

Poster session

Research on raw materials and plant extracts used in the care and treatment of skin diseases

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12. Bioactive plant-derived compounds from *Psephellus bellus* as a promising antifungal agents

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13. Extract of *Ajuga reptans* as an active ingredient of antipollution cosmetics

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14. Green tea (*Camellia sinensis* (L.) Kuntze) and yerba mate (*Ilex paraguariensis* A.St.-Hil.) extracts as active ingredients for anti-aging cosmetics

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15. Fruit peel extracts – active ingredients for anti-aging cosmetics

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Introduction. Fungal infections are an epidemiological, therapeutic, and social problem. Additionally, COVID-19 increases the risk for fungal infections. Skin care plays a large role in alleviating the cutaneous symptoms of fungal infections. The new ingredients for therapeutic formulations, especially of natural origin, are desirable, because of pathogenic fungi are becoming resistant to standard antifungal treatments.

Materials and methods. Herbs of *Psephellus bellus* were collected from the garden of the Department and Division of Practical Cosmetology and Skin Diseases Prophylaxis, Poznań University of Medical Sciences and the seeds of *P. bellus* were provided by the Botanical Garden in Karaganda (Kazachstan). Phytochemical analysis were performed, and selected lipophilic compounds as well as the herb extract of this species containing 26 sesquiterpene lactones were tested. The antifungal effect of the herbal compounds was determined on clinical strains of fungi *Candida*, *Rhodotorula*, *Trichophyton*, *Microsporum*, and *Scopulariopsis* using a diffusion test. All strains were isolated from the infected skin and nails of patients. The MTT assay was employed to study the cytotoxic effects of the extract against human fibroblasts. Statistical analysis was performed.

Results. All analyzed compounds exhibited antifungal activity in cultivations suitable for assessment. Most lipophilic cembellins from *P. bellus* prevent the growth of most fungal strains. The yeast-like fungi, *Candida famata* and *C. glabrata* as well as dermatophytes from *Trichophyton* genus *T. rubrum* and *T. mentagrophytes* var. *interdigitale* were the most susceptible to the analyzed compounds.

Conclusions. The extract of the herb *P. bellus* showed antifungal properties probably due to the presence of unique guaianolides, with an ester on C-2. The extract of *P. bellus* herb may constitute promising ingredients of preparations beneficial for skin with fungal infections.

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Introduction. Environmental and air pollution affect the condition of human skin. Growing awareness of the impact of pollution on the condition of the skin, has prompted the market to develop new preparations to protect the skin from the negative impact of environmental factors [1].

Material and methods. *Ajuga reptans* is a plant that contains active compounds including ecdysteroids, iridoids and flavonoids [2-5], which are potent antioxidant compounds. Extracts of *Ajuga*, are antioxidants and UV-protective agents in cosmetic preparations [2]. Methanolic extracts from the root and herb of the plant were analyzed. The extracts were tested by methods: DPPH, Folin-Ciocalteu, FRAP and ABTS. Cosmetic preparations in the form of O/W emulsions were prepared, for which organoleptic, functional, microbiological and rheological properties were studied, and tests were carried out with probands.

Results. The tests confirmed that extracts of the plant's herb showed the highest antioxidant values. Tests conducted on the extracts, showed the ability of the extracts obtained from the whole plant to absorb ultraviolet radiation in three ranges of ultraviolet radiation: UVA, UVB and UVC. The obtained emulsions were stable. The use tests confirmed the positive effect of cosmetics - containing extracts from *Ajuga reptans* - on the condition of the skin.

Conclusions. The research confirmed the possibility of using the extract from *Ajuga reptans* as an active ingredient in cosmetic preparations. The results show the possibility of using *Ajuga reptans* extracts as a very good active ingredient used in antipollution preparations.

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14. Green tea (*Camellia sinensis* (L.) Kuntze) and yerba mate (*Ilex paraguariensis* A.St.-Hil.) extracts as active ingredients for anti-aging cosmetics

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Introduction. Cosmetics with anti-aging properties, containing active substances of natural origin, are of increasing interest among consumers in recent years. Plant extracts used in this type of cosmetic products are characterized by a high content of polyphenolic compounds, the ability to neutralize free radicals and the potential to reduce skin hyperpigmentation - one of the important aesthetic problems of aging skin. Raw materials that combine these properties are, for example green tea (*Camellia sinensis* (L.) Kuntze) and yerba mate (*Ilex paraguariensis* A.St.-Hil.) extracts, more and more often found in formulations for mature skin [1, 2].

Materials and Methods. The phytochemical composition, antioxidant and skin-lightening potential of extracts from green tea (*Camellia sinensis*) and yerba mate (*Ilex paraguariensis*) was compared. The extracts were prepared by ultrasound assisted extraction in three solvents: water (W extracts), 50% (v/v) ethanol (E extracts) and 50% (v/v) propylene glycol (WG extracts). WG extracts from *C. sinensis* and *I. paraguariensis* have not been the subject of scientific research so far, despite their wide application in the formulations of various forms of cosmetics. The antioxidant properties of the extracts were compared using the DPPH and ABTS scavenging assays, and the skin-lightening properties were assessed using the tyrosinase inhibition test. In order to compare the phytochemical composition, the HPLC-ESI-QTOF-MS/MS technique was used.

Results. The conducted research showed that yerba mate extracts contain more polyphenolic compounds and flavonoids in total than *C. sinensis* extracts. Nevertheless, stronger antioxidant and skin-lightening properties were noted in the case of green tea extracts. WG extracts from both plants were characterized by the highest content of flavonoids and the strongest antioxidant potential in the ABTS scavenging assay. Significant differences between the W, E and WG extracts were also observed in their phytochemical composition.

Conclusions. WG extracts from *Camellia sinensis* and *Ilex paraguariensis* are a valuable source of antioxidant and skin-lightening ingredients for anti-aging cosmetics.

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Introduction. Plant by-products derived from the food industry are one of the major environmental concerns worldwide. Due to the high content of bioactive compounds such waste may be considered hazardous due to the interference with the plant growth, deterioration of the drinking water quality or toxic effects on sensitive marine organisms. At the same time plant-derived waste and by-products, with proper handling, may represent a low-cost source of several bioactive compounds potentially important for pharmaceutical and cosmetic industries. Phytochemical analysis of plant by-products and development of sustainable biowaste processing methods might help to meet the growing demand for natural products without increasing the exploitation of plant resources [1,2].

Materials and Methods. The aim of studies was to compare the phytochemical content and selected properties important for anti-aging cosmetics of pulp and peel extracts obtained from selected fruits: *Cydonia oblonga*, *Diospyros kaki*, *Annona cherimola* and *Fortunella margarita*. The extracts were prepared by ultrasound-assisted extraction using “green” solvents: water (**W** extracts), 25% (v/v) polyethylene glycol (**WG** extracts) and 20% (v/v) ethanol (**E** extracts). The extracts were compared for the content of total phenolics, flavonoids, antioxidant activity (DPPH and ABTS scavenging), tyrosinase inhibition and *in vitro* sun protection factor. The differences between compared extracts in respect of phytochemical composition were analysed by HPLC-ESI-QTOF-MS/MS method.

Results. All analyzed fruit peel extracts contained higher amounts of bioactive compounds and were more active in respect of the antioxidant properties and *in vitro* SPF than flesh extracts. The tyrosinase inhibitory activity was more significant for the flesh extracts.

Conclusions. The study shows that fruit peels, considered as by-products of the food industry, are a rich source of active compounds with potential application in anti-aging cosmetic formulations, protecting the skin from the negative impact of environmental factors. The extracts might be obtained using simple and eco-friendly extraction methods and “green” solvents.

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