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Indole alkaloids from *Vinca sardoa* (Stearn) Pignatti: phytochemical study and *in vitro* antileukemic activity on a B lymphoblast cell line (SUP-B15)

Chaired by Dr. Alfredo Berzal-Herranz and Prof. Dr. Maria Emília Sousa

pharmaceuticals MDPI

Chiara Toniolo[1]*, Rita Petrucci[2], Annarita Stringaro[3], Marisa Colone[3], Andrea Maxia[4], Maria Teresa Petrucci[4] and Sebastiano Foddai[1]

[1]Department of Environmental Biology, "Sapienza" University of Rome, Piazzale Aldo Moro 5, 00185 Rome, Italy
[2]Department of Basic and Applied Sciences for Engineering, "Sapienza" University of Rome, Rome, Italy
[3]National Center for Drug Research and Evaluation, Italian National Institute of Health, Rome, Italy
[4]Laboratory of Economic and Pharmaceutical Botany, Department of Life and Environmental Sciences, University of Cagliari, Italy
[5]Department of Cellular Biotechnologies and Hematology, "Sapienza" University of Rome, Rome, Italy

*Corresponding author: chiara.toniolo@uniroma1.it

SAPIENZA UNIVERSITÀ DI ROMA

ISTITUTO SUPERIORE DI SANITÀ

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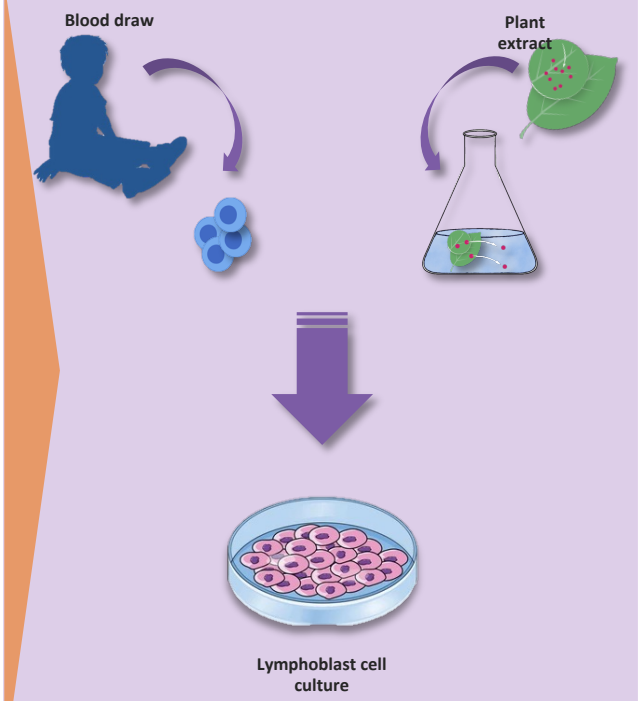
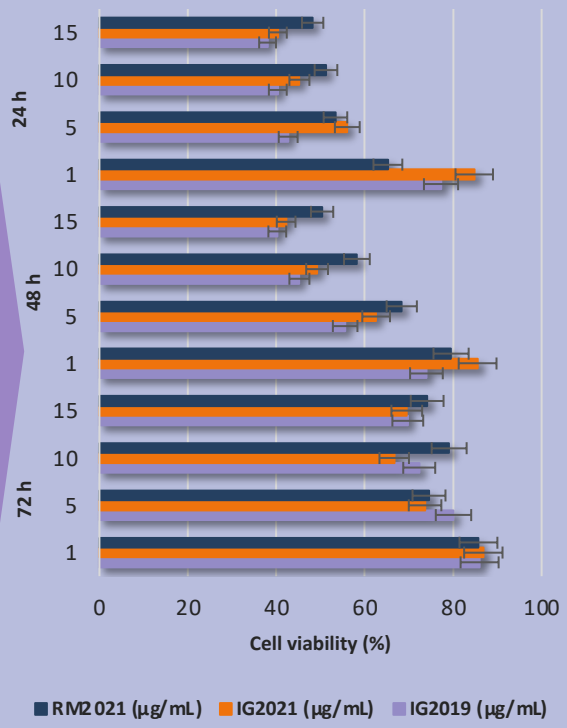
PHYTOCHEMICAL ANALYSIS

Alkaloids from *Vinca sardoa* (Stearn) Pignatti

BIOLOGICAL ASSAY



RESULTS



Abstract: Some of the most used chemotherapeutic agents in oncological therapies are derived from natural substances, in particular from plants. These compounds can be extracted from various parts of plants, such as roots, leaves, flowers, or fruits, and are often recognized for their anticancer or antitumor properties. Some well known examples of plant-derived chemotherapeutics include: Taxol extracted from the Pacific yew tree (*Taxus brevifolia* Nutt.) and another taxanes obtained from *Taxus baccata* L., Camptothecin extracted from happy tree (*Camptotheca acumina*ta Decne.), Vinblastine and Vincristine extracted from the periwinkle plant (*Catharanthus roseus* (L.) G.Don) and more. In this study, the anti-leukemic activity of a plant widely distributed in Sardinia, the second largest Italian island in the Mediterranean Sea, *Vinca sardoa* (Stearn) Pignatti, known as Sardinian periwinkle, was investigated. This species is known for its indole alkaloids, which exhibit a wide range of biological activities. Three extracts obtained from the aerial parts of plants cultivated in Italy, two from Iglesias (Sardinia) and one from Rome (Italy), were tested at different concentrations (1, 5, 10, and 15 µg/mL) on a B lymphoblast cell line (SUP-B15). Each extract demonstrated a good capacity to induce reductions in cell proliferation of up to 50%, and none of the concentrations exhibited cytotoxicity on normal cells.

Keywords: *Vinca sardoa* (Stearn) Pignatti; *Vinca difformis* subsp. *sardoa* Stearn; alkaloids; antileukemic activity; HPLC-PDA-ESI-MS analysis

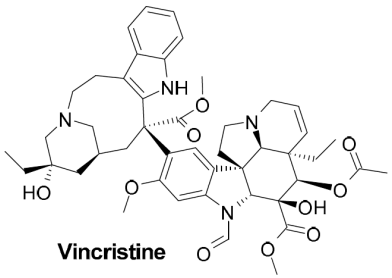
Introduction

Sardinian periwinkle is a perennial herbaceous widely diffused in Sardinia (Italy).

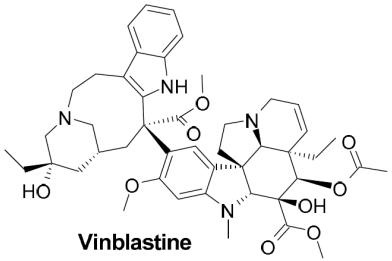
The roots and leaves of *V. sardoa* contain indole alkaloids e.g., norfluorocurarine, akuammigine, conoflorine, and venalstonine.

Indole alkaloids have a long history of use, nowadays they are well-known for their diverse biological effects, including antimicrobial, antidepressant, antiviral, and anticancer properties.

Vincristine and vinblastine are used for the treatment of some kind of cancers such as lymphomas and acute lymphoblastic leukaemia (ALL).



Vincristine



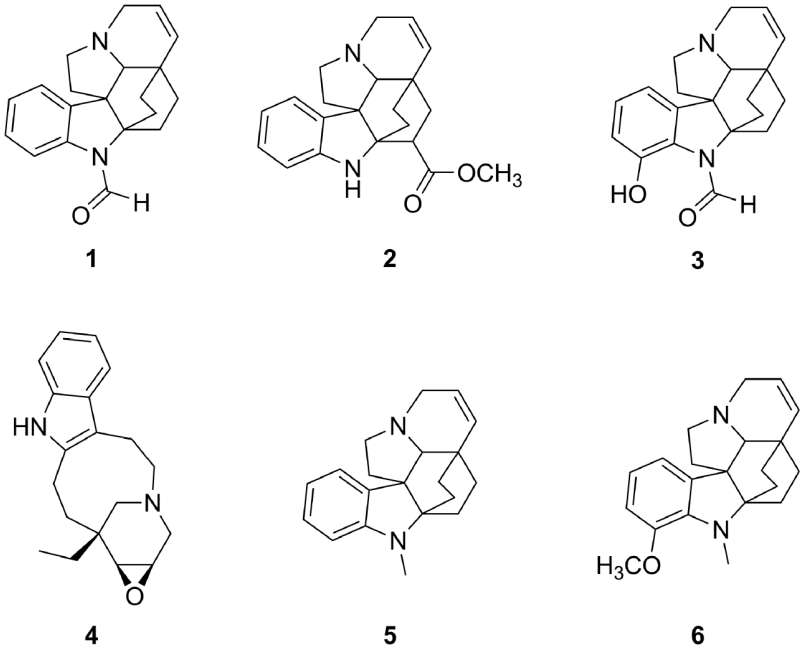
Vinblastine

Results and discussion: *Sampling*

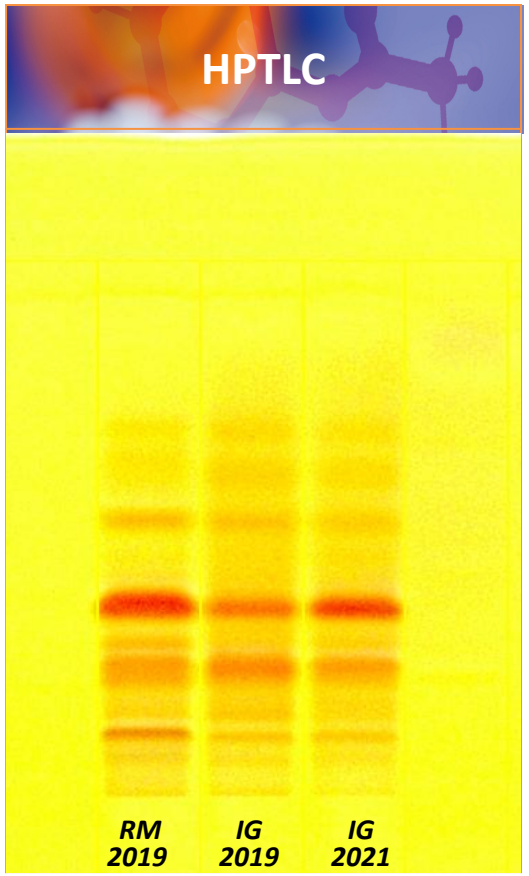
The aerial parts of *V. sardoa* were collected in Iglesias (Italy) in 2019 and 2021 (IG2019 and IG2021), as well as in the experimental botanical garden of Sapienza University of Rome in 2019 (RM2019). The samples were processed to extract alkaloids and were subsequently analyzed using LC-MS and NMR spectroscopy.

Moreover, the extracts were tested for *in vitro* activity on a B lymphoblast cell line (SUP-B15) and a normal cell line (fibroblast).

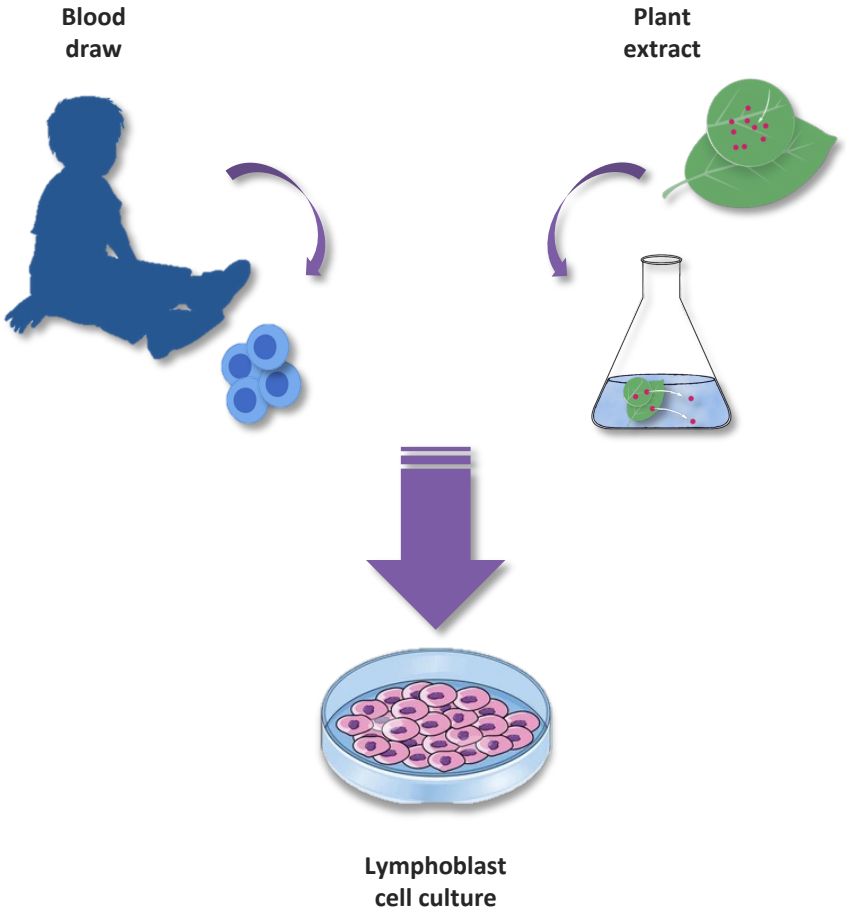
Results and discussion: *Phytochemical study*

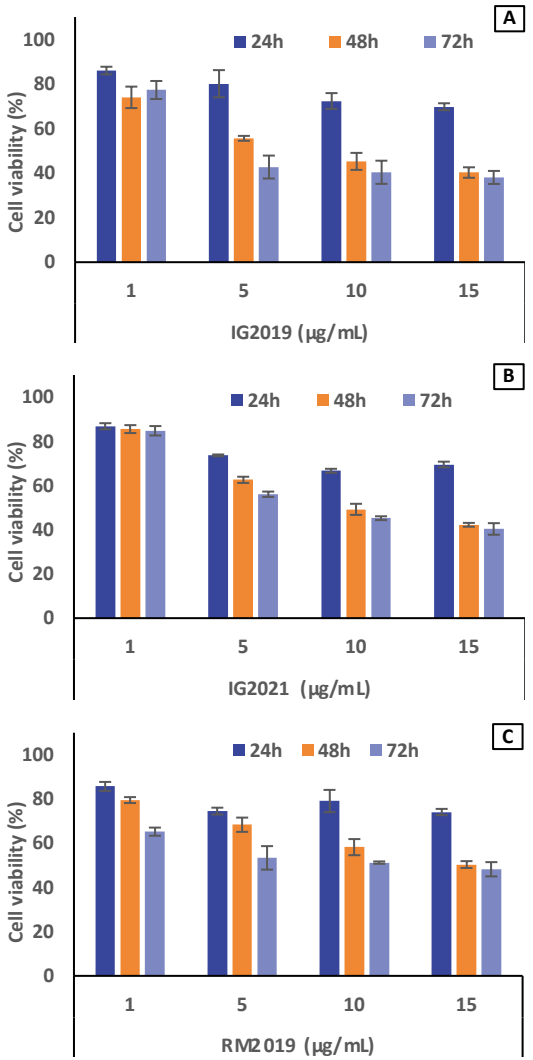


N(1)-formyl-14,15-didehydroaspidofractinine (**1**); venalstonine (**2**); *N*(1)-formyl-14,15-didehydro-12-hydroxyaspidofractinine (**3**); conoflorine (4); *N*(1)-methyl-14,15-didehydroaspidofractinine (**5**); *N*(1)-methyl-14,15-didehydro-12-methoxyaspidofractinine (**6**)



Results and discussion: *Cytotoxicity Assays*





Cell viability analysis in SUP-B15 cells treated with IG2019 (A), IG2021 (B), and RM2019 (C) at 24, 48, and 72 h. All experiments were performed in triplicate and the data are expressed as mean ± SD values.

Conclusions

- The phytochemical analyses revealed that IG2019, IG2021 and RM2019 contain indole alkaloids
- All the extracts tested were able to induce a reduction in cell proliferative capacity without showing a cytotoxic effect on normal cells
- This is the first study that investigated the biological activity of *V. sardoa*

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