Phytochemical and bioactivity studies from *Plectranthus hadiensis* varieties

Eva María Domínguez-Martín [1,2*], Márcia Santos Filipe [1,2*], Epole Ntungwe [1,2], Andreia Rosatella[1,3], Elian Jiménez [1], Ana María Díaz-Lanza[2], Patrícia Rijo[1,3]

[1] CBIOS – Universidade Lusófona's Research Center for Biosciences & Health Technologies, Campo Grande 376, 1749-024 Lisbon, Portugal.

[2] University of Alcalá de Henares, Faculty of Pharmacy, Department of Biomedical Sciences, Pharmacology Area (Pharmacognosy Laboratory), New antitumor compounds: Toxic action on leukemia cells research group. Ctra. A2, Km 33.100 – Campus Universitario, 28805. Alcalá de Henares, Madrid, Spain.

[3] Research Institute for Medicines (iMed.ULisboa), Faculty of Pharmacy, University of Lisbon, 1649–003 Lisbon, Portugal.

*These authors share first authorship.

1. INTRODUCTION & OBJECTIVES

The *Plectranthus* genus belongs to the Lamiaceae family and consists of around 300 species distributed from Africa to Asia, and Australia. This genus has been used traditionally for a wide range of complaints including cancer, inflammatory and skin disorders [1]. Several studies have reported that *Plectranthus* species are rich in abietane-type diterpenes, such as royleanones, which can justify their diverse biological activities [2]. One of such species is *P. hadiensis* (Forssk.) Schweinf. ex Sprenger, which has been documented to be useful against several types of tumours and skin related diseases. The objective of this work is to study the phytochemistry and biological activity of *P. hadiensis* (Forssk.) Schweinf. ex Sprenger. var. hadiensis leaves, stems and whole plant acetone and methanol extracts.

Fig 1. Aerial parts of *P. hadiensis var. hadiensis*

2. METHODS & MATERIALS

Air-dried *P. hadiensis* stems, leaves and whole plant were extracted in acetone and methanol using the ultrasound-assisted extraction method. The phytochemical study was done using different chromatographic techniques and their chemical composition studied and compared. *P. hadiensis* acetone leaves and whole plant methanol extracts were screened for their antioxidant, antimicrobial, general toxicity, and cytotoxic activities.

3. RESULTS

Table 1. *P. hadiensis* var. hadiensis extraction yields, antioxidant activity (DPPH assay), General toxicity (*Artemia salina* assay) and antimicrobial activity (Well-diffusion method).

P. hadiensis var. hadiensis extracts	Yield (% w/w)	% AA	% Mortality	Antimicrobial Activity		
				Sa (ATCC 25923)	Sa (ATCC 6538)	Ca (ATCC 10231)
Leaves acetone extracts	13,49	36,24±0,04	43,65±3,04	11	N/A	15
Stems acetone extracts	2,96	N/A	N/A	N/A	N/A	N/A
Whole plant methanol extracts	4,72	43,71 ±0,00	4,39±3,91	12	16	N/A
Positive control	N/A	92,77 ±5,65	88,94±0,07	18	22	20
Negative control	N/A	N/A	21.87 0.44	5	5	5

AA- Antioxidant activity. *Sa- Staphylococcus aureus. Ca- Candida albicans.* N/A- Not applicable. Positive controls: Antioxidant Activity (Quercetin); Mortality (Potassium dichromate); Antimicrobial activity (Vancomycin (*Sa*) Nystatin (*Ca*)). Negative control- DMSO.

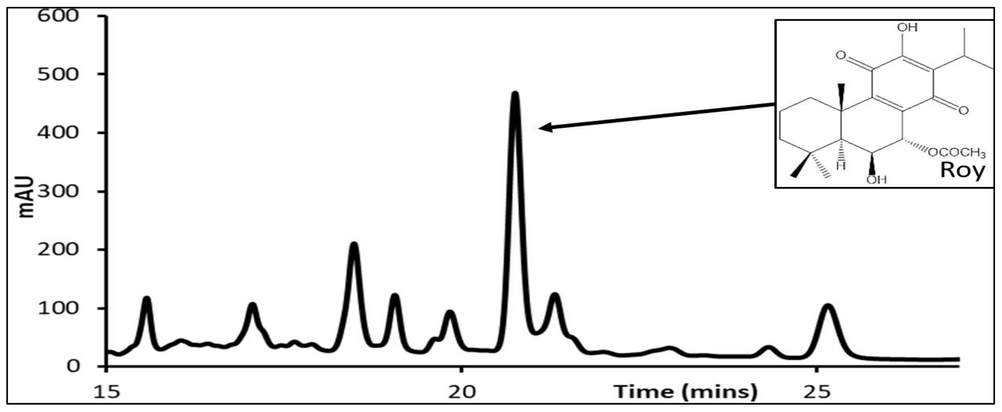

Fig 2. HPLC representative chromatogram (270 nm) of *P. hadiensis* leaves showing the major compound, 7α-acetoxy-6β-hydroxyroyleanone (Roy).

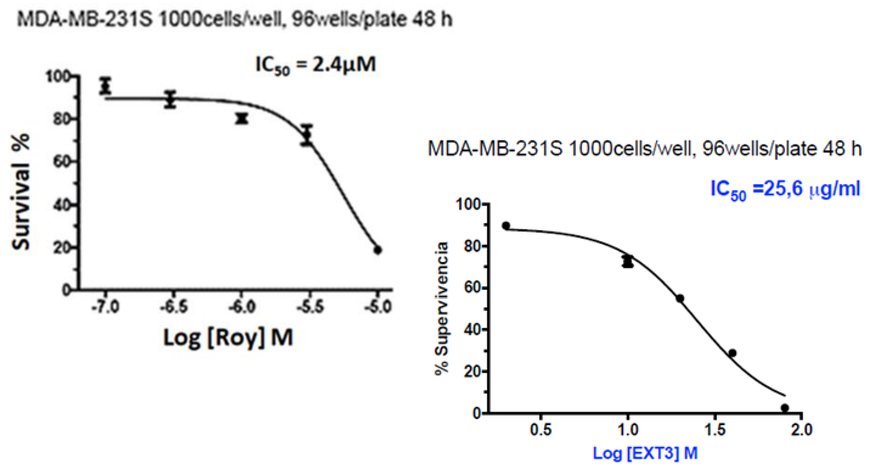

Fig 3. Concentration-response curves (IC_{50} µM) for Roy and *P. hadiensis* var. leaves acetone extract.

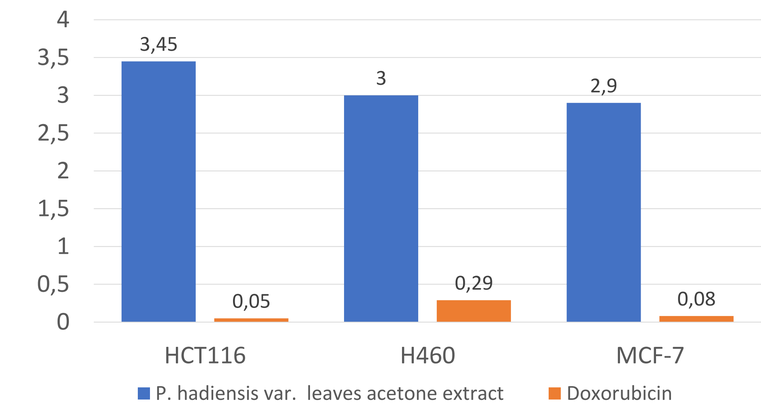

Fig. 4. *P. hadiensis* var. leaves acetone extract cytoxicity (IC_{50}).

4. CONCLUSIONS

- The results indicate a great difference on the HPLC profile between the acetone extracts from leaves and stems. Roy was found to be the major compound in the acetone leaves extract but not in the stems extract.
- The antimicrobial activity was higher in acetone extract than in methanol extract, while the acetone leaves extract had the highest general toxicity.
- All extracts were found to have antioxidant activity. Roy isolated from the acetone leaves was found to be about 12 times more cytotoxic against the MDA-MB-231S cancer cell lines than the corresponding extract.
- Currently, phytochemical studies on the acetone stems, methanol whole plant of *P. hadiensis* var. hadiensis and *P. hadiensis* var. tomentosus leaves and stems methanol, acetone and ionic liquid extracts is ongoing to elucidate the main compounds that may be responsible for its biological activity.

5. BIBLIOGRAPHY

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