

<b>Research Title</b>	Antimicrobial, antioxidant, antityrosinase, and phytochemical assessment of crude extracts and essential oils from <i>Alpinia intermedia</i> Gagnea and evaluation for safety assessment of deodorant roll-on product in clinical trials
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Galangal extracts are used for anti-fungal, anti-tumor, antimicrobial, anti-inflammatory, antioxidant, anti-tyrosinase and many other properties. Home galangal, yellow galangal and water galangal were tested against odour-producing bacteria. The home galangal, yellow galangal and water galangal has been identified as *Alpinia siamensis* K. Schum, *Alpinia galangal* (L.) Willd and *Alpinia nigra* (Gaertn.) B.L. Burtt., respectively. Leaf, stem and rhizome of three galangal types were extracted with ethanol solvent. The results found that the average percentage yield of home galangal extract (27.80 %) showed higher compare with other galangal types. The essential oil yield ( $0.098 \pm 0.021$  %) from home galangal rhizome showed higher compare with other galangal types. Yellow galangal extract rhizome gave high active against *Corynebacterium xerosis* 2637 ( $19.00 \pm 0.00$  mm) and *Staphylococcus epidermidis* ATCC 2228 ( $30.25 \pm 9.22$  mm). Furthermore, it gave the highest inhibited *Propionibacterium acnes* DMST 14916 ( $27.25 \pm 3.86$  mm). While, leaf extract from three galangal types were not antibacterial activity against *Corynebacterium xerosis* 2637, *Staphylococcus epidermidis* ATCC 12228, *Propionibacterium acnes* DMST 14916 and *Staphylococcus*

*aureus* ATCC 25923. The best minimal microbial concentrations (MIC) of yellow galangal extract against *Corynebacterium xerosis* 2637 and *Staphylococcus epidermidis* ATCC 12228 was 6.25mg/mL, followed by both *Propionibacterium acnes* DMST 14916 and *Staphylococcus aureus* ATCC 25923 were exhibited a MIC of 12.5 mg/mL. The yellow galangal extract against showed the best antioxidant activity ( $38.12 \pm 0.18$   $\mu\text{mol}$  Trolox/g extract), anti-mutant activity and nontoxic from UV. The value of highest tyrosinase inhibition from home galangal stem was  $77.93 \pm 1.67\%$ . The water galangal rhizome extract showed highest phenolic compound (4.30 mg GAE/g extract).

In an *in vivo* Sniff test, the deodorant formula 5 (3% yellow galangal rhizome extract) was evaluated by the assessment of body odour over 48 hours at three time points. The results found that odour at 12-24 h still showed a reduction in odour. After 24 hours treatment of the deodorant formulations there was a reduction in body odour of 43.75%. The reduction of total bacterial counts found that the deodorant formula 3 gave the least reduction in aerobic bacteria count (82.09%) and anaerobic bacteria count (71.92 %).

**Keywords:** *Alpinia siamensis* K. Schum, *Alpinia galangal* (L.) Willd and *Alpinia nigra* (Gaertn.) B.L. Burt. Antibacteria, Antioxidant, Antityrosinase and Deodorant roll-on product