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A REVIEW ON : *SAMBUSCUS NIGRA*

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Abstract:-

A good source of protein, free and conjugated amino acids, unsaturated fatty acids, fibre fractions, vitamins, antioxidants, and minerals is the elderberry plant (*sambucus nigra*). Elderberry also has a number of health benefits both in vivo and in vitro, including antioxidant, anti-inflammatory, anti-cancer, anti-influenza, antibacterial, antidiabetic, cardiovascular protective, and neuroprotective properties. Activities are linked to controlling some important molecular targets and signalling cascades, as well as their probable molecular processes.

Keywords : *Sambuscus nigra*, elderberry, elderflower, anti-inflammatory

Introduction:-

Inflammation is one of the organism's defence mechanisms that aims to eliminate dangerous stimuli, such as pathogens, irritants, or damaged cells. Research interest is increasing.[1] in regards to natural anti-inflammatory agents that will stop and explain the pathogenesis of numerous diseases like diabetes, cardiovascular disease, and chronic inflammatory disorders.[1-2] numerous epidemiological studies show a link between increased consumption of foods high in polyphenols and a decline in the prevalence of cardiovascular illnesses. There are several dietary polyphenols consumed, and studies have shown that they have anti-inflammatory properties.[3] an element of this protective effect has been linked to polyphenols' anti-inflammatory effects. Polyphenols, polysaccharides, peptides, proteins, triterpenoids, lipid derivatives, and glycoproteins seem to be the most abundant bioactive chemicals in plants.[4-5]

Elderberry

Western and central asia, central asia, europe, and north africa are all home to the s. Nigra linnaeus tree. The generic greek name sambucus derives from an old musical instrument made of this tree's wood. According to taxonomy, the european species is s. Nigra var. Nigra, and the north american species is s. Nigra var. Canadensis [figure 2]. There are american (s. Cearulea) and european (s. Ebulus) species. All portions of the tree have historically been utilised in traditional medicine; the chemical composition of s. Nigra is influenced by a number of factors, such as cultivar, location, ripening stage, and weather conditions. In particular, polyphenols such flavonols, phenolic acids, proanthocyanidins, and anthocyanins, which give the fruit its deep purple colour, are present in significant concentrations in elderberrie.[6] sugar, cyanogenic glycosides, phenolic acids, flavonoids, and pectin can all be found in elderberry blooms. Flowers are used to treat colds because they include antiviral, diuretic, and mild anti-inflammatory qualities. The fruits of elderberries include a lot of flavonoids, anthocyanin glycosides, and essential oils. They have strong antioxidant, antiviral, and immunostimulatory properties that help strengthen the immune system and work as effective viral inhibitors to cure flu. S. Nigra promotes the production of cytokines and modifies the immune system without being specifically targeted. A special protein found in elderberries acts as a messenger and controls the immune response.[7]

Figure no I : Elderberry fruit

- Synonym: Elderberry, Sambucus canadensis, Sambucus racemosa
- Common name: *Sambucus nigra*
- Kingdom: Plantae
- Division: Magnoliophyta
- Class: Dicotyledonae
- Order: Dipsacales
- Family: Adoxaceae
- Genus: Sambucus
- Species: S. Nigra[8]

Chemical Constituent

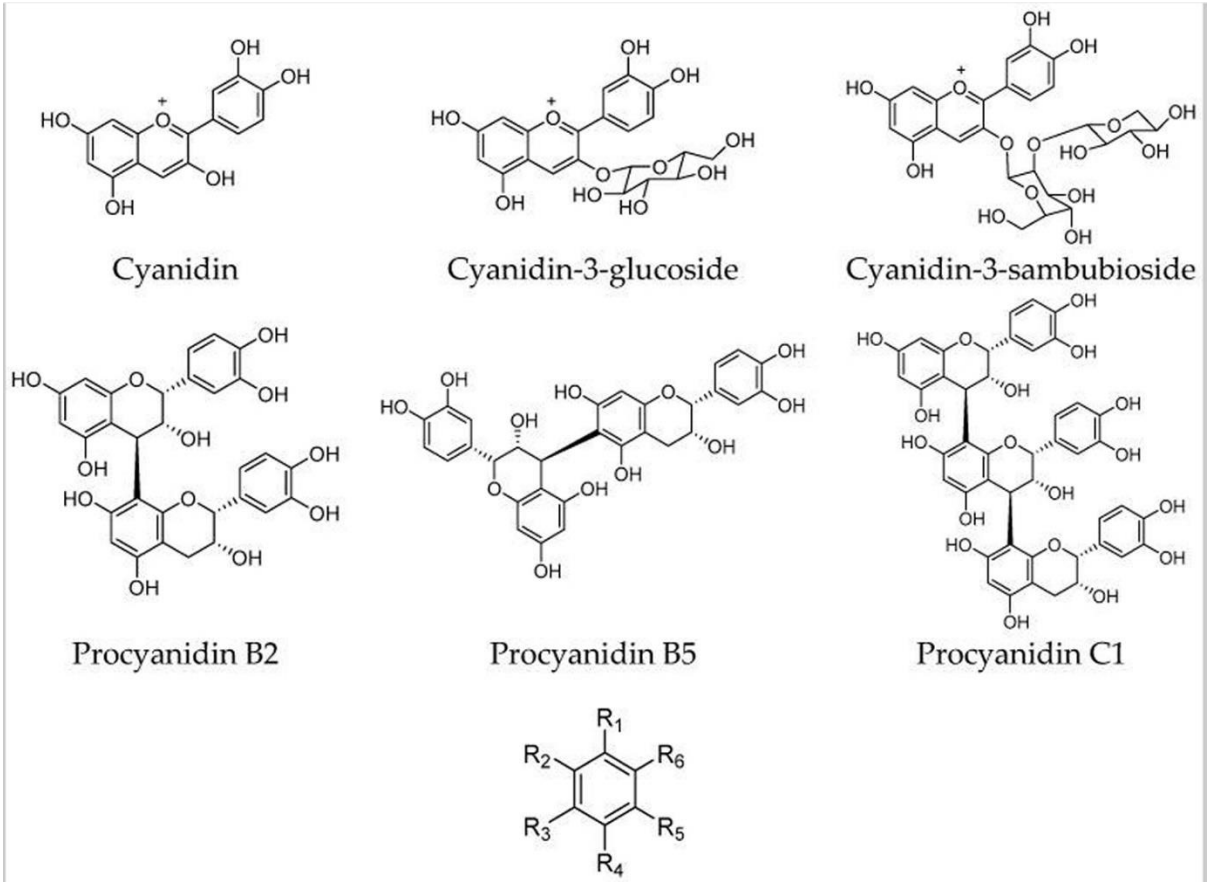

Figure 2

Uses of Elderberry

Anti-viral, Anti-bacterial and Anti-fungal activity

Elderberry has been used in folk medicine for centuries to treat influenza, colds and sinusitis, and has been reported to have antiviral activity against influenza and herpes simplex. Sixty patients (aged 18-54 years) suffering from influenza-like symptoms for 48 h orless were enrolled in this randomized, double-blind.[9] a well-known plant called elderberry aids the treatment of influenza and colds by having antiviral and antibacterial properties.[10] a 252 g/ml concentration of elderberry flower extract prevented the infection of madin-darby canine kidney (mdck) cells brought on by the h1n1 influenza virus.[11] the h1n1 virus was directly bound by the polyphenolic compounds that were the subject of the analysis, which prevented the virus from entering cells and suppressing infection in vitro. Additionally, research has been done using mdck cells to examine the cytotoxicity of elderberry juice concentrate and its antiviral effectiveness against the h1n1 virus.[12]

Anti-inflammatory activity

Hexane extracts of aerial parts (flowered browes), leaves and roots of sambucus ebulus were investigated for their anti-inflammatory activity in rats. Aerial parts and roots extracts produced statistically significant and dose dependent inhibition of edema.[13]

Antibiotic activity

Black elderberries (sambucus nigra l.) Are well known as supportive agents against common cold and influenza. We have analyzed a standardized elderberry extract (rubini, berry pharma ag) for its antimicrobial and antiviral activity using the microtitre broth micro-dilution assay.[14]

Anticancer activity

In our research we used the extract from dietary supplement of elderberry (ee) and its dominant anthocyanin-cyanidin 3-*o*-glucoside (cy 3-gluc).[15]

Antimicrobial activity

The scope of the experiments included analysis of the antimicrobial activity of ethanolic, methanolic and aqueous extracts against bacterial and fungal cultures and determination of the minimum inhibitory concentration of plant extracts tested microbial growth.[16]

Antidiabetic activity

The european black elder (*sambucus nigra*), found in abundance in the spontaneous flora, can provide us, as a raw material, elderberries, which have been known for thousands of years as having nutritional and healing properties.[17]

Cardiovascular protective activity

In this study, we investigated the anti-inflammatory and anti-oxidant effects of the american elderberry (sambucus nigra subsp. Canadensis) pomace as well as some of the anthocyanins (cyanidin chloride and cyanidin 3-o-glucoside) and flavonols (quercetin and rutin) in bv-2 mouse microglial cells.[18] numerous research' findings point to the elderberry's favourable benefits on blood pressure, oxidative stress reduction, increased blood plasma antioxidant enzyme activity, including glutathione (gsh), and uric acid (ua) level reduction.[19] a positive aspect of uric acid activity is associated with antioxidant activity, which is exhibited at a sufficiently high concentration. Uric acid has the ability to scavenge ros and chelate transition metal such as cu and fe, which makes it an important compound for living organisms.[20]

Neuroprotective activity

Microglial cells constitute a unique class of immune cells and exhibit characteristic properties to carry out multifunctional duties in the brain. Activation of microglial cells has been implicated in brain injury and in many types of neurodegenerative diseases.[21]

Covid-19

We aimed to determine benefits and harms of elderberry for the prevention and treatment of viral respiratory infections, and to assess the relationship between elderberry supplements and negative health impacts associated with overproduction of pro- inflammatory cytokines.[22][23]

Elderberry and its immunomodulatory effect

Part of the activity of elderberry is due to its anthocyanins, which are water-soluble pigments responsible for the colors of the many flowers, fruits, and vegetables that have an anti-inflammatory and immunomodulation effect[24] in vitro studies have demonstrated the antiviral activity of elderberry extracts against influenza a, influenza b, and h1n1 viruses.[25] in addition to directly inhibiting viruses, elderberry may also have an impact on the host immune system via cytokines. Elderberry may reduce the synthesis of cytokines,

according to some studies, but other evidence suggests increases in inflammatory cytokines.[26][27] pectins and -glucans, two plant-derived polysaccharides, are said to have immunological effects. The complement system and macrophages are immunomodulated by polysaccharides found in elderflowers and elderberries. The components that the host immune response can upregulate or downregulate are known as immune modulators.[28][29][30]

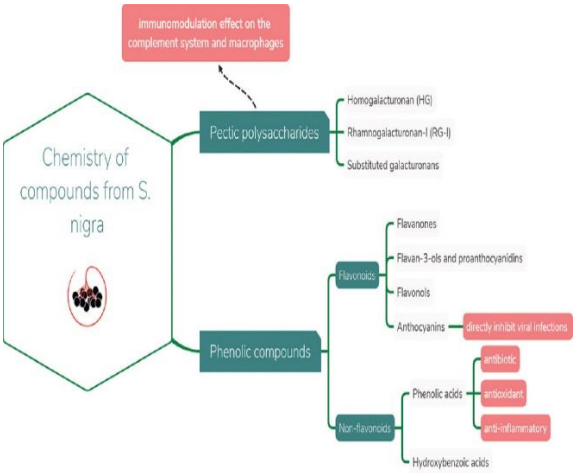

Figure 3: Chemistry of compounds from Sambucus nigra[30]

Chemicals

4-hydroxybenzaldehyde, 4-hydroxybenzoic acid, caffeic acid, homovanillic acid, vanillic acid, protocatechuic acid, phloroglucinol aldehyde, hippuric acid, ferulic acid, p-coumaric acid, quercetin, chlorogenic acid, neochlorogenic acid, epicatechin, catechin, kaempferol, kaempferol-3-rutinoside, 3-hydroxyphenylacetic acid, 3,4-dihydroxyphenylacetic acid, isorhamnetin-3-rutinoside, naringenin, isorhamnetin, rutin, quercetin, quercetin-3-rhamnoside, quercetin-3-glucoside, 4-methylcatechol, benzoic acid, dmso-d6, cd3od, griess reagent a, griess reagent b, cell proliferation kit i (mtt), and bovine serum albumin (bsa) were purchased from sigma-aldrich (st. Louis, mo, usa). Proanthocyanidins b2, b5, and c1 were obtained from plantchem (klepp, norway). Dulbecco‘s modified eagle’s medium (dmem-glutamax™, 5.5 mm), fetal bovine serum, and penicillin–streptomycin–amphotericin b were obtained from gibco life technologies (paisley, uk). Corning cellbind tissue culture plates were obtained from corning life-sciences (schiphol-rijk, the netherlands). All other reagents were of the highest purity available.

Side effects and contraindications to elderberry consumption

Although elderberry is not a poisonous plant, its unripe fruits, blossoms, leaves, stems, bark, roots, and cyanogenic glycosides, primarily sambunigrin, prunasin, holocain, and zierin, are digested to produce hydrogen cyanide.[31] although elderberry is most frequently ingested in processed form, eating young plants or large quantities of fruits may make you sick to your stomach and make you dizzy and nauseated. Consuming fruits heated during processing does not result in poisoning symptoms since thermal processing of raw materials causes sambunigrin to decay.[32] elderberry, ingredients in foods, and other therapeutic plants did not interact. However, it is important to keep in mind that medicinal plants include a variety of elements that may work similarly to or in opposition to conventional medications, so they cannot be totally deemed safe. The interactions of elderberry components with medications have not been studied in clinical studies. Only issues related to using elderberry with insulin, morphine, phenobarbital, diuretics, and immunoactive medications are taken into consideration.[33] determined the presence of a homologue of rip (ribosomal inactivating proteins) which may cause allergic symptoms after inhalation (conjunctivitis and asthma) in a selected group of patients. Due to the lack of sufficient information on its toxicity, it is recommended to avoid eating of elderberry by pregnant and lactating women as well as children and adolescents under 18 years of age.[34] studies analysing the effects of anthocyanin combination dosages (up to 9 g/kg of body mass) derived from currants, blueberries, or elderberries have produced data that do not support the negative effects seen in experimental animals. The anthocyanin mixture's acute oral toxicity levels were established to be 25 g/kg in mice and 20 g/kg in rats. Three different concentrations of tested anthocyanins—1.5, 3, or 9 g/kg month/day in three successive generations—did not result in toxicity.[35]

Discussion

Because of its ability to control pro-inflammatory cytokines,[36] elderberry has been found to have antiviral properties and to be effective against a range of viruses both in vitro and in vivo.[37][38][39][40][41] randomized, double-blind, placebo-controlled studies have shown that elderberry reduces the length of influenza symptoms.[42][43][44] according to a randomised controlled experiment (rct), elderberry shortens cold symptoms' average length and severity by 1.5 days. But in this study, 50% of the patients also took additional drugs.[45] by stopping reproduction, this aids in virus eradication. Theoretically, it would no longer be appropriate once the cytokine storm starts, but there is no evidence to support either hypothesis. According to the most recent research, elderberry is suitable for both preventive and first treatment.[46]

Conclusion

Plants are abundant sources of many bioactive chemicals with strong antioxidant potential, which have a substantial impact on consumers' health. Numerous research' findings support the positive impact of consuming elderberry (s. Nigra) preparations. It has been demonstrated that they are antioxidants and protective against respiratory conditions, colds, cardiovascular conditions, diabetes, and obesity. Additionally, a considerable effect on the,it has been established that the immune system, antiviral, antibacterial, and uv radiation protection. Despite the encouraging findings, more research is required to comprehend how interactions with other substances may impact how well elderberry components work. Questions about the interaction mechanism of elderberry components, their stability during storage, and their use in complex systems, such as food, have not yet been addressed by literature sources. Elderberry is useful for preventing disease in healthy people and it boosts immune system activity, but because it may provoke cytokine storms in covid-19 patients, further research is required before it can be utilised therapeutically.

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