ISOLATION, CHARACTERIZATION, STRUCTURAL ELUCIDATION AND BIOACTIVITY OF SOME PHYTOCHEMICAL CONSTITUENTS FROM RHIZOME OF SHAN-PAN-OOT (*KAEMPFERIA PULCHRA* RIDL.)

PhD (DISSERTATION)

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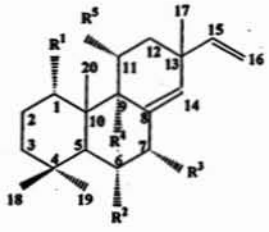
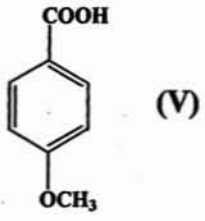
ABSTRACT

Shan-pan-oot (*Kaempferia pulchra* Ridl., Family *Zingiberaceae*) is one of the Myanmar indigenous plants distributed in Aung Ban, Shan State, Myanmar and in the South Western part of Thailand. It is widely used in Myanmar for the treatment of a wide range of diseases such as inflammation, urinary tract infection and diabetes. In the present chemical investigation, four novel pimarane diterpenes namely sandaracopimaradiene-1α,6β-diol (I) (m.p.133-136°C) (0.012%), sandaracopimaradiene-7α,9α-diol (II) (m.p. 193-196°C) (0.012%), sandaracopimaradiene-7-oxo-9α-ol (III) (m.p. 212-215°C) (0.007%), sandaracopimaradiene-1α,11α-diol (IV) (m.p. 156-158°C) (0.007%) and two known compounds namely p-methoxy benzoic acid (V) (m.p. 180-183°C) (0.0012%) and methyl p-hydroxy cinnamate (VI) (0.0012%) were isolated from rhizomes of *K. pulchra*. The structures of the isolated compounds were elucidated and identified by utilizing modern spectroscopic techniques such as UV, FT-IR, ^{1}H NMR, ^{13}C NMR, DEPT, 2D NMR (^{1}H-^{1}H COSY, HMQC, HMBC), 1D NOE, 1D TOCSY, ESI-MS, EI-MS, HRESI-MS spectroscopy and elemental analysis. On the other hand, as a part of the study on the pharmaceutical investigation of this plant, the preliminary acute toxicity effect of 70% EtOH crude extract of rhizome of *K. pulchra* was first assessed on male ICR (Institute of Cancer Research) mice of 25-30 g body weight. In acute toxicity test, toxic or harmful effects did not occur. The Hypoglycemic activity of two crude extracts (70% EtOH & H_2O) and two isolated compounds (I and II)

were then evaluated on adrenaline (0.2 mg/kg) induced male OFA (Original France Albino) rats of 250-300 g body weight. The effective doses of hypoglycemic activity were found to be 1000 mg/kg H_2O extract ($p < 0.01$, 32% reduction at 3 hr),300 mg/kg 70% EtOH extract ($p < 0.01$, 40% reduction at 3 hr), 2 mg/kg (I) ($p < 0.01$, 43% reduction at 1 hr), and 2mg/kg (II) ($p < 0.01$, 40% reduction at 1 hr) respectively. The order of effect of hypoglycemic property was observed to be 2 mg/kg compound (I) ≥ 2 mg/kg compound (II) > 300 mg/kg 70% EtOH extract > 1000 mg/kg H_2O extract. Furthermore, five crude extracts (PE, 70% EtOH, CH_2Cl_2, EtOAc, H_2O) and all isolated compounds of rhizome of *K. pulchra* were screened for antibacterial activity using agar disc diffusion method against *Escherichia coli, Vibrio cholerae* B, *Samonella typhi, Staphylococcus aureus* and *Pseudomonas aeruginosa.* Except H_2O extract, all of the crude extracts as well as all isolated compounds were found to exhibit antibacterial activity against the organisms tested. It may be inferred that the ethanol extract of Shan-pan-oot may be used safely in the treatment of diabetes because the 70% ethanol extract showed pronounced hypoglycemic activity against *in vivo* test on adrenaline induced diabetic albino male rat model. From the antibacterial tests of 70% ethanol extract of Shan-pan-oot on 5 test microorganisms, the ethanol extract of Shan-pan-oot may also be used in the formulation for the treatment of diarrhea, dysentery, typhoid, and cholera.



	R^1	R^2	R^3	R^4	R^5
I	OH	OH	H	H	H
II	H	H	OH	OH	H
III	H	H	O	OH	H
IV	OH	H	H	H	OH



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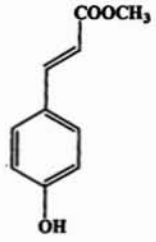

(VI)

Keywords: Shan-pan-oot, *Kaempferia pulchra* Ridl., sandaracopimaradiene-1α,6β-diol, sandaracopimaradiene -7α,9α-diol, sandaracopimaradiene-7-oxo-9α-ol , sandaracopimaradiene-1α,11α-diol, acute toxicity, hypoglycemic activity, antibacterial activity.