



## **VITIS VINIFERA (GRAPES): A REVIEW ON HEALTH BENEFITS IN SKIN CARE**

**Mr. Ganesh Bhausahb Parkhe<sup>1\*</sup> Ms. Pallavi Jadhav<sup>2</sup>**

<sup>1\*</sup>Student, Pratibhatai Pawar College of Pharmacy Shrirampur

<sup>2</sup>Department of Pharmacology, Pratibhatai Pawar College of Pharmacy Shrirampur

### **ABSTRACT**

*Grapes (Vitis vinifera) are commonly known grape species that belong to the Vitis genus in the Vitaceae family and come from western Asia and southern Europe. Vitis Vinifera (Grapes) contain valuable phenolic components and grape byproducts are widely available low cost raw materials. They also present antioxidant, antimicrobial, anti-inflammatory or antiaging actions and can permeate through the skin barrier. These ingredients of Vitis Vinifera are reported to have many functions in cosmetics, most frequently as skin conditioning agents. Some of these ingredients are reported to function as antioxidants, flavoring agents and many other activities. The demand of natural skin care products is steadily growing since consumers perceive them as safe. Currently, cosmetic manufacturers are focusing their efforts on developing innovative natural products to address skin-care, thus meeting consumers' needs of healthy appearance and well-being. This review presents an overview of the application of phenolic compounds from grape products and byproducts as sources of natural ingredients for cosmetics i.e. in skin care.*

### **INTRODUCTION**

Herbs were utilized by human beings for longer than we were retaining written record. Originally they have been observed with inside the wild, via way of means of the gatherers and used for a number of special things. They have been used to flavor food, as a supply of nutrition, as medicines. Plant lively compounds are gaining extended recognition as beauty elements on the grounds that they are able to shield and therapy the pores and skin. Compared with artificial beauty merchandise, natural merchandise is slight and biodegradable and feature organic and healing activities. [2] During the final decade a fashion in the direction of herbal cosmetics has been advanced and consequently scientists and enterprise are shifting in the direction of the studies of opportunity elements that won't reason any allergic reactions or different forms of pores and skin irritations to consumers. Natural treatments were used for hundreds of years for treating pores and skin and additionally for a huge form of dermatological disorders (inflammation, photo toxicity, psoriasis, atopic dermatitis and alopecia areata). Protection of the pores and skin hydration and generating softening outcomes to pores and skin and hair arrangements is accomplished the usage of seed oils wealthy in fatty acids and triglycerides that lessen trans epidermal water loss [1]. Nowadays, many beauty agencies are the usage of herbal elements like special varieties of herbs, honey, sugar, beer and wine. Apart from wine, grape seed oil, grape seed extract and grape juice is used as a chief aspect for the manufacturing of creams, shampoos, frame creams and hair remedy merchandise. [3]

Draksha is that the Ayurvedic name for vinifera. Daksha's fruits are widely used everywhere the planet. The fruits are utilized for thousands of years because of their nutritional and medicinal benefits. this is often a preferred crop in western India, Germany, Portugal, Morocco, South Western Asia, Europe, and also the Mediterranean. Secondary plant metabolites referred to as phenolic compounds are formed in response to a range of stressors. [4] Phenolic chemicals are secondary plant metabolites that are formed in response to a range of stressors, including infections, wounds, UV irradiation, ozone, pollutants, and so on. the foremost prevalent and physiologically active phytonutrients are flavonoids. which may reduce the inflammation, inhibit tumor growth, have proapoptotic and anti-angiogenic actions, antimicrobial, antiviral, and antiaging properties, modulate the system, increase capillary resistance, protect the cardiovascular and neurological systems, limit weight gain, promote wound healing, etc. Polyphenolics are utilized in numerous sectors of the food and cosmetic industry as natural additives (natural coloring agents, conservative agents, natural antioxidants, nutritional additives) [5].

Fruits of common grape vine are used for thousands of years due to their nutritional and medicinal benefits. they're rich in sugars, flavonoids, anthocyanin's and proanthocyanins, organic acids, tannin, mineral salts and vitamins. Grapes skin, especially from the red and black species is rich in resveratrol which could be a derivative of stilbene. Studies have shown that resveratrol is one



amongst the strongest known natural antioxidants. it's found during a great quantity in black fruit juice, skin and seed. The seeds and also the leaves other grapevine are utilized in herbal medicine and its fruits are utilized as a dietary supplement. [2]

Botanical Name – *Vitis vinifera* Linn, Domain- Eukaryotes, Kingdom- Plantae Phylum- Spermatophyta, Subclass- Angiospermae, Class- Dicotyledonae, Order – Rhamnales, Family- Vitaceae, Genus- Vitis, Species- Vitis vinifera.



**Figure 1.0- Vitis vinifera**

*V. vinifera* and its bioactive compounds have several pharmacological activities like antioxidative, anti-inflammatory and antimicrobial activities, in addition as in vitro activity against several neoplastic cell lines and hepatoprotective and cardio protective effects. It seems that grape seed extract and its active Components like proanthocyanidins, resveratrol, and quercetin are potent antioxidants. The consumption of grapes and fruit crush is probably going to own positive effects on human health and particularly in postmenopausal women. These results suggest that grape seeds and their active components should be studied in additional detail for development as agents to help within the treatment of cardiovascular, gastrointestinal, and neurodegenerative diseases. [2]

Grape (*Vitis vinifera*), one in all the foremost commonly consumed fruits within the world, contains a spread of active compounds, including organic acids, oils and polyphenols. Melatonin (N-acetyl-5-methoxytryptamine) is additionally present in grapes [5]. Grape is one among the richest fruit sources of polyphenols; simple phenolic are derivatives of hydroxycinnamic acid and hydroxy acid and polyphenols include flavonoids, stilbenes and proanthocyanidins. The stilbene resveratrol and its derivatives have received attention from scientists and have found increasing applications. [5,6].

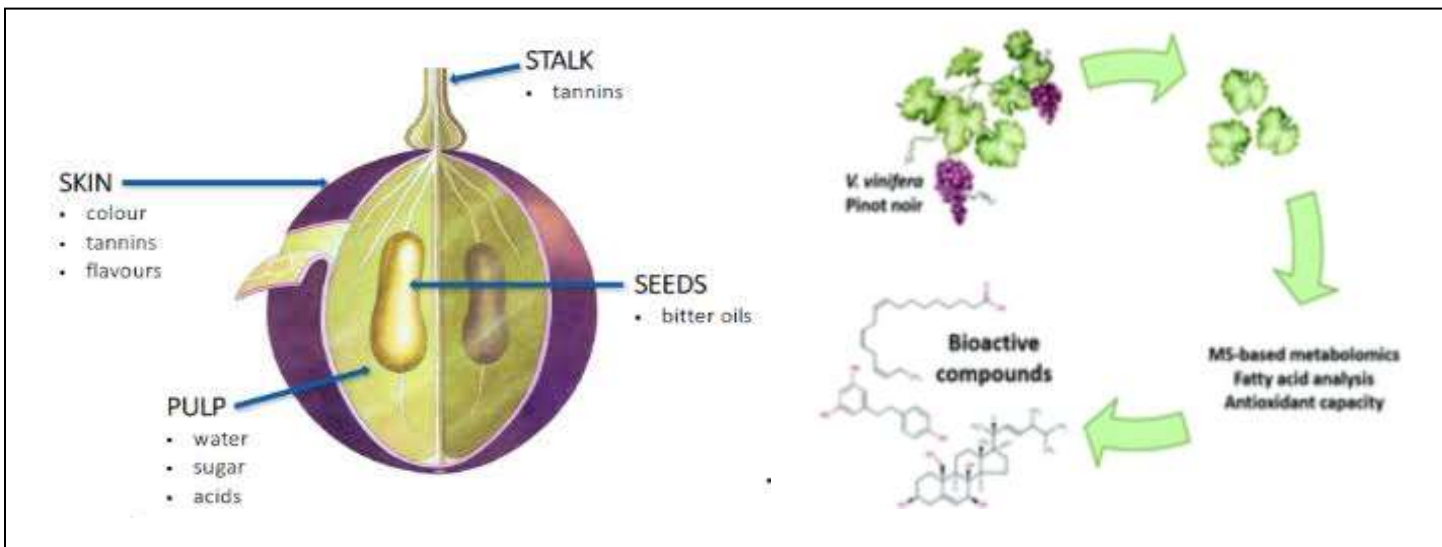
The safety of *vinifera* (Grape) Seed Oil and Hydrogenated Grapeseed Oil was reviewed previously in 2011 by the Cosmetic Ingredient Review (CIR) Expert Panel within the Safety Assessment of Plant-Derived carboxylic acid Oils as employed in Cosmetics, at which period the Panel concluded that these ingredients are safe as employed in cosmetics. Consequently, these two

ingredients don't seem to be included during this safety assessment. [7,12] Grapes contain fruit acids, and therefore the unripe fruit contains 34 ppm acid. 2,4 Grape seeds contain 6-20% oil. Phenols are the third most abundant constituent in grapes; carbohydrates and fruit acids are the foremost and second most abundant, respectively. The full extractable phenolic in grapes are present at  $\leq 10\%$  within the pulp, 60-70% within the seeds, and 28-35% within the skin. The number of a constituent present within the plant present varies with the situation within which it's grown. For instance, the fruit of grapes from Africa and Asia contain 50.0  $\mu\text{g}$   $\beta$ -carotene equivalent per 100 g of fruit while elsewhere trace  $\beta$ -carotene equivalent is present within the fruit. The cultivar, climate condition, and degree of maturation also affect the composition, as does whether the grapes are red or white. [7]

The *Vitis vinifera* (Grape)-derived ingredients included during this safety assessment are reported to own many possible functions in cosmetic formulations. As given within the International Cosmetic Ingredient Dictionary and Handbook, *Vitis vinifera* (Grape) Seed Extract is reported to function as an anti-caries agent, anti-dandruff agent, anti-fungal agent, anti-microbial agent, antioxidant, flavoring agent, light stabilizer, oral care agent, oral health care drug, and sunscreen agent. Many of the opposite grape (grape) ingredients are reported to function as skin conditioning agents, and some are reported to function as antioxidants. Five of the ingredients - the seed extract, the fruit powder, the juice, the juice extract, and also the skin extract - are reported to function as a flavoring agent and 4 of these five (all except the seed extract), likewise because the skin powder, are reported to function as colorants. [7,13]. Traditionally, wine making by-products, which account for 20%-30% (w/w) of the whole grapes used for wine elaboration, are mainly destined to the formulation of soil fertilizers and as substrate for biomass production and livestock feeds, and quite 70% of grape polyphenols remain within the pomace. Moreover, grape seeds are also separated from the pomace and used either for production of grape seed oil or as individual food supplements within the type of grape seed powder or grape seed extracts. Bioactive compounds from winery by-products have health promoting activities both in vitro and in vivo. Wine pomace is a remarkable source for natural antioxidants with application in pharmacological, cosmetic, and food industries [5,8,9].

This work reviews the major phenolic bioactive in grape products and byproducts, their cosmetic activities and the products in which they can be incorporated and the *Vitis vinifera* benefits in skin care.

## PHYTOCHEMICAL COMPOUNDS OF *V. VINIFERA*



**Figure 2.0- Phytochemical compounds of *V. vinifera*(Grape)**

Phytochemical compounds are various bioactive compounds found in these plants' parts and are beneficial to humans. *V. vinifera* L. contains many phenolic compounds and aromatic acid on multiple parts of the plant. The most blends of grapes are stilbenoid, flavonoids, proanthocyanidins [1], hydroxy acid, hydroxycinnamic acid. [15]

Fruit they're found in long and heavy clusters, very soft berry and having pulp in it, having 2-3 small seeds in it which are hard. Skin adhering to pulp, mainly having oval or oblong shape, or we are able to say bearing ellipsoid to globose like shape, colour of the fruit may vary from time to time like green, yellow, red, purple and black. Shiny and glorious surface. [4,19] Grapes are rich in polyphenols, anthocyanin's, flavonols, stilbenes, phenolic acids, protein, fats, and vitamins C [1,16].



Grape root extract contained stilbenoid compounds, which were stated by Esatbeyoglu et al. (2016): resveratrol, vitisins A and B, and picaetanol, and miyabenol C. [1,17]

Grape leaves Thin leaves are found, they're circular to circular-ovate in shape, width 5-23 cm, it's having Dentate margins or jagged, deep leaves lobes often overlapping, 5-7-lobed are present in them, above Surface is glabrous, tendrils are present which are branched, normally opposite two leaves out of three.[4]They are deep green in colour contain hydroxy acid (quinic acid, acid, vanilic acid, and syringic acid), hydroxycinnamic acid (caftaric acid, caffeic acid, and fertaric acid), coumarin, dihydrochalcone, monomeric stilbenes, dimeric stilbenes, trimeric stilbenes, tetrameric stilbenes, condensed tannin, even be found in leaves[1,14]

Grape seed extract contained the following: procyanidin, acid, epicatechin, catechin, and quercetin [18]. The grape seed extract from white grape was analysed by ultra-high-performance liquid chromatography-tandem mass spectrometry contained flavonol glycosides [1]. In black, the grape seed was exposed to flavonol glycosides, resveratrol, and anthocyanidins [1,18]

Grape skin the outer layer of the grape (*Vitis vinifera*), is either green, red, or purplish-black in colour. Generally, the skin of red grapes is employed in making nutritional supplements. [20] contained flavonols, anthocyanin, flavan-3-ols, stilbenes, and phenolic acid [1].

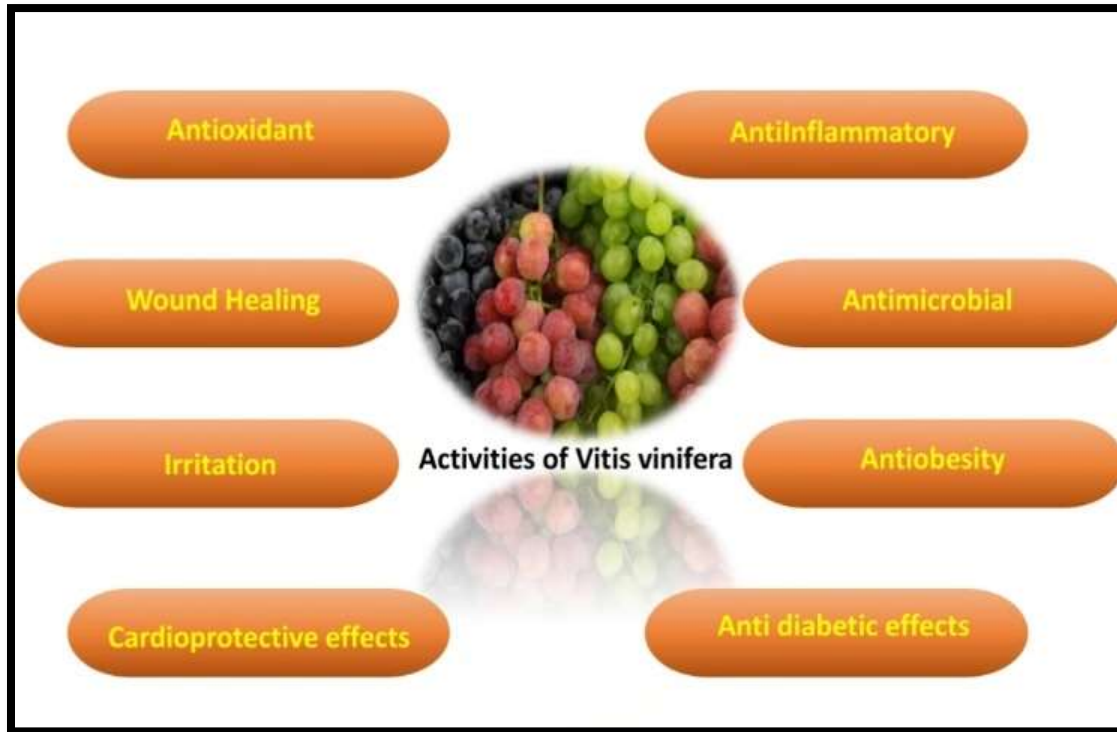
Grape stem contained acid, syringic acid, caftaric acid, chlorogenic acid, gallic acid, gallo catechin, caffeic acid, syringic acid, ferulic acid, procyanidin B1, procyanidin A1, procyanidin C1, epicatechin, catechin, catechin gallate, anthocyanin, flavanone, flavone. Stilbenoid compounds are found in stem parts like trans-astringing, trans-resveratrol side, ampelopsin A, D, and F, vitisin A, B, and C [1,15].

**Figure 3.0- Various Phytochemicals Present in *V. vinifera***





## General Activities



**Figure 4.0- Flow Chart Showing General Activities of *V. vinifera*(Grapes)**

### ➤ **Antioxidant and Antiaging**

Antioxidants may neutralize oxidative stress by inhibiting atom formation, interrupting autoxidation chain reactions, up-regulating and protecting cellular antioxidant defenses mechanisms, neutralizing the action of metal pro-oxidant ions, inhibiting the action of pro-oxidative enzymes and increasing the activities of other antioxidants. Flavonoids represent an outsized group of low mass compounds with high antioxidant properties and their chemical structure allows them to scale back oxidative stress through numerous mechanisms.

Grape seed extract has antioxidant and atom scavenging activity. The sparing/recycling effect of procyanidins from *V. Vinifera* seeds on alpha-toco-pherol was established in phosphatidylcholine liposomes and red blood cells. Procyanidines, additionally to scavenging free radicals, strongly and non-competitively inhibit xanthine oxidase activity, the enzyme which trig- Gers the oxy-radical cascade [22]. In one study, polyunsaturated carboxylic acid peroxidation was inhibited by low concentrations of grape seed proanthocyanidins(2mg/l). Other studies have confirmed that grape seed proanthocyanidin extract (GSPE) (50 mg/l) provided protection against free radicals in invitro free radicals scavenging assay and this effect was better than vitamins C and E. Moreover, GSPE(100mg/kg), com- pared to other antioxidants, provided significant protection against12-O-tetradecanoylphorbol -13- acetate (TPA)-induced oxidative damage. [23]

The antioxidant properties of grape parts, products and byproducts is well-known, including their chelating activities, high radical scavenging properties in relevance Trolox and Vitamins C and E and therefore the potential to inhibit lipid oxidation in various food and cell models. The consumption of grape-derived dietary flavonoids within the variety of grape extracts and grape seed powders has been shown to effectively suppress oxidative stress and stop oxidative damage in vivo [24]. However, phenolic compounds can have deleterious effects on the skin, since they'll be unstable and led to the formation of radicals, or behave as prooxidants [5]. after they act as antioxidants, they will also form radicals, having effects on the skin not yet satisfyingly answered. Further, they'll form degradation products whose toxicological relevance is additionally not yet proven. ultraviolet radiation produces reactive oxygen species in skin, which accelerate aging by damaging DNA, proteins, lipids, and other cellular constituents. Skin aging could be a complex, progressive deterioration caused by intrinsic and extrinsic or environmental factors. The skin is that



the largest body organ, its ability to self-repair with advanced age is proscribed thanks to telomere attrition, hormone exhaustion, oxidative stress, genetic events and UV exposure, genomic instability and epigenetic mutations. The formation of free radicals, which may react with DNA, proteins, and fatty acids, can cause oxidative damage and may be a widely accepted mechanism causing skin ageing, by inducing wrinkling, photo aging, elastosis, drying, roughness, appearance of fine lines, lack of elasticity, and de-or hyperpigmentation marks. [5,25]

#### ➤ **Anti-Inflammatory Action**

Inflammation could be a protective response of tissues against cell injury, irritation, pathogen invasions, and is a mechanism for eliminating damaged and necrotic cells. Several environmental stress factors may cause inflammation. Under normal physiological conditions, a brief period of acute inflammation can overcome negative effects on injured tissue. However, if inflammation is prolonged, chronic inflammation can develop and is taken into account to be a main mediator within the development of chronic diseases like cancer, Alzheimer's, neurodegenerative diseases, cardiovascular diseases, diabetes, arthritis, and autoimmune and pulmonary diseases. Deregulation of precise control mechanism of inflammation results in chronic inflammation and promotion of chronic disease. Grape polyphenols decrease chronic inflammation either by modulation of inflammatory pathways or by reducing ROS levels.

Grape flavonoids and proanthocyanidins can target multiple pathways to beat chronic inflammation, being simpler than some synthetic drugs. A freeze-dried extract of wine, which contains mainly flavonoids, anthocyanins, proanthocyanidins and hydroxycinnamic acid derivatives, showed higher anti-inflammatory activity in comparison to indomethacin. Plant-derived phenylpropanoids can modulate different molecular pathways involved within the inflammatory responses in human cells triggered by different pro-inflammatory stimuli. [5,26]

#### ➤ **Wound Healing**

Non-healing wounds remain stagnant within the inflammatory stage, a mechanism during which phagocytic cells destroy invading pathogens and clear cellular debris. A by-product of this inflammation is that the discharge from the neutrophils and macrophages of reactive oxygen species, which could induce cytokine and protein expression, but greatly increased ROS levels limit this beneficial effect in chronic wounds. A renewed interest in natural compounds with potential to push angiogenesis and wound healing has arisen both for several chronic and vascular diseases and for cosmetic purposes. Among them, grape seed proanthocyanidins extract is shown to be efficient. [5,27]

Grape oil contained  $20.10 \pm 0.02$  mg/g of hydroxyproline, which acts as a wound-healing as evidenced by reducing wound area on the 13th day by 84.6% after grape oil administration [28]. In previous research, Nayak et al. (2010) exposed that grape skin also had wound-healing activity, where the wound area was closed on the 13th day. [1,28,29]

#### ➤ **Irritation**

Plant phenolic are active components of plants, traditionally employed in medicine to treat chronic skin diseases when applied topically, i.e., to accelerate skin wound healing, exert anti-inflammatory effects, and protect human skin against deleterious effects of solar irradiation. Cosmetic/dermatological preparations containing phenolic extracts are sold with the claims of photo protection, chemoprevention, anti-aging, wound healing, etc., but they may be a double-edged sword for human skin, exerting both protective and damaging actions. Polyphenols will be major contributors to adverse cutaneous reactions, namely skin irritation, inflammation, ulceration, hypersensitivity, and/or irritant dermatitis, and might induce skin pigmentation defects. The molecular mechanisms of plant polyphenols/their metabolites interact with human skin components resulting in opposite results: anti- and pro-oxidant properties, activation versus inhibition of the skin metabolic system, anti- and proinflammatory effects, and photo protective and phototoxic actions are discussed. [30]

#### ➤ **Antimicrobial**

Ointments and cosmetic treatments containing grape/wine polyphenols have been used since ancient times for the treatment and prevention of some skin diseases [31]. Among the organic compounds produced by grapes as a defense against invading phytopathogens are numerous phenolic compounds, also active against human pathogens. Wines and winery byproducts and some of their bioactive components are efficient against foodborne, medical, and oral pathogenic bacteria [32]. Dose dependent antibacterial activities of the seed extracts were observed against some pathogenic and spoilage bacteria including *Aeromonas hydrophila*, *Bacillus cereus*, *Enterobacter aerogenes*, *Enterococcus faecalis*, *Escherichia coli*, *E. coli* O157:H7, *Klebsiella pneumoniae*, *Mycobacterium smegmatis*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Pseudomonas fluorescens*, *Salmonella enteritidis*, *S. typhimurium*, *Staphylococcus aureus* and *Yersinia enterocolitica*. Also, the extracts at 0.5%–1% had a bacteriostatic effect and at 2.5%–5% had a



bactericidal effect against *E. coli* O157:H7 [56]. The inhibitory effects of grape seed extracts on biofilm formation are dose dependent and the effect is different against different bacteria. [5]

The compounds causing oral malodour and the available oral care preparations used for treatments have been reviewed. Excess of reactive oxygen species release is implicated in the inflammatory process, and the implication of oxidative stress in the pathogenesis of periodontitis was evidenced. Therefore, antioxidant properties in the prevention of periodontal diseases and for oral hygiene purposes should also be considered [33]. A grape seed extract was proposed for prevention or treatment of periodontal diseases, for its antibacterial effect on *F. nucleatum* and *P. gingiva* Lis, its antiplaque activity on a multispecies biofilm and its antioxidant capacity [5,33]. The inhibitory effect of phenolic compounds from grape seeds extracts is more potent against Gram-positive bacteria than against Gram-negative [5]. The ability of extracts of red grape seed to inhibit bacteria and plaque formation was confirmed. Red wine and dealcoholized wine had an antimicrobial effect against *F. nucleatum*, *S. oralis* and *A. oris*. [34]

#### ➤ **Antiobesity**

Wine components have been proposed as an alternative natural approach to prevent or treat inflammatory bowel diseases since they act as both free radical scavengers and modulators of specific inflammation-related genes, and have recently been considered for their ability to act as probiotics [5,37]. Grape flavonoids may play an important role in modulation of human gut microflora and thus could have beneficial effects in control of weight loss. Polyphenols in grapes and grape products may reduce metabolic syndrome and prevent development of obesity and type 2 diabetes, by acting as multi-target modulators with antioxidant and anti-inflammatory effects. Grape powder acutely improves glucose tolerance and grape seed extract prevents metabolic syndrome, type 2 diabetes and obesity, also by modulating of metabolic endotoxemia and improving of gut barrier integrity. [5]

Grape skin extract could prevent weight gain when weight gain causes obesity and fatty liver risk [1]. Fan et al. (2019) reported that grape skin extract of *Vitis vinifera* L., which contains proanthocyanidins, could act as an anti-fatty liver high-fat-diet-induced NAFLD mice. Prevention of fatty liver, apart from weight loss, was also followed by reducing alanine transaminase (ALT), alkaline phosphatase (ALP), aspartate transaminase (AST), total protein (TP), total cholesterol (TC), low-density lipoproteins (LDL), and triglyceride (TG) values, and decreasing the number of abnormal cells (lesion area) [35]. Ethanoic grape seed extract from the Muscat variety could also reduce blood serum levels in diabetic rats. [1,36]

#### ➤ **Cardio protective effects**

Oral consumption of standardized grape extract (100 and 200 mg/kg) provided significant cardio protection by improving post-ischemic ventricular recovery and reducing the amount of myocardial infarction in rats. In an Ex-vivo experiment using rat aortic rings, Ex Grape seeds (7 g/ml) induced 77% endothelium-dependent relaxation, whereas Ex Grape total and grape seed extract (30  $\mu$ l/ml) induced 84 and 72%, respectively. Dietary grape seed tannins (2% monomers or 2% polymers, 3 or 9 weeks) have a pronounced antihypercholesterolemic effect resulting from enhanced reverse cholesterol transport and also by reduced intestinal cholesterol absorption and increased bile acid excretion in rats. Procyanidin supplementation in rat and rabbit reduced ischemia/reperfusion damage in the heart and this was associated with an increase in plasma antioxidant activity. Also it was able to prevent a peroxynitrite attack to vascular cells by layer ingot the surface of coronary endothelial cells, and enhancing endothelial NO-synthase-mediated relaxation in human internal mammary aortic rings. [2]

The pomace of pinotted and unfermented *V. vinifera* L. var. Fetească Neagră was able to against isoprenaline (ISO)-induced myocardial ischemia on rats by reducing oxidative stress markers. Polyphenol extract of *V. vinifera* L. var. Fetească Neagră and *V. vinifera* L. var. Aglianico N. could increase antioxidant capacity in rats treated with doxorubicin. The cardio protective effect of the grape comes from phenolic compounds. [1,42]

#### ➤ **Antidiabetic effects**

GSPE has been reported to be effective in treating diabetic nephropathy, though little is known about the functional protein changes. After GSPE therapy in diabetic rats, only nine kidney proteins were found to return to normal levels. It was shown that these proteins are involved in oxidative stress, glycosylation damage, and amino acid metabolism. GPSE (250 mg/kg body weight/d) also ameliorated glycation associated cardiac damage in diabetic rats. [2,21]

Grape seeds, skins, and flesh from *V. vinifera* L. var. Seyval Blanc, Hibernat, Pinot Gris, Freiminer, Rotter Taminer, Regent and Rondo presented antidiabetic activity by IC50 ranging from 0.27 to 1.13 mg dry sample/ml in inhibiting  $\alpha$ -amylase and  $\alpha$ -glycosidase [38]. Ostberg Potthoff et al. (2019) also reported red grape juice activity concentration in  $\alpha$ -amylase and  $\alpha$ -glycosidase; the best action was anthocyanin fraction, followed by co-pigment fraction red grape juice concentrate. Grape seeds, skins, and stems from var. Pusa Navrang and Merlot were able to increase insulin secretion in isolated mice pancreatic islets 2-8 fold from regular. [1,39]

### Vitis vinifera in skin care

The Vitis Vinifera (Grape)-derived ingredients included in this safety assessment are reported to have many possible functions in cosmetic formulations. As given in the International Cosmetic Ingredient Dictionary and Handbook, Vitis Vinifera (Grape) Seed Extract is reported to function as an anti-caries agent, anti-dandruff agent, anti-fungal agent, anti-microbial agent, antioxidant, flavoring agent, light stabilizer, oral care agent, oral health care drug, and sunscreen agent.<sup>13</sup> Many of the other Vitis Vinifera (grape) ingredients are reported to function as skin conditioning agents, and a few are reported to function as antioxidants. Five of the ingredients - the seed extract, the fruit powder, the juice, the juice extract, and the skin extract – are reported to function as a flavoring agent and four of those five (all except the seed extract), as well as the skin powder, are reported to function as colorants. The International Cosmetic Ingredient Dictionary and Handbook does not list the functions for Vitis Vinifera (Grape) and Vitis Vinifera (Grape) Leaf Wax. [7]

**Figure 6.0- Activities of V. vinifera in Skin Care**



#### ➤ Antioxidant Properties

The sources of antioxidants can be natural or artificial. Certain plant-based foods are thought to be rich in antioxidants. Plant-based antioxidants are a kind of phytonutrient, or plant-based nutrient. The body also produces some antioxidants, known as endogenous antioxidants. Antioxidants that come from outside the body are called exogenous.

Free radicals are waste substances produced by cells as the body processes food and reacts to the environment. If the body cannot process and remove free radicals efficiently, oxidative stress can result. This can harm cells and body function. Free radicals are also known as reactive oxygen species (ROS). Factors that increase the production of free radicals in the body can be internal, such as inflammation, or external, for example, pollution, UV exposure, and cigarette smoke. Oxidative stress has been linked to heart disease, cancer, arthritis, stroke, respiratory diseases, immune deficiency, emphysema, Parkinson's disease, and other inflammatory or ischemic conditions. Antioxidants are said to help neutralize free radicals in our bodies, and this is thought to boost overall health. [10]

Grape Seed Extract contains proanthocyanidins: a potent anti-oxidant with healing and anti-inflammatory properties! It contains "20 times the antioxidant power of vitamin E and 50 times the antioxidant power of vitamin C" (Live strong). Grape Seed Extract is so "rich in antioxidants and oligomer proanthocyanidin complexes and has been linked to a wide range of possible health benefits" [11].

#### ➤ Protect Your Skin from Sun Damage

It has been found that grape seed extract may protect your skin from UVA and UVB radiation (Sun) damage which can range from wrinkles to pigment changes and skin cancer. The antioxidants found in grape seed extract help your skin fight free radicals and





protect the skin from its harmful effects. From sun damage to pollution to smoking and even stress, free radicals develop as a result of facing the elements you see on a daily basis (Live strong). The antioxidant properties of grape seed extract fight these free radicals directly and help you guard your skin. Researchers have stated that grape seed extract “could be useful in the attenuation of the adversary UV-induced health effects in human skin”. [11]

The anti-sunburn activity of resveratrol from *V. Vinifera* L. Was proven by skin colour Parameters measured using a CM-2500d spectrophotometer. In the skin colour parameters, there Was a decrease in degrees of lightness from 64.20 to 59.3 and an increase in degrees of Green to red from 7.51 to 13.43 in the test group with resveratrol treatment on skin exposed to UV irradiation for 4 d, which indicated reducing sunburn in the test group. [43]

#### ➤ **Improve the appearance of your skin**

If you protect your skin from sun damage, you are also helping to maintain the overall appearance of your skin. Grape seed extract increases cell turnover and collagen synthesis which helps your skin stay elastic and stay healthy.

If used consistently, skincare and beauty products that contain grape seed extract can even out your skin tone and treat acne outbreaks due to the anthocyanidins’ antioxidant and microbial properties! (Health line) Grapeseed also makes your skin softer and more elastic. It improves your skin’s moisture, softness and elasticity by helping vitamin c and vitamin e in the skin more effective and efficient at preserving your skin. [11]

#### ➤ **Ultraviolet Radiation Protection**

The increased levels of ultraviolet radiation reaching the earth surface and skin overexposure have contributed to a growing number of skin-related disorders. Depending on the wavelength UV radiation is classified into UVA (320–400 nm), UVB (280–320 nm) and UVC (200–280 nm). UVA radiation (typically >90% of the total UV radiation reaching the earth surface) can penetrate deeper into the epidermis and dermis, induces the generation of reactive oxygen species (ROS), and after chronic exposure can cause premature photo aging of the skin. UVB radiation (4%–5% of the total UV radiation) can penetrate into the epidermis layer and induces adverse biological effects. UVC radiation is completely absorbed by atmospheric oxygen and ozone. The harmful effects of UV radiation include erythema, edema, hyperpigmentation, photo aging, and skin cancer [40]. Melanin can absorb UV rays and protects skin cells from the detrimental effects of UV exposure. If the amount of melanin produced is not sufficient, sunburn can occur. In order to protect skin against UV radiation topical application of UV absorbing or reflecting active molecules has been proposed. Nowadays, there is a worldwide trend to develop highly effective UV protection chemical sunscreens, since the incidence of skin cancers have increased over the past few decades. Naturally occurring compounds have gained considerable attention since most show antioxidant, anti-inflammatory, and immunomodulatory properties, which provide further protection against the damaging effects of UV radiation exposure. However, the optimal dose of active constituents in natural extracts, compatibility, concentration, and stability should be established. The use of natural compounds in combination with synthetic agents may provide an effective strategy. [5]

Sunscreens can be inorganic, inert particles reflecting the radiations without causing allergic sensitization, but have a cosmetically undesirable visual effect, and organic sunscreens, generally conjugated aromatic compounds, with more cosmetic appeal, may be activated by UV radiation and produce photosensitizer molecules causing adverse skin reactions. Different substances used in cosmeceuticals formulations could be useful for individuals who have had previous skin cancers and need to prevent possible new lesions. [5,41]

#### ➤ **Anti-hyperpigmentation and skin lightening activity.**

The anti-hyperpigmentation activity of red vine leaf extract of *V. vinifera* L., which contained flavonoids, resveratrol, gallic acid, chlorogenic acid, and epicatechin, could inhibit tyrosinase with IC<sub>50</sub> 3.84 mg/ml, where tyrosinase was responsible for skin pigmentation. Skin lightening activity showed on the Yucatan swine test on dark skin, treatment for eight weeks, five days per week, and twice a day using a topical preparation containing 1% resveratrol showed skin lightening without any irritation [1,43].

#### ➤ **Anti-aging activity.**

Aging on the skin may be caused by radiation and pollutants. Based on Cronin's research, those grape seeds extract from *V. vinifera* L. containing t-resveratrol could slow the onset of aging and had the potential to be an ingredient for anti-aging products. However, based on Sharif's research, seed extract of *Vitis vinifera* L. var. Muscat Hamburg could be an ingredient for an anti-aging product because it is rich in antioxidants and works by increasing skin elasticity. [1,44]



➤ **Skin cancer**

The high concentration of skin and seed extract from *V. vinifera* L. increases A431 skin cancer cells' growth inhibition. The mechanism of its inhibition can be seen through induction of cytotoxicity, measured the cytotoxic effect of the two extracts via MTT assay using A431 cells and human keratinocytes cell line (HaCaT). The IC<sub>50</sub> values of grape seeds and skin extract on A431 cells were 111.11 µg/ml and 319.14 µg/ml, followed by increases in reactive oxygen species (ROS) production induced apoptotic cells, which showed by green fluorescence through a fluorescence microscope [64]. However, demean et al. (2016) said that grape seeds extract could induce apoptotic cells but did not increase ROS production but decreased it. [45]

➤ **Skin Irritation/Sensitization**

A product containing 3% vitis vinifera (grape) fruit extract was a non-irritant in a dermal irritation test in human skin,85 a product containing 10% vitis vinifera (grape) fruit extract was non-/minimally irritating in an Epidermal MTT viability assay,86 and hydrolysed grape skin was no irritating in an MTT assay.87 In a single-dose study in NZW rabbits, vitis vinifera (grape) seed extract applied neat was classified as moderately irritating52; in a human 2-week use study, a formulation containing 0.15% vitis vinifera (grape) seed extract was not an irritant.88 In an in vitro assay of prosensitizing potential, hydrolysed grape skin did not increase the expression of the investigated markers and did not show any stimulating potential of the immune cellular response mediated by monocytes/macrophages.89 In clinical testing, products containing up to 10% vitis vinifera (grape) fruit extract,90-93 a formulation containing 0.1% vitis vinifera (grape) juice,94 cosmetic formulations containing 0.5% vitis vinifera (grape) juice extract, and vitis vinifera (grape) seed extract tested at a maximum concentration of 1% in a raw material95-99 were not irritants or sensitizers in human repeated insult patch testing (HRIPTs).[46,47]

## CONCLUSIONS

*Vitis vinifera* L., with its various varieties, *Vitis vinifera* L still has phytochemical compounds similar to each other. The major phytochemical compounds are stilbenoid, phenolic compounds, aromatic acids (hydroxycinnamic and hydroxybenzoic acid), flavonoids, proanthocyanidin. Every part of *V. vinifera* L. was rich in phytochemical compounds, which differ from one component to another. Every part and compound contained therein had benefits for humans, as evidenced by the many pharmacological activities found. The pharmacological activity depends on the part of the grapevines and the type of extract used. Therefore, *Vitis vinifera* can be beneficial for humans in traditional use and research development. There is a lack of recent studies on Geno toxicity and toxicity. Much recent research is needed regarding the Geno toxicity and toxicology study of *V. vinifera*.

Grape contains a wide variety of compounds with demonstrated therapeutic or health promoting properties. Among them, flavonoids are the most abundant and widely studied, with biological properties, including antioxidant, anti-inflammatory, anti-cancer, antimicrobial, antiviral, cardio protective, neuroprotective, and hepatoprotective activities. Consumer demand for natural cosmetic formulations is increasing, but also the sensory attributes should be optimized. Novel and innovative delivery systems will help in the development of new cosmetic products and cosmeceuticals ingredients. The growing interest in the biological activities of grape and grape products favour their valorisation as a source of bioactive phytochemicals of application in pharmaceutical, cosmetic and food industries, and constitute an efficient, profitable, and environment-friendly alternative for the generated residues. Caution is needed with regard to some controversial effects derived from the use of plant polyphenols in cosmetology.

## REFERENCES

1. Muhamad Insanu, Hana Karimah, Hegar Pramastya, Irda Fidrianny *Phytochemical Compounds and Pharmacological Activities of Vitis vinifera L.: An Updated Review Volume11, Issue5,2021,13829–13849* <https://doi.org/10.33263/BRIAC115.1382913849>.
2. N.S.S.A. Valli Kanagarla, I.J. Kuppast, T. Veerashekar, Chindala Laxman Reddy *A review on benefits and uses of Vitis vinifera(Grape)RRBS, 7(5), 2013 [175-180]*
3. Evangelia Sotiropoulou, Vassileios Varelak, Elia s Nerantzis *GRAPE SEED OIL: FROM A WINERY WASTE TO A VALUE ADDED COSMETIC PRODUCT-A REVIEW Conference Paper · May 2015*
4. . Aishwarya, Vijay Chopra, Amrinder Kaur, Vandna Kalsi “*An insight of Vitis vinifera (Draksha): A Review*” © 2018 JETIR November 2018, Volume 5, Issue 11
5. María Luisa Soto, Elena Falqué and Herminia Domínguez, *Relevance of Natural Phenolics from Grape and Derivative Products in the Formulation of Cosmetics 2015, 2, 259-276; doi:10.3390/cosmetics2030259*
6. Delmas, D. *Resveratrol: Sources, Production and Health Benefits; Nova Science Publishers Inc.: Hauppauge, NY, USA, 2013.*
7. *Vitis Vinifera (Grape) Ingredients as Used in Cosmetics February 17, 2012, The 2012 Cosmetic Ingredient Review Expert Panel members are: Chair, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Ronald A. Hill, Ph.D.; Curtis D. Klaassen, Ph.D.; Daniel Liebler, Ph.D.; James G. Marks, Jr., M.D., Ronald C. Shank, Ph.D.; Thomas J. Slaga, Ph.D.; and Paul W. Snyder, D.V.M., Ph.D. The CIR Director is F. Alan Andersen, Ph.D.*
8. García-Lomillo, J.; González-SanJosé, M.L.; del Pino-García, R.; Rivero-Pérez, M.D.; Muñoz-Rodríguez, P. *Antioxidant and antimicrobial properties of wine byproducts and their Potential uses in the food industry. J. Agric. Food Chem. 2014*



9. Teixeira, A.; Baenas, N.; Domínguez-Perles, R.; Barros, A.; Rosa, E.; Moreno, D.A.; García-Viguera, C. Natural bioactive compounds from winery by-products as health promoters: A review. *Int. J. Mol. Sci.* 2014.
10. <https://www.medicalnewstoday.com/articles/301506>
11. <https://misturabeauty.com/blogs/mistura/3-benefits-of-grape-seed-extract-on-your-skin>
12. Burnett, CL, Fiume MM, Bergfeld WF, Belsito DV, Hill RA, Klaassen CD, Leibler DC, Marks JG, Shank RC, Slaga TJ, Snyder PW, and Andersen FA. Safety assessment of plant-derived fatty acid oils as used in cosmetics. Washington, D.C., *Cosmetic Ingredient Review*. 2011. Available from the *Cosmetic Ingredient Review*
13. Gottschalck TE and Breslawec HP. *International Cosmetic Ingredient Dictionary and Handbook*. 14 ed. Washington, DC: Personal Care Products Council, 2012.
14. Radulescu, C.; Buruleanu, L.C.; Nicolescu, C.M.; Olteanu, R.L.; Bumbac, M.; Holban, G.C.; Simal-Gandara, J. Phytochemical Profiles, Antioxidant and Antibacterial Activities of Grape (*Vitis vinifera* L.) Seeds and Skin from Organic and Conventional Vineyards. *Plants* 2020, 9, <https://doi.org/10.3390/plants9111470>.
15. Goufo, P.; Singh, R.K.; Cortez, I. A Reference List of Phenolic Compounds (Including Stilbenes) in Grapevine (*Vitis vinifera* L.) Roots, Woods, Canes, Stems, and Leaves. *Antioxidants* 2020,
16. Arora, P.; Ansari, S.H.; Najmi, A.K.; Anjum, V.; Ahmad, S. Investigation of anti-asthmatic potential of dried fruits of *Vitis vinifera* L. in animal model of bronchial asthma. *Allergy, Asthma & Clinical Immunology* 2016,
17. Esatbeyoglu, T.; Ewald, P.; Yasui, Y.; Yokokawa, H.; Wagner, A.E.; Matsugo, S.; Winterhalter, P.; Rimbach, G. Chemical Characterization, Free Radical Scavenging, and Cellular Antioxidant and Anti-Inflammatory Properties of a Stilbenoid-Rich Root Extract of *Vitis vinifera*. *Oxid. Med. Cell. Longev.* 2016,
18. Cádiz-Gurrea, M.D.; Borrás-Linares, I.; Lozano-Sánchez, J.; Joven, J.; Fernández-Arroyo, S.; Segura-Carretero, A. Cocoa and Grape Seed Byproducts as a Source of Antioxidant and Anti-Inflammatory Proanthocyanidins. *Int. J. Mol. Sci.* 2017,
19. A. Marjan Nassiri, and Z. Hossein, "Review of the Pharmacological Effects of *Vitis vinifera* (Grape) and its Bioactive Compounds,"
20. <https://www.encyclopedia.com/medicine/encyclopedias-almanacs-transcripts-and-maps/grape-skin>
21. Cheng, H.Q. Gao, L. Xu, B.Y. Li, H. Zhang, X.H. Li; Cardioprotective effects of grape seed proanthocyanidins extracts in streptozocin induced diabetic rats. *J. Cardiovasc Pharmacol.*
22. G.K. Jayaprakasha, T. Selvi, K.K. Sakariah; Antibacterial and antioxidant activities of grape (*Vitis vinifera*) seed extracts, *Food Res. Int.*, 36, 117-122 (2003).
23. M.R. Facino, M. Carini, G. Aldini, E. Bombardelli, P. Morazzoni, R. Morelli; Free radicals scavenging action and antienzyme activities of procyanidines from *Vitis vinifera* A mechanism for their capillary protective action, *Arzneimittelforschung*, 44, 592- 601 (1994).
24. Georgiev, V.; Ananga, A.; Tsoolova, V. Recent advances and uses of grape flavonoids as nutraceuticals. *Nutrients* 2014
25. Saraf, S.; Kaur, C. Phytoconstituents as photoprotective novel cosmetic formulations. *Pharmacogn.Rev.* 2010
26. Korkina, L., Kostyuk, V.; de Luca, C.; Pastore, S. Plant phenylpropanoids as emerging anti-inflammatory agents. *Mini Rev. Med. Chem.* 2011
27. Morgan, C.; Nigam, Y. Naturally derived factors and their role in the promotion of angiogenesis for the healing of chronic wounds. *Angiogenesis* 2013
28. Shivananda Nayak, B.; Dan Ramdath, D.; Marshall, J.R.; Isitor, G.; Xue, S.; Shi, J. Wound-healing Properties of the Oils of *Vitis vinifera* and *Vaccinium macrocarpon*. *Phytother. Res.* 2011.
29. Nayak, B.S.; Ramdath, D.D.; Marshall, J.R.; Isitor, G.N.; Eversley, M.; Xue, S.; Shi, J. Wound-healing activity of the skin of the common grape (*Vitis Vinifera*) variant, cabernet sauvignon. *Phytother. Res.* 2010.
30. Korkina, L.; de Luca, C.; Pastore, S. Plant polyphenols and human skin: Friends or foes. *Ann. N. Y. Acad. Sci.* 2012
31. Fehér, J.; Lengyel, G.; Lugasi, A. The cultural history of wine—Theoretical background to wine therapy. *Cent. Eur. J. Med.* 2007
32. Friedman, M. Antibacterial, antiviral, and antifungal properties of wines and winery byproducts in relation to their flavonoid content. *J. Agric. Food Chem.* 2014
33. Furiga, A.; Lonvaud-Funel, A.; Badet, C. In vitro study of antioxidant capacity and antibacterial Activity on oral anaerobes of a grape seed extract. *Food Chem.* 2009
34. Muñoz-González, I.; Thurnheer, T.; Bartolomé, B.; Moreno-Arribas, M.V. Red wine and oenological extracts display antimicrobial effects in an oral bacteria biofilm model. *J. Agric. Food Chem.* 2014
35. Fan, M.; Choi, Y.-J.; Tang, Y.; Bae, S.M.; Yang, H.P.; Kim, E.-K. Efficacy and Mechanism of Polymerized Anthocyanin from Grape-Skin Extract on High-Fat-Diet-Induced Nonalcoholic Fatty Liver Disease. *Nutrients* 2019, 11, <https://doi.org/10.3390/nu11112586>.
36. Giribabu, N.; Kumar, K.E.; Rekha, S.S.; Muniandy, S.; Salleh, N. *Vitis vinifera* (Muscat Variety) Seed Ethanolic Extract Preserves Activity Levels of Enzymes and Histology of the Liver in Adult Male Rats with Diabetes. *Evid. Based Complement. Alternat. Med.* 2015.
37. Biasi, F.; Deiana, M.; Guina, T.; Gamba, P.; Leonarduzzi, G.; Poli, G. Wine consumption and intestinal redox homeostasis. *Redox Biol.* 2014, 2, 795–802.
38. Tkacz, K.; Wojdyło, A.; Nowicka, P.; Turkiewicz, I.; Golis, T. Characterization in vitro potency of biological active fractions of seeds, skins and flesh from selected *Vitis vinifera* L. cultivars and interspecific hybrids. *J. Funct. Foods* 2019
39. Doshi, P.; Adsule, P.; Banerjee, K.; Oulkar, D. Phenolic compounds, antioxidant activity and insulinotropic effect of extracts prepared from grape (*Vitis vinifera* L) byproducts. *J. Food Sci. Technol.* 2015.
40. Saewan, N.; Jimtaisong, A. Natural products as photoprotection. *J. Cosmet. Dermatol.* 2015, 14, 47–63.



- 
41. França, K.; Cohen, J.L.; Grunebaum, L. *Cosmeceuticals for recurrence prevention after prior skin cancer: An overview. J. Drugs Dermatol.* 2013
  42. Sergazy, S.; Shulgau, Z.; Fedotovskikh, G.; Chulenbayeva, L.; Nurgozhina, A.; Nurgazyev, M.; Kriviyh, E.; Kamyshanskiy, Y.; Kushugulova, A.; Gulyayev, A.; Aljofan, M. *Cardioprotective effect of grape polyphenol extract against doxorubicin induced cardiotoxicity. Sci. Rep.* 2020.
  43. Boo, Y.C. *Human Skin Lightening Efficacy of Resveratrol and Its Analogs: From in Vitro Studies to Cosmetic Applications. Antioxidants* 2019.
  44. Sharif, A.; Akhtar, N.; Khan, M.S.; Mena, A.; Mena, B.; Khan, B.A.; Mena, F. *Formulation and evaluation on human skin of a water-in-oil emulsion containing Muscat hamburg black grape seed extract. Int. J. Cosmetic Sci.* 2015.
  45. Decean, H.; Fischer-Fodor, E.; Tatomir, C.; Perde-Schrepler, M.; Somfelean, L.; Burz, C.; Hodor, T.; Orasan, R.; Virag, P. *Vitis vinifera seeds extract for the modulation of cytosolic factors BAX- $\alpha$  and NF- $\kappa$ B involved in UVB-induced oxidative stress and apoptosis of human skin cells. Clujul Medical* 2016.
  46. *Safety Assessment of Vitis vinifera (Grape)-Derived Ingredients as Used in Cosmetics. International Journal of Toxicology* 2014, Vol. 33(Supplement 3) 48S-83S.
  47. *BioScreen Testing Services Inc. Evaluation of one sample Blend 3EL-New (contains 3% Vitis vinifera (grape) fruit extract (water extract)) utilizing the dermal irritation test method. Unpublished data submitted by the Personal Care Products Council; 2009.*