavone.
- Similar compounds were isolated from both *E. eriocalyx* and *A. ovalifolius* showing that the two plants are closely related.
- The activities of the isolates were mild compared with the positive controls/ standard drugs used in this study.

5.3 Recommendations

- Concoctions from the three plants can be used as herbal remedies in health-care systems since the ethnomedical information has been confirmed by the positive results in bioassay analysis of both the crude extracts and isolates.
- This ethnomedical information should be documented for dissemination and stored as part of Kenya/African/Global medicinal plants database
- Large-scale cultivation of these plants should be done while conservation of plants already there should be encouraged to avoid their extinction.

5.4 Suggestions for further studies

- More tests should be carried out to evaluate the crude extracts from these plants for any broad spectrum bioactivities.
- Structural modification should be done on the isolated compounds to test if this can improve activity.
- Studies should also be carried out on the active isolates to test any synergy, antagonism and mechanism of action.