

V.1. PLANTS FROM THE SPONTANEOUS FLORA OF ROMANIA WITH TOPIC SKIN PROTECTION ACTION AGAINST EXTERNAL FACTORS THAT INDUCE OXIDATIVE STRESS - A MINI REVIEW

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Abstract

For skin care, the organic ingredients have been used by folk products. Today, they are becoming more used because of the toxic action of chemical products. Thus, there is a great demand that natural products should be used in cosmetic products. The main benefits that are determined by the plant extracts, used for skin care, contains antioxidant and anti-germ activities or the effect of halting of tyrosinase. Phenol compounds are the main group of natural antioxidants popular on the market and express anti-germ actions, anti-inflammatory or anti-aging, that can get pass the skin barrier. The purpose of the paper was to present a revised and detailed list of the main factors that have effects on the skin, a detailed list of benefits, from a scientific point of view, of topic anti-oxidants, to understand the way of formulating and administering of topic anti-oxidants protection study.

Key words: plant extracts, anti-oxidant activity, phenols, skin.

INTRODUCTION

The spontaneous flora of Romania represents a high source of plants and fungi with therapeutic potential (Vasile et al., 2017). Many of these bioactive elements are underrated, and studies that show the effects of a topic administering were not brought up to date according with the new way of things of the biopharmaceutical field.

The active compounds from plants are becoming more popular as cosmetic ingredients, because, when they act, the skin products, the ones made with plants have a lower toxic rate and are biodegradable (Ribeiro et al., 2015). In addition, these compounds have different biological activities and are therapeutic (Jucá et al., 2018).

The use of cosmetic products is rising in the last years, being used for beauty treatments, for improving skin appearance and for treating many other skin problems (Rinaldi, 2008).

Products that protect against the sun have been evolving, from the first tanning oils and have elements that offer protection from UV radiation within (Korac & Khambholja, 2011). Today, sun block products have sophisticated formulas that promise and offer much more

than a simple UV block and sun burn protection (Young et al., 2019).

Sunscreens are cosmetic products, with a functional role (Shanbhag et al., 2019). The classification criteria differ from skin care and make-up products. The companies are trying to add functional compounds to main sun screen creams through the incorporation of some bioactive ingredients (Ngoc et al., 2019). Through these formulas, extra benefits are obtained, such as anti-aging effects, hydration, anti-wrinkling etc. While some of these extra ingredients have a more advanced protection role for the skin (Dopcea and Matei, 2018), others do not express their advantages only after a long and regular application of the product, thus the majority of effects are limited because of temporary and limited usage time (Ganceviciene et al., 2012).

Thus, in this mini review the main factors that work on the skin, a detailing of benefits, from a scientific point of view, of topic antioxidants, to understand the formulating and way of administering, of topic antioxidants and identifying new ways for antioxidant protection study.

1. Ingredients of natural origins in cosmetic products

The skin has an extremely vast surface, the biggest organ that gives a diverse sensitivity; it protects the body from external factors of the environment and from germs (Abdallah et al., 2017). It offers a certain protection from sun waves that inevitably affects us, and destroys the „horny layer” of the skin, inducing loss of transepidermal water and reduced elasticity (Hillebrand et al., 2010).

According to EU regulation 1223/2009, cosmetics are substances or products destined to be put in contact with different external parts of the body, such as skin, hair, nails and lips, with the purpose to hydrate, change aspect, clean, perfume, and also to confer a sense of wellbeing.

In the formulation of cosmetic products, you can find natural active ingredients and chemical ones that promote benefits similar to medical products, such as beneficial topic actions, and protection against degenerative skin conditions (Ribeiro et al., 2015). Cosmetic products provide nutrients necessary to skin care and the improvement of its appearance, conferring glow to the skin and diminishing wrinkles. Cosmetics are the sort of products with a rapid growth of the industry of personal care natural products (Mukul et al., 2011; Figure 1).



Figure 1. The aspect of cosmetic products based on functional extracts obtained in Faculty of Biotechnology lab

The extractions with HCl, HNO₃ and acetic acid at 60°C for 2 hours lead to lower pectin content in comparison with citric acid extraction (Table 4), which recorded the highest content of 23.06% of fresh matter. By conducting the experiment at 75°C for 2 hours, the pectin content was also lower for the

first 3 acids but higher for citric acid with a value of 14.38% (Table 4).

The use of plants for medical purposes is ensue the appearance of new products on the market that contain natural oils. Plants were the only source of all cosmetic products before the use of industrial substances with similar actions (Ribeiro et al., 2015). Molecules from organic vegetables represents one of the main objectives of the researchers in this field of expertise. With all this, the utilization of extracts needs special attention on the methods of extraction, interaction between plant and solvent and the contents of active ingredients (Zhang et al., 2018). The use of plant extracts in skin care products is pointed out by the demand of consumers that are more preoccupied with the procuring of ecological products that contain ingredients of natural origins (Bruno et al., 2015; Ribeiro et al., 2015).

2. The advantages of extracts of natural origins

The natural products present a rich source of vitamins, protein, anti-oxidant, oils and essential oils, enzymes and other bioactive compounds (Figure 2). Depending on their structure, these extracts can give different elements to cosmetic products (Altemimi et al., 2017).



Figure 2. The aspect of functional extracts obtained in Faculty of Biotechnology lab

2.1. Antimicrobial activity

Pharmaceutical and cosmetic industries have an increasing interest to substitute the synthetic antimicrobial compounds with products that have a working role, without toxicity (Ivanov et al., 2015). Besides the

growing interest of clients for natural agents, the microbial resistance to ordinary antimicrobials is on the rise (Ribeiro et al., 2015) and health problems are appearing. Phenolic compounds are synthesized by plants and mushrooms (Figure 3) for different purposes. Those can interact with the cellular wall of the microorganism, that leads to cellular destruction. Phenols can get into bacterial cells and can determine the coagulation of its contents (Ribeiro et al., 2015).



Figure 3. Mushroom from the Faculty of Biotechnology garden

2.2. Antioxidant activity

The importance of antioxidants of phenolic origin has raised considerably due to their high capacity to inhibit free radicals (Rahman, 2007). Plants rich in phenols can be used to prevent the toxic effects on the skin by UV radiations (Kurutas, 2016).

Phenolic compounds can be assimilated by the organism from the plant extracts, in the form of medicine, food supplements and cosmetic products (Ribeiro et al., 2015). The pattern of phenolic compounds from an extract is highly influenced by the way of extraction, and also by the solvent that was used (Jiménez-Moreno et al., 2019).

In the last years, there has been a rise in the number of scientific studies regarding plants used in traditional medicine on par with their chemical composition and possible benefits for the health of humans (Ekor, 2014). The species *Centaurea cyanus*, which is known as cornflower, originates from Europe and Asia. In Romania, this regnum is present at the mountain side, and is not yet harnessed. In traditional European medicine, the watery

extract from *Centaurea cyanus* is used to treat eye diseases, mental, dermatological and gastric. It also has, a diuretic role, stimulant and tonic (Escher et al., 2018).

2.3. Inhibition effect on tyrosinase

Melanin is a human pigment that gives the color to the eye, hair and skin (Małgorzata and Grzybowski, 2016). It is made and secreted, through a physiological process called melanogenesis in the lowest layer of the skin (Ali & Naaz, 2018). There are two types of melanic pigments produced by melanocytes (Solano, 2014), eumelanin, for black or brown and pheomelanin, for red or yellow. Each person from the same race has, in general, the same number of melanocytes; thus, the type of melanin produced depends on their function, meaning that people who have a dark skin are genetically programmed to constantly produce a higher level of melanin (Ribeiro et al., 2015). When the skin is exposed to solar radiation, the melanogenesis is enhanced by the tyrosinase, a key enzyme of melanogenesis (Zahiu et al., 2010).

3. The benefits of anti-aging creams with solar protection

Exposure to UV radiations is the main source of sun burns on the skin (D'Orazio et al., 2013); harmful quantities of free radicals are produced, oxygen reactive species (ROS), that leads to premature aging (Amaro-Ortiz et al., 2014). The human skin can be protected from the damaging effects of the oxygen reactive species using typical products, such as solar protection cream (Jadoon et al., 2015).

The use of vitamins in sunscreens is widespread (Norval and Wulf, 2009), based on numerous studies, even though the majority of them are on animals or *in vivo*, their “anti-aging” activity is not far off vitamins C and E have a more “preventive” role (Pullat, 2017; antioxidant, that need to be used for sun exposure), while vitamin A and its derivatives are more of a “repairing” type, cancelling some of the damage caused by UV radiations (Lintner, 2017). The main disadvantage is the difficulty to formulate a functional product, thus the right quantity of vitamins can be optimal for a limited amount of time (Lintner, 2017).

CONCLUSIONS

Sun damage prevention can be improved by some of the antioxidant and photoprotector agents; and also, it can be justified that treating sun damage during or immediately after sun exposure with bio-compounds with repairing effect (Lintner, 2017);

Teaching the consumer how to manage sun light, has become a marketing obligation. Prevention supersedes the use of sun screen and includes wearing proper clothes and avoiding to go out during the day at some hours etc;

Many plant extracts, after being properly studied, can be a certain alternative, efficient and cost friendly in cosmetic products;

Today, consumers have a rising interest in natural products, mainly in the case of cosmetic products. In other ideas, many studies refer to the advantages of plant extracts, such as antioxidant capacity, inhibiting tyrosinase and antimicrobial activity, that can be good for reducing and preventing different problems of the skin.

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AUTHOR CONTRIBUTIONS

DCM & EV analyzed the data and wrote the paper. The authors discussed and made comments on the paper.

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