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A REVIEW ON ANTIOXIDANT FROM NATURAL ORIGIN:

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Abstract:

The aim of this study is to develop a herbal cosmetic sunscreen containing flavonoid-rich plant extracts with antioxidant properties. In vitro sun protection values, antioxidant activity, skin irritation, photostability and flavonoid retention were evaluated. The importance of these natural ingredients is not only their biological benefits but also their financial impact, as they can often be obtained from foods and the identification of plant species. In recent years, there has been interest in the use of natural antioxidants. Many plant materials such as herbs, spices, seeds, fruits and vegetables are known as sources of antioxidants.The aim of this study is to create a herbal cosmetic sunscreen with antioxidant properties, containing plant extracts rich in flavonoids. In vitro sun protection values, antioxidant activity, skin irritation, photostability and flavonoid retention were evaluated. The importance of these natural ingredients is important not only for their biological benefits but also for their financial impact, as they can often be obtained from foods and the identification of plant species. In recent years, there has been interest in the use of natural antioxidants. Many plant materials such as herbs, spices, seeds, fruits and vegetables are known as sources of antioxidants.

Keyword: Flavanoid; phytocosmetic; antioxidants; sunscreen;

1. Introduction:-

Antioxidants are nutrients that have been linked to many dangerous diseases such as heart disease, diabetes, cataracts, rheumatoid arthritis, Alzheimer's disease and more.

Phytochemicals can act as antioxidants by inhibiting the production of reactive oxygen species (ROS) in the body or in foods or by directly scavenging free radicals. Some compounds can increase the level of local antioxidant activity by regulating the expression of genes encoding synergists and thus enhance antioxidant effects in the body. Synergists themselves have almost no antioxidant effect, but they can enhance its effect by reacting with heavy metal ions. antioxidants and catalyzes auto-oxidation.

Natural antioxidant compounds can be divided into vitamins, carotenoids, hydroxycinnamates and flavonoids. Among these, flavonoids are the largest class of antioxidants and are found in almost every condition in fruits, vegetables, and plants. Many types of natural antioxidants and their food products are supplied in the form of superoxide dismutase (SOD), catalase or glutathione peroxidase.

Antioxidants can be divided into three groups

(a) True antioxidants

(b) Reducing

(c) Antioxidant synergists.

True antioxidants react to free radicals and block their anti-inflammatory effects. Reducing agents have a low reducing capacity, are easily oxidized, and have been shown to be effective against oxidizing agents. Oxygen is an important chemical in the metabolism of aerobic organisms. However, it may cause adverse effects and there is interest in researching the effects of its active ingredients. This reagent is a byproduct of normal cellular structure and function and plays an important role in cell signaling, apoptosis, gene expression and ion transport. However, if the ROS level is too high, it will damage many molecules, including proteins, lipids, RNA and DNA, due to their high reactivity. Moreover, the formation of free radicals not only affects metabolic processes in the human body (endogenous), but also affects the environment (exogenous), such as stress pressure, ozone radiation, pollution, pesticides and chemicals. . Once ROS are produced, they are cleared by biological organisms (antioxidant protection) and ion transport. However, if the ROS level is too high, damage can occur to many molecules, including proteins, lipids, RNA and DNA, because they are very reactive. Doing this again is called oxidative stress.

2. Antioxidants:-

Vitamin C or ascorbic acid is often considered an important antioxidant because ascorbic acid and dehydroascorbic acid free radicals scavenge free radicals. Vitamin E or tocopherol delays lipid peroxidation by reacting with peroxyl radicals, which grow chain faster than the radicals react with protein or fatty acid side chains. It interacts with free radicals to produce Beta-carotene-derived free radicals, which produce peroxyl radicals in the presence of oxygenAntioxidants play different roles in the oxidation process involving lipids, fatty acids and their esters. Nutraceuticals; are medicines or dietary supplements that contain food, plants, or other naturally occurring substances. Improve health by preventing or treating disease. They have significant health benefits in cardiovascular, brain, joint, skin and women's health, and some of these nutraceuticals are frequently used to prevent cancer, while others do so to improve athletic performance and weight management. Some of these substances can be isolated, purified, potentiated and made into different types of medicines, but some are used directly as food. Some of the isolated foods and herbs used as dietary supplements are discussed below.

Consider the significant impact of natural antioxidants on health, good extraction methods, good analysis of the antioxidant properties of natural antioxidants and their main products from food and plants. Spraying has been well received by the food science and nutrition community. In order to increase the effectiveness of antioxidant products in herbal products, many green methods such as ultrasonic-assisted extraction, microwave-assisted extraction, enzyme-
assisted extraction, which reduce the processing time and use organic solvents, have been developed. , pressurized liquid extraction etc. extraction, supercritical fluid extraction, high hydrostatic pressure extraction, pulsed electric field extraction and high pressure discharge extraction. In addition, different tests such as the Trolox Equivalent Antioxidant Capacity (TEAC) assay and the metal ion reducing antioxidant capacity (FRAP) assay have been developed to evaluate the antioxidant capacity of natural products, especially those frequently consumed by humans. method, oxygen measurement method etc. Free radical absorption capacity (ORAC) measurement, lowdensity lipoprotein (LDL) oxidation inhibition measurement, cellular antioxidant measurement, etc. These measurements are used to evaluate the antioxidant properties of plants and recommend the best antioxidant foods to consume. This article focuses on the analysis of the extraction process, the evaluation of the antioxidant activity process, and the important place of antioxidants in food and medicinal plants.

3. Natural Nutraceutical Substances:-

Certain medicinal or nutritional components in plants, animals or marine sources are present in very small proportion Such components can be isolated and used as supplement for specific health benefit or for prevention or treatment of ill health Polyunsaturated fatty acids, glucosamine,chondroitin,methylsulphonylmethane,melatonin,carnitine,octacosanol,resveratrol, etc., are such substances that cause amelioration of health.

Antioxidants	**Sources**
Vitamins	
Vitamin C	Citrus fruits, Vegetables
Vitamin E	Grains, nuts, oils
Carotenoids	
Carotene	Carrots, sweet potato
Lycopene	Tomatoes
Beta-carotene	Carrots, sweet potato, green vegetables
Xanthophylls	
Beta-Cryptoxanthin	Mango, papaya, oranges
Lutein	Banana, egg yolk, green vegetables
Zeaxanthin	Paprika
Hydroxycinnamates	
Ferulic acid	Cabbage, spinach, grains
Caffeic acid	White grapes, olive, spinach
Flavanoids	
Flavone	
Rutin	Buckwheat, tobacco, *Eucalyptus* Spp.
Luteolin	Lemon, red pepper, olive
Flavonols	
Quercetin	Onion, apple skin, black graps
Kaempferol	Grape fruit, tea
Flavonone	
Naringin	Citrus peel
Taxifolin	Citrus fruit
Chalcones	
Liquiritin	Liquorice
Anthocyanidins	
Cyanidin	Grapes, strawberry
Delphnidin	Aubergin skin

Catechins	
Epicatechin gallate	Green tea polyphenols
Epigallocatechin gallate	Green tea polyphenols

Table No.1 Naturally Occurring Antioxidants

4. Extraction Methods of Antioxidants from Foods and Medicinal Plants:-

Many extraction factors play an important role in optimization, such as the type and concentration of extraction solvent, temperature, extraction time and extraction pH. Among these, weight is one of the most affected. Many solvents are used to extract antioxidants from foods and herbs. The choice of solvent depends on the chemistry and polarity of the antioxidant to be extracted. Most phenols, flavonoids and anthocyanins are water-soluble antioxidants. Polar and medium polar solvents such as water, ethanol, methanol, propanol, acetone and their aqueous mixtures are widely used for extraction. Carotenoids are fat-soluble antioxidants, and organic solvents such as the mixture of hexane with acetone, ethanol, and methanol or the mixture of ethyl acetate with acetone, ethanol, and methanol have been used for extraction. With a choice of traditional and non-traditional extraction methods to extract antioxidants from foods and herbs. Traditional extraction methods are mainly hot water bath, maceration and Soxhlet extraction, these methods take a long time, require more organic solvents and have poor results. Additionally, long heating processes such as hot water baths and Soxhlet extraction can cause degradation of thermally unstable compounds. Ultrasound, microwaves, high pressure liquids, enzymatic hydrolysis, supercritical fluids, high hydrostatic pressure, pulsed electric field and High voltage outputhave been investigated differently to obtain antioxidants from plants in an energy-saving and sustainable industry.

4.1 Ultrasound Assisted extraction (UAE):-

This mechanism is based on cavitation. Ultrasonic waves propagate in the fluid machine through a series of co mpression waves and rarefaction parameters, resulting in cavitation bubbles in the fluid. The size of these bub bles increases until the critical point is reached where the bubbles burst and release too much energy, causing t he air temperature (5000 K) and pressure (1000 air) to reach room temperature.

During Ultrasound assisted extraction of bioactive compounds from plant material, high temperature and pressure destroy the cell wall, promote the release of bioactive compounds from the plant cell wall and enhance growing growth. In order buildings in the UAE, heat transfer is from the outside to the inside of the plant cell, which is in the opposite to the inside of the plant cell, which is in the opposite direction to microwave assisted extraction.

4.2 Microwave-Assisted Extraction (MAE):-

During the MAE process, microwaves can transfer energy to the solvent and plant matrix, and the energy can be absorbed by molecules in the plant, especially polar molecules. The intense heat, local energy and mechanical stress caused by microwaves change the physical structure of the cell wall, eventually causing the cell wall to rupture and release plaques. Since the first application of microwave irradiation in 1986, many studies have been conducted in MAE to recover antioxidants from plant materials. Due to the thermal effect of microwave radiation, MAE is not suitable for the extraction of thermally labile antioxidants, which may result in decreased extraction efficiency. Additionally, MAE only works with solvent extraction.

4.3 Enzyme-Assisted Extraction (EAE):-

Enzymes have the characteristics of high activity and high efficiency. It is a possible green extraction method. These enzymes degrade components and affect the integrity of the plant cell wall, thus contributing to the release of bioactive compounds. Cellulases, pectinases, hemicellulases, and β-glucosidases are commonly used in EAE. These enzymes can be obtained from various sources such as bacteria, fungi, vegetable and fruit extracts or animal organisms. EAE technology has been shown to increase the activity of antioxidants, including phenols, flavonoids, anthocyanins, and carotenoids.

4.4 Pressurized Liquid Extraction (PLE):-

PLE is based on the extraction of target particles from various matrices using solvents at low temperatures. By increasing the pressure, the temperature of the heavy liquid can be higher than room temperature, thus increas ing the mass conversion rate and promoting the solubility of the analyte. PLE can be used over a wide temper ature range from room temperature to 200 °C and at pressures from 35 to 200 bar. When the extraction solvent is water, PLE is also called subcritical water extraction (SWE), When water is heated to200-250^{0}C,it can become liquid when the dielectric constant of the water drops from 80 to 3025,close to the dielectric constant of some organic problems. Solvents such as ethanol and methanol. The implicit dielectric constant means that the polarity of organic solvenrs is the same. Although not possible for all applications, the use of SWE can be considered a good alternative.

4.5 Supercritical Fluid Extraction (SFE):-

Supercritical fluid extraction (SFE), as a sustainable green technology, has been widely used in the last few years. Above the critical point (pc) and temperature (Tc), the solvent can transition to the supercritical state, showing liquid-like (gravitational capacity, negligible stress) and oil-like (high diffusivity and low viscosity). Although PLE and SFE are similar in that they operate at moderate to high temperatures, SFE uses solvents at temperatures above their critical points, while PLE relies on the use of liquids at temperatures above their boiling points. Compared to ordinary fluids, supercritical fluids can improve transport and spread easily between materials, resulting in faster extraction rates. SFE uses the physical properties of supercritical fluid (SF) to extract targets from various matrices. SFE actually has two main steps: first, a supercritical solvent is used to extract soluble compounds in the plant material, and then the compounds are separated from the supercritical solvent by high speed, gold enhancement, or both.

5. Mechanism Of Action Of Natural Antioxidants:-

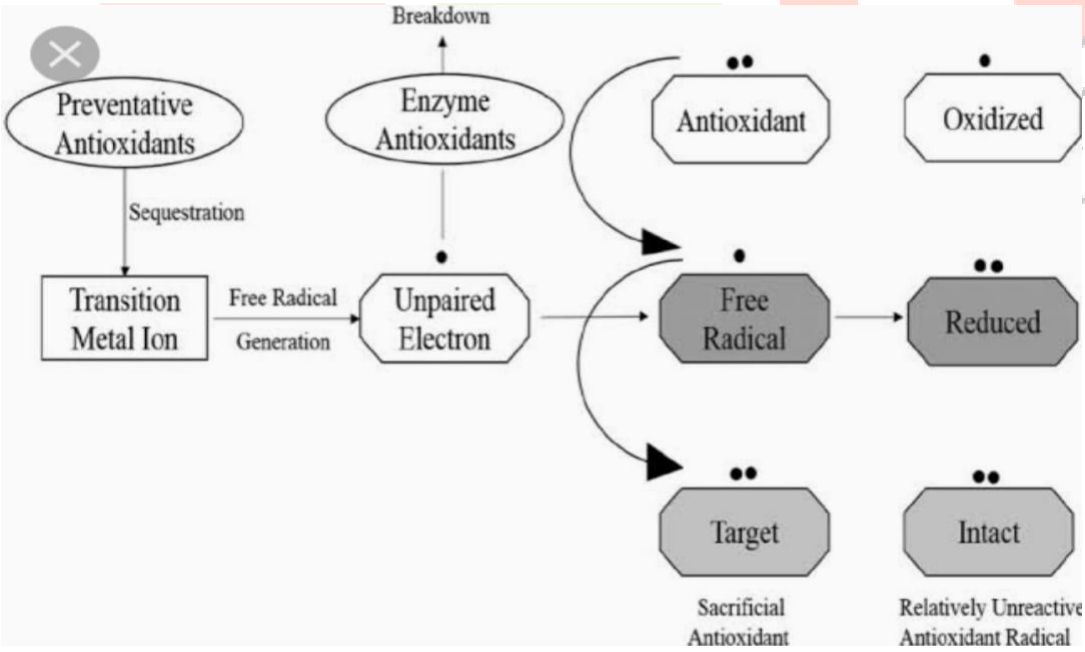

Fig No.2 Mechanism Of Action

Natural antioxidants are recognized to be beneficial to health and different diseases such as neurodegenerative and cardiovascular diseases, diabetes and cancer. There is a long history of using natural antioxidant products in the treatment of different diseases; It long predates the development of modern medicine with synthetic drugs and antioxidants. Much of the activity of natural antioxidants is attributed to their ability to eliminate reactive oxygen species (ROS) and thus prevent oxidative stress. Over the past few years, many studies have shown that its hydrogen-free antioxidant properties are unlikely to be the sole explanation for its effects. First, natural antioxidants undergo metabolism in the body, changing their redox potential. Additionally, in vivo concentrations of natural antioxidants and their metabolites are lower than those commonly used in vitro.

Other evidence suggests that the cellular effects of natural antioxidants may also be mediated through interaction with specific proteins at the site of intracellular signaling cascades, regulation of their expression and activity of important proteins (2.10.111. effects on epigenetic processes or changes in the gut microbiota.

This special issue is about the process. There is new information on the impact of natural antioxidants in health and disease. nine contributions, seven research articles and two reviews and the most up-to-date content on the subject.

Cardiovascular diseases are the leading cause of death in the world, and atherosclerosis, a chronic inflammatory process associated with pathophysiological effects, is one of the major risk factors. The development of atherosclerosis is associated with the proliferation and migration of vascular smooth muscle cells (VSMCs) after stimulation by proinflammatory cytokines. In recent years, phytochemicals have attracted great attention in the prevention and/or prevention of atherosclerosis. The book by Chou et al. It has been reported that polyphenol-rich mallow leaf extract can induce cell cycle G0/G1 arrest by regulating protein kinase B (PKB) and inducing expression, thereby inhibiting VSMC A75 cells pretreated with TNF-α. p53 and its basic contents. The extract also caused a reduction in ROS production after TNF-α stimulation in the New Zealand White rabbit atherosclerosis model. The authors confirmed in vitro data on the anti-atherosclerotic effect of hibiscus leaf extract; This showed that the extract would help prevent atherosclerosis and therefore heart disease.

6. Formulation With Antioxidants Properties

6.1 Material:-

A mixture of freeze-dried extracts (1:1:1:1) with in vitro Sun Protection Factor (SPF) value extracted from Ginkgo biloba, Dimorphandramollis Beth, Ruta leaves and Grape leaves obtained from the local Brazilian market, G. biloba L.' He used . ., 7.72 ± 0.4 from mixed sample, 7.08 ± 0.4 from Rgraveolens L., 5.04 ± 0.2 from D. molliBenth and 3.71 ± 0 from V. vinifera L. ,5. Emulsions prepared using Sanshan Yuan were used in this study. sorbitan stearate and sucrose cocoate supplied by Croda (Campinas, São Paulo, Brazil) as emulsifiers. Croda (Campinas, São Paulo, Brazil) is used as a thickening agent. Caprylic/capric glyceryl hydrolyzed rice protein/polyvinylpyrrolidone (PVP) crosspolymer and Perseagratissima (avocado) oil are also produced by Croda (Campinas, São Paulo, Brazil). Phenoxyethanol, glycerol, and extracts were provided by PharmaSpecial (São Paulo, Brazil). Isopropyl alcohol and ethanol, Synth (São Paulo, Brazil), 1,1-diphenyl-2-trinitrophenylhydrazine (DPPH), methanol (high-performance liquid chromatography (HPLC) grade), formic acid, and MTT 13-(4,5-Dimethylthiazole) -2-yl)-2,5-diphenyltetrazolium bromide, thiazolyl blue tetrazolium bromide] with phosphate buffered saline were provided by Sigma-Aldrich (São Paulo, Brazil), and Sodium dialkyl sulfate was provided by Gibambaco, MA). Quercetin (93.3% purity) and routine (97.3% purity) analytical samples were provided by Acros (ITU, Brazil).

6.2 Development of Emulsion and Stability Study:-

Nine (F1 to F9) oil-in-water (o/w) emulsions were produced by heating the two phases (water and oil) to 70 ± 3 degrees*C and then homogenizing according to the combination shown in Table 1. 125 + 3 °C. The aqueous phase containing phenoxyethanol, glycerol, and water was placed in a beaker at 70 °C using a hot plate (Quimis, São Paulo, Brazil). The oil phase, containing the additional ingredients listed in Table 1 (except talc), was placed in a pot using a heating plate (Quimis, São Paulo, Brazil) at the same temperature until completely melted. The aqueous phase is then poured into the oil phase with manual mixing and then cooled to 135 °C. While preparing the emulsion, add the Tal, mixing by hand.

To evaluate the physical stability of the emulsions, 5.0 g of each sample was subjected to 3 centrifugation cycles at 3000 rpm for 30 min each. The measurement was made at a temperature of 27 ± 2 degrees*C. Sensory properties (colour, odor and appearance), pH (QumispHmeter, São Paulo, Brazil), density and

viscosity values were also evaluated. Density is calculated from the difference between weight pycnometer (5 with and without pycnometer). milliliters of sample) divided by the sample volume. Viscosimetry No. 4 spindles and a rotational viscometer (Brookfield Mod LV-TSão Paulo Brazil) rotate at 1.5 rpm for 30 seconds. Results are expressed in centipoises (cP) and measurements were made at 37 + 7 degrees * C.

6.3 Sensorial Analysis:-

Sensory tests were performed on emulsions with better stability tests using different concentrations and test preferences. After signing the informed consent form, 50 volunteers (37 women and 13 men) aged between 20 and 50 chose to try the cream. Volunteers took 0.1g of the cosmetics and measured all parameters (likes and dislikes) to measure its absorption, residual oil, dryness, stickiness, spreadability and dry touch. Choose the best lotion to load with flavonoids.

6.4 Production of Phytocosmetic and Stability Study:-

Phytocosmetics were prepared by adding 200 mg of a mixture of plant extracts (Ginkgo, Dimorphandramollis Beth, Rue and Grape L-1:1:1:1) to the emulsions selected by analysis, equal to 0.2% in the final sample of the spun extract. . Botanical cosmetics were then subjected to safety research. Stability studies were performed using a multi-standard analytical centrifuge Lumisizer (LUM, GmbH, Berlin, Germany). Normal emulsions (without botanical extracts) and formulated botanical cosmetics (emulsions with botanical extracts) were diluted with distilled water (1:5; w/w) and heated at 3000 rpm and 27.5 ± 0.5 °C for 2 h. analyzed.

6.5 Zeta Potential:-

Normal emulsions (without botanical extracts) and formulated botanical cosmetics (emulsions with botanical extracts) were diluted with distilled water (1:500; w/w), and 1 ml samples were placed in a Zetasizer® device (Malvern Instruments Ltd.). , Malvern, Worcestershire, UK) at 25.0 ± 0.1 °C. Results were obtained from 10 measurements per sample and measured in triplicate.

6.6 Droplet Size Distribution:-

To determine particle size, each ordinary emulsion (without botanical extract) and formulated lotion (emulsion with botanical extract) was diluted in distilled water and then particle size was measured for laser diffraction analysis (MasterSizer, Malvern, UK) and a large-capacity sample dispersion unit (Malvern Hydro 2000 MU, Malvern, Germany). The studies were carried out at a rotation speed of 750 rpm, in the 10-20% opacity range, and with water as dispersion. Assays were performed in triplicate.

6.7 Mechanical Analysis:-

Texture analysis was performed on a texture analyzer (Stable Micro Systems TA-XT2i, Godalming, UK) using compression mode. Penetration tests were performed three times at a speed of 3 mm/s and an application of 0.05 N. Breaking strength (G), adhesion (g.sec), and brittleness (mm) were measured using a cylindrical probe (SMS P/IR). To make a decision. Use a 5 kg load cell. Hardness (G) was evaluated using an extrusion unit (HDP/FE) and a 5 mm cylindrical probe measured in triplicate.

6.8 Thermal Analysis:-

The samples were subjected to differential scanning calorimetry (DSC) and thermogravimetry (TG) analyses, both carried out in triplicate. Approximately 10 mg of sample were placed in an aluminum straw for DSC analysis (Mettler DSC 823e System, Mettler Toledo, Spain), at a heating rate of 15 °C/min in N2 atmosphere, from 25 to 350±1 °C temperature For TG analysis (TA-50WSI, SHIMATZU, 50WSI, Tokyo, Japan), approximately 10 mg of sample were placed in an aluminum straw and analyzed at 10 °C/min heating rate in N_2 atmosphere with a temperature range of 25 to 500 ± 1 °C.

6.9 Microbiologic Control:-

One gram of each sample (cosmetic and botanical cosmetic) was diluted in phosphate buffer (pH 72; 19; w/v) to determine bacterial and fungal species. Then add a 1 mL volume of solution to thioglycolic acid agar (35 °C for 24 h) and Sabouraud agar (25 °C for 7 days). Bacteria such as E. coli, Staphylococcus aureus, Salmonella and Pseudomonas aeruginosa are examined using MacConkey agar, bismuth sulfite agar, cetrimonium bromide agar, Vogel's and Johnson's agar as media. Petri dishes were incubated at 35°C for 24 h and analysis was performed in triplicate.

6.10 In Vitro Sun Protection Factor (SPF) Evaluation of the Phytocosmetic:-

In vitro sun protection of botanical cosmetics is determined by ultraviolet spectrophotometry (290 to 320 nm) using the following formula: SPF, where SPF represents sun protection factor 290, CF represents correction factor, EE) is the redness effect of wavelength scattering. (A) nm, I) is the intensity of solar radiation with wavelength (A) nm. The obtained CF (10 value) and EEA values were previously calculated according to Sayre et al. absorbance (Abs) Read spectrophotometrically to determine the SPF value. In vitro UVAPF, UVA/UVB ratio, and critical wavelength (Ac) were determined using spectral transmittance (Labsphere UV-20005, LabsphereHalma Company, São Paulo, Brazil) as described in the ISO24443:2012 protocol. Measurements were performed in triplicate at 290–400 nm.

6.11 In Vitro Antioxidant Activity Analysis of the Phytocosmetic:-

DPPH radical was used for in vitro antioxidant activity. Dilute one gram of the preparation in 10 mL of isopropyl alcohol. Place a 2.5 mL volume of this solution in a test tube and add 2.5 mL of 0.004% DPPH in ethanol (w/v). Keep the reaction in the dark for 30 minutes. Quercetin was also identified as a canonical antioxidant at concentrations of 0.25, 0.5, 1.0, 1.75, and 2.5 µg/mL. Maximum absorbance at 513 nm was determined using ethanol as a blank. In the presence of the DPPH radical scavenger, the absorbance intensity decreases and the percentage of inhibition (% Inhibition) is calculated according to the method of Socorro et al.

6.12 Skin Permeation:-

To determine the release of flavonoids from the emulsion, 200 mg of phytocosmetics were placed on a synthetic cellulose membrane (Millipore, 0.45 µm) mounted on a diffusion cell. The analysis was performed in phosphate buffer pH 7.2 (68.4 mL 1 M Na2HPO and 31.6 mL 1 M NaH2PO4) as the obtained medium at

37 °C. To measure flavonoid permeability, clean hard tissue so that the dermis is in contact with the pad. Rutin concentration was analyzed by HPLC/DAD [45] and buffers were collected after 1, 2, 4 and 6 h and 2, 4, 8, 12 and 24 h for release and permeation measurement, respectively. Following the experiment, the skin was washed with distilled water and dried with absorbent paper, and the concentration of routine in the stratum corneum was measured using a peeling tape. 20 peelings were performed using an adhesive (Dsquame D100, 22 mm-Monaderm, Monaco). Transfer the tape to a tube containing methanol (4 mL) and shake for one minute, then sonicate for 30 minutes. Supernatants were analyzed by HPLC/DAD.

According to the routine penetration rate, after removal of the stratum corneum, the skin was excised and transferred to a vial containing methanol (4 mL), shaken for 1 min, and sonicated for 10 min. 30 minutes. Supernatants were analyzed by HPLC/DAD. All tests were performed in six replicates and clear emulsion was used as a blank control.

6.13 Photostability Study:-

To evaluate the photostability of botanical cosmetics, samples (phytocosmetics and ordinary emulsions) were placed on a PMMA substrate (HELIOPLATE HD 6-50 mm x 50 mm, 6 micron) and irradiated using a solar simulator at 1.2 J/cm2 90 min/irradiance. Sensor (CPS+, 1012014/SunCal BB 300-400 BST Atlas Material Testing Solutions). Photostability was assessed using a UV transmission analyzer (Labsphere UV-2000S, North Sutton, NH, USA). The analysis was performed in quadruplicate. Single irradiated plates were used for the negative control as described in the ISO24443:2012 protocol. 17%.

6.14 In Vitro Skin Irritation-Reconstructed Human Epidermis:-

In vitro skin stimulation is based on the Organization for Economic Co-operation and Development (OECD) Test Guideline No. 439 for Drug Testing [47] . Samples containing the extract were chemically coated on 3D reconstructed human tissue models. 42 minutes. After treatment following a 42-hour incubation period, tissue samples were placed in MTT 13-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide, thiazolyl blue tetrazolium bromide] (Sigma-Aldrich, São Paulo). , Brazil) solution is 1 mg/ml. 3 days. The concentration of blue formazan produced in cells in the brain was measured at 570 nm using a spectrophotometer (Versamax, Molecular Devices, São Paulo, Brazil). SkinEthic™M RHE (1% Triton X-100) was used to evaluate the reliability of the test. A negative (phosphate buffered saline) (Gibco Waltham, MA, USA) and a positive control (5% sodium lauryl sulfate in water) (Gibco Waltham, MA, USA) were used. As described in the literature and the United Nations GHS (United Nations Globally Harmonized System) Category 2, samples are considered to be skin irritating upon exposure and contact if the tissue capacity is less than or equal to 50%. Post-treatment incubation period.

7. Therapeutic Uses Of Antioxidants

7.1 Anti-cancer agents :-

a. Lanthanides as anti-cancer agents:-

Many iron-based drugs are widely used in cancer treatment. The therapeutic efficacy of cisplatin and other platinum complexes in elderly colitis is limited. Side effects are acceptable or weak. For this reason, attention is drawn to the development of medical products and the creation of new combinations through the work of blood cells. Strategies to develop new antibodies include incorporating carriers that can target specific tumor cells. It is also of interest to develop complexes that bind DNA in a completely different way than cisplatin to overcome the resistance that develops to eliminate the drug.

b.Lycopene as a potential anti-cancer agent:-

Chemopreventive therapy has been shown to be a cost-effective way to control many diseases, including cancer. Tomatoes and their products in particular are thought to have many health benefits. Epidemiological studies have provided evidence that high tomato consumption may reduce the risk of reactive oxygen species (ROS)-related diseases such as cancer.

Antioxidant carotenoids have been reported to be more stable and effective singlet oxygen quenchers than other carotenoids. In addition to its antioxidant properties, lycopene has many biological effects, including anti-cardiovascular, anti-inflammatory, anti-mutagenic and anti-cancer properties. The anticancer activity of lycopene has been demonstrated in in vitro and in vivo tumor models.

c.Selenium derivatives as cancer preventive agent:-

The role of selenium in cancer prevention has recently been confirmed by clinical studies, clinical trials, and epidemiological data. Therefore, selenium supplementation has shifted from nutritional deficiency treatment to medical use, particularly in clinical areas such as cancer, chemoprevention, and heart failure management.)

7.2 Application of lipoic acid:-

Anti-Aging Lipoic Acid Provides powerful antioxidant protection against age-related diseases, stroke, heart disease, and cataracts (both of which can cause damage). It does this by blocking the activity of free radicals in the brain, heart and eye cells. Fatty acids are closely related to four other important antioxidants: glutathione, coenzyme Q10: vitamin C and vitamin E. Lipoic acid not only plays an important role in brain cells, but also increases glutathione levels by interfering with the combination of antioxidants. Lipoic acid in the form of therapeutic seeds promises to be one of the most exciting and effective treatment methods of the twentieth century by providing antioxidant protection and immunity against diseases such as diabetes.

7.3 Acute central nervous system injury:-

Oxidative stress is considered a potential cause of central nervous system (CNS) damage caused by ischemic or hemorrhagic stroke or trauma. Free radicals damage important cellular components such as lipids, proteins and nucleic acids. DNA causes cell death after necrosis or apoptosis. Damage can be done further as the cellular immune system is weakenedsystem. In addition, brain injury also increases the level of excitotoxic amino acids (e.g., glutamate) that produce ROS, thus promoting parenchymal damage. Therefore, in theory, antioxidant therapy may act to prevent tissue damage and improve survival and neurological outcomes. A better understanding of the pathomechanisms of chronic CNS injury will identify important targets for drug intervention, and the effects and specific problems of free radicals should be considered in the development of antioxidant design.system. In addition, brain injury also increases the level of excitotoxic amino acids (e.g., glutamate) that produce ROS, thus promoting parenchymal damage. Therefore, in theory, antioxidant therapy may prevent tissue damage and improve survival and neurological outcomes. A better understanding of the pathomechanisms of chronic CNS injury will identify important targets for drug intervention, and the effects and specific problems of free radicals should be considered in the development of antioxidant design.

7.4 Neurodegenerative disease:-

Oxidative stress plays a role in the development of Alzheimer's disease. Some previous evidence suggests that oxidative damage to lipid membranes can affect the function of cells and glial cells, leading to the formation of amyloid plaques and neuronal cell death. Therefore, studies have shown that dietary intake of antioxidants such as vitamins E, C, and beta-carotene can inhibit the production of free radicals and reactive oxygen species. Antioxidants are also being investigated for the treatment of Parkinson's disease.

8.Conclusion:-

Antioxidants of natural origin are valuable bioactive compounds with good data for use in the food industry. In addition to their use in workplaces, there is also interest in them as alternatives to synthetic materials to increase product stability and prevent degradation from oxidation during processing and storage. Within the scope of the circular economy, studies are being carried out to use natural antibiotics in foods obtained from agriculture and non-organic products.

Every step of the extraction and application of natural antioxidants has been carefully designed. Research focus. Regarding the extraction steps, the choice of the most appropriate method will vary depending on the type of connection for recovery. Greener techniques have been explored to avoid using more solvents in heavy processes. Although the replacement of modern technology with low-tech technology has occurred, improvements still need to be made. Regarding post-extraction treatments for stability, spray drying is the most commonly used process; This is mainly because it is easy to operate and scalable, deliveringencapsulated antioxidants in the form of powder particles, making them easy to handle and dose.

Although these compounds are derived from natural materials, their amounts and toxicological effects should be taken into account when using them in food. It is also necessary to mention the negative effects of some compounds on the sense of smell and taste. This will increase the consumer's need to purchase foods containing natural antioxidants and will ultimately help reduce the cost of these products.

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