



Short report

Antiproliferative activity of Thai medicinal plant extracts on human breast adenocarcinoma cell line

Primchanien Moongkarndi^{a,*}, Nuttavut Kosem^a,
Omboon Luanratana^b, Suna Jongsomboonkusol^a,
Narongchai Pongpan^b

^aDepartment of Microbiology, Faculty of Pharmacy, Mahidol University, Rajdhevee, Sri Ayudthaya Rd, Bangkok 10400, Thailand

^bDepartment of Pharmacognosy, Faculty of Pharmacy, Mahidol University, Rajdhevee, Bangkok 10400, Thailand

Received 2 July 2003; accepted 20 January 2004

Abstract

Ethanollic extracts of selected nine Thai medicinal plants were tested for antiproliferative activity against SKBR3 human breast adenocarcinoma cell line using MTT assay. *Garcinia mangostana* showed the most potent activity. However, all plant extracts showed activity in potential range for further investigation on cancer cells.

© 2004 Elsevier B.V. All rights reserved.

Keywords: Antiproliferative activity; Breast cancer; Thai medicinal plants; MTT assay

Plant. *Garcinia mangostana* L. (Guttiferae) pericarp, *Phyllanthus amarus* Schum. & Thonn. (Euphorbiaceae) whole plant, *Passiflora foetida* L. (Passifloraceae) aerial part, *Ardisia elliptica* Thunb. (Myrsinaceae) fruit, *Morinda citrifolia* L. (Rubiaceae) fruit, *Aegle marmelos* (L.) Corr. (Rutaceae) fruit, *Heliotropium indicum* L. (Bora-

*Corresponding author. Tel.: +66-2644-8692; fax: +66-2247-4696.
E-mail address: pypmk@mahidol.ac.th (P. Moongkarndi).

ginaceae) whole plant, *Stephania venosa* Spreng. (Menispermaceae) bulb and *Thunbergia laurifolia* L. (Acanthaceae leaf). All plants were collected from many provinces of Thailand between 2000–2001. The voucher specimens were deposited in forest herbarium of the Royal Forest Department, Bangkok, Thailand.

Uses in traditional medicine. *G. mangostana* possesses anti-inflammatory, astringent, antibacterial, antitumor and antioxidative activities [1]; *P. amarus* is used in flu, cough, hepatitis, diabetes, jaundice [2]; *H. indicum* has wound healing effect [3]; *P. foetida* is used in vomiting, eczema and chronic ulcer [4]; *S. venosa* is used in skin diseases, diabetes, anaemia; *A. elliptica* has antipyretic activity and is used in diarrhea, gonorrhoea, venereal diseases; *M. citrifolia* used in rheumatism and other pains, has wound healing effect [5]; *A. marmelos* possesses activity in diarrhea, dyspepsia, dysentery and mental diseases [6].

Previously isolated constituents. *G. mangostana*: xanthenes, tannin [1]; *P. amarus*: tannin [2]; *H. indicum*: alkaloids [7]; *P. foetida*: passifloricins [8]; *S. venosa*: alkaloids [9]; *M. citrifolia*: glycosides, anthraquinones [5]; *A. marmelos*: aegeline, imperatorin, xanthotoxol [10].

Tested material. Yields of ethanolic extract from tested material: *G. mangostana* (23.8%), *P. amarus* (12.7%), *H. indicum* (7.9%), *P. foetida* (12.0%), *S. venosa* (16.2%), *A. elliptica* (10.7%), *M. citrifolia* (19.3%), *A. marmelose* (19.2%) and *T. laurifolia* (10.8%).

Studied activity. Antiproliferative activity studied by MTT assay on SKBR3 cell line at 48 h [11,12].

Table 1

Antiproliferative activity of ethanolic extracts of Thai medicinal plants on SKBR3 cell line

| Tested material | IC ₅₀ ^a (μg/ml) |
|---------------------------------|---------------------------------------|
| <i>G. mangostana</i> (pericarp) | 15.45 ± 0.50 |
| <i>P. amarus</i> (whole plant) | 34.25 ± 3.48 |
| <i>H. indicum</i> (whole plant) | 34.50 ± 9.09 |
| <i>P. foetida</i> (aerial part) | 54.75 ± 6.03 |
| <i>S. venosa</i> (bulb) | 76.50 ± 2.46 |
| <i>A. elliptica</i> (fruit) | 103.25 ± 6.42 |
| <i>T. laurifolia</i> (leaf) | 106.88 ± 11.81 |
| <i>M. citrifolia</i> (fruit) | 120.00 ± 5.43 |
| <i>A. marmelos</i> (fruit) | 144.00 ± 1.21 |
| Paclitaxel ^b | 22.20 ± 2.30 |

All determinations were done in triplicate, standard deviation for 95% confidence.

^a IC₅₀; the concentration of drug required for 50% inhibition.

^b Reference standard.

Results. Reported in Table 1.

Conclusions. Nine Thai medicinal plants (selected on their availability including their traditional uses) were tested on antiproliferative activity on SKBR3 human breast cancer cell line using MTT assay. The ethanolic extract from *G. mangostana* showed the most potent activity with IC_{50} 15.45 ± 0.50 $\mu\text{g/ml}$. However, we concluded that all extracts from these plants showed IC_{50} in potential range for further investigation on other activities against cancer cells [13].

Acknowledgments

This study was supported by a grant from Faculty of Pharmacy, Mahidol University.

References

- [1] Chairungrilerd N, Takeuchi K, Ohizumi Y, Nozoe S, Ohta T. *Phytochemistry* 1996;43:1099.
- [2] Foo LY. *Phytochemistry* 1993;33:487.
- [3] Reddy JS, Rao PR, Reddy MS. *J Ethnopharmacol* 2002;79:249.
- [4] Morton JF. *Atlas of medicinal plants of Middle America—Bahamas to Yucatan*. Charles Thomas Publisher, 1981.
- [5] Zin ZM, Abdul-Hamid A, Osman A. *Food Chem* 2002;78:227.
- [6] Rana BK, Singh UP, Taneja V. *J Ethnopharmacol* 1997;57:29.
- [7] Pandey VB, Singh JP, Rao YV, Acharya SB. *Planta Med* 1982;45:229.
- [8] Echeverri F, Arango V, Quiñones W, Torres F, Escobar G, Rosero Y, Archbold R. *Phytochemistry* 2001;56:881.
- [9] Banerji J, Chatterjee A, Patra A, Bose P, Das R, Das B, Shamma M, Tantisewie B. *Phytochemistry* 1994;36:1053.
- [10] Sharma BR, Rattan RK, Sharma P. *Phytochemistry* 1981;20:2606.
- [11] Moongkarndi P, Srivattana A, Bunyaphrathasara N, Puthong S, Laohathai K. *Mahidol Univ J Pharm Sci* 1991;18:25.
- [12] Studzinski GP. *Cell growth and apoptosis: a practical approach*. IRL Press, 1995.
- [13] Ruffa MJ, Ferraro G, Wagner ML, Calcagno ML, Campos RH, Cavallaro L. *J Ethnopharmacol* 2002;79:335.