

Individual and Combinatorial Antibacterial Properties of *Plectranthus amboinicus*, *Murraya Koenigii*, *Acorus Calamus* and *Azadirachta Indica* Against Acne Causing Bacteria *Staphylococcus aureus*, *Propionidcaterium acnes* and *Staphylococcus epidermibis*

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ABSTRACT

Bacteria have developed resistance against various antibiotics. The aim of this study is to test for antibacterial properties of *Murraya koenigii*, *Plectranthus amboinicus*, *Azadirachta indica* and *Acorus calamus* crude extracts against clinically important bacteria *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Propionibacterium acnes*. A preliminary test was done to test individual and also combinatorial ethanolic extract formulas using the disk diffusion assay and agar diffusion assay against the pure bacterial cultures and also acne samples that had been obtained with the consent of volunteers. The disk diffusion assay carried out allowed less amount of extracts of *M. koenigii*, *P. amboinicus*, *A. indica* and *A. calamus* compared to the agar diffusion assay. The negative control used was 80% ethanol to confirm that the ethanol in the extraction preparation did not affect the antibacterial activity. It was noticed that all four extracts had antibacterial activity. However, in combination with *A. calamus*, there is an antagonistic effect that decreases the diameter of the zone of inhibition produced. The combination of *M. koenigii* and *A. indica* showed promising results and was further tested against pure bacterial cultures and acne sample cultures and provided a rather satisfying zone of inhibition for several sample especially Acne sample 5. Each combination of extract had different effect on different bacteria. ANOVA analysis also showed the mean difference is significant at the 0.05 level for *P. acnes*, Acne sample 5, 6, and 7 where else no significance was generated at 0.05 level for *S. aureus*, *S. epidermidis* and Acne sample 4. The tests also suggested that for topical application of these antibacterial agents, the crude plant extracts are best individually and not in combination.