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SEABUCKTHORN: COMPREHENSIVE INSIGHTS INTO IT'S BIOLOGICAL ACTIVITY & USES

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ABSTRACT

Chinese, Tibetan, & Ayurvedic medicine have long utilized sea buckthorn, according to historical accounts. Because of its unique appearance, valuable phytoconstituents, and therapeutic properties, seabuckthorn rose to prominence among all medicinal plants. Berries are produced by the sea buckthorn, includes biologically active compound that have soothing, anti-radiation, and anti-ageing qualities in addition to pharmacological effects on the heart and immune system. It has a variety nutrient and biologically active compound, by adding vitamin, flavonoids, and carotenoids. For free of amino acid, polyunsaturated fatty acids, & additional component.

KEYWORD: Seabuckthorn, medical research, the cardiovascular system, and the anti-inflammatory, anti-radiation, anti-cancer, and anti-senile properties of Hippophae rhamnoides L.

INTRODUCTION

Medical research, seabuckthorn, the cardiovascular system, and beneficial elements such as the anti-cancer, anti-inflammatory, & radiation-shielding. First, Common sea rhamnoides.[1] In the cosmetics industry, the plant is utilized inconventional medicine (helpful in treating of skin conditions brought on by bed confinement, ulcers in the stomach and duodenumheart conditions and possibly the growth of certain tumour's), as feed for animals, and for environmental reasons. The plants possess aextremely extensive and well-developed root system, and the roots coexist with nitrogen in a symbiotic relationship. repairing the Frankia

bacteria. Additionally, the rootschange insoluble mineral and organicsoil-derived materials into more solubledeclares.[2] Berries are carried by the species known as the sea buckthorn. This shrub, which belongs to the Elaeagnaceae family, is hardy. Sand thorn, another name for sea buckthorn, There are about 100 species in Dhurchuk, Chumaa, Tarwaa, Sirmaa, etc. Mostly found in the Northern Hemisphere are three genera. geographical latitudes that are moderate.[3]

Rhamnoides, or Hippophae Currently, Linn is expanding seven species.

- Sinensis subspecies
- Yunnanensis subspecies
- Subspecies Turkestan bungle
- Subspecies Caucasus
- subsp. carpatia
- subsp. Fluviatilis

Studies of sea buckthorn in humans and animals, both enternal & external have revealed several biological compound in roots, leaves, seeds, berries known as Siberian pineapples or seaberries, and antioxidant qualities that help to prevent atherosclerosis.[4] Sea buckthorn is a multipurpose herb with significant therapeutic and health benefits.. The versatile plant known as sea buckthorn contains roughly 200 beneficial chemical compounds. The intriguing nutritional profile of sea buckthorn is due to a variety of nutrients, including minerals, fat-soluble vitamins, water-soluble vitamins, lipids, fatty acids, amino acids, organic acids, antioxidants, phenols, tocopherols, tannins, folic acid, and carbohydrates. There are 24 different minerals found in its berries.[5]

Bioactive components and nutrients

Table No. 1: Bioactive compounds in *Hippophae rhamnoids* Linn.

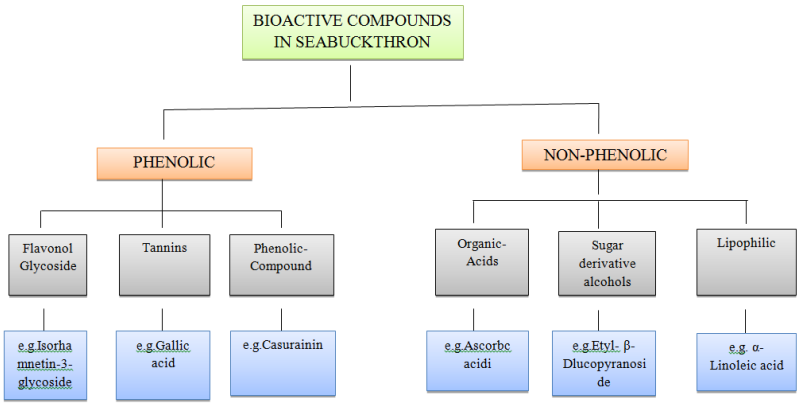


Table No. 2: Several sea buckthorn bioactivities.[6]

The phytoconstituent	Therapeutic qualities
Plant steroids	Steroids from plants enhances skin microcirculation, has anti-ulcer, anti-atherogenic, anti-cancer, and regulatory properties.
Fatty acid that is polyunsaturated	Neuroprotective, anti-tumor, and immunomodulatory
Acids that are organic	Reduce the stroke and heart attack; prevent ulcers; promote wound healing; and prevent arthritis
The Tocopherol	reduces lipid peroxidation, has antioxidant properties, and eases pain.
The vitamin "C"	maintains the integrity of a cell membranes and functions as an antioxidant. speeds up the production of scleroprotein
Pigment	acts as an anti-oxidant & promotes the production scleroprotein & epithelialization.
The vitamin "K"	Has an antiulcer effect, stops bleeding, and encourages wound healing.
Complex of vitamin "B"	Encourage neuroregeneration and cell repair
Tri-terpenes and Coumarines	Regulation of hunger, learning, & memory Compounds with polyphenols
Components of Polyphenols	Wound healing, cytoprotection, antioxidant, and cardioprotection

Fig. 1: seabuckthorn berry.

Classification of Hippophae rhamnoides according to taxonomy Linn[7]

- The Kingdom The plantae
- Phylum Spermatophytes
- The division A angiospermae
- The Class Dicot
- Subclass The Apetalae
- The serie A daphnales
- Family The Elaeagnaceae
- Genus The Hippophae

- species linn rhamnoides

External study of sea buckthorn

- Leaf extracts have the ability to both induce cancer cell death and slow the growth of glioma and breast cysts.[8]
- The tumor cell in the stomach, prostate, intestine, breast, colon, and liver can be inhibited by berry extracts. Additionally, they lower signals associated with inflammation, such as NF-κB.
- By obstructing the FAS pathway, sea buckthorn seed procyanidins can kill breast cancer cells (MDA-MB-231).[9]
- Extracts from fruits and berries can slow the growth of colon and breast cysts.

Internal study of seabuckthron

- In mice, the entire plant demonstrated antitumor activity and aided in the fight against tumors.
- When administered twice daily to dogs, seed oil increased oxidative stress (a detrimental effect).[10]
- In rats, aqueous seed extract demonstrated antidiabetic effects, particularly beneficial for Type 1 diabetes.[11]
- Rats' immune systems were stimulated by seed and pulp oils.
- A 5-gram dose of sea buckthorn oil decreased platelet aggregation, which meant that blood was less likely to clot, but it had no effect on blood sugar or cholesterol in healthy men.[12]
- Fruit powder improved metabolism and decreased stress associated with hypertension in stroke-prone rats.

Biological Activity of Seabuckthron

1. Anti-ageing and Anti-stress Activity

Depending on the individual, strain is defined "a pattern of physiological reactions that prepares an organism for action" 1471.[13] Atmospheric emissions, food adulteration, competitive living, synthetic medications, and other stressors have increased along with the exponential progress in society's, economy & population. Any form of stress that is not managed causes tolerance to other forms of stress to decline. Plant adaptogens frequently act as smooth pro-stressors, reducing the host defense mechanism's reactivity and enhancing the

baseline associated with strain in order to mitigate the detrimental effects of different stressors.[14] According to Tulsawani an aqueous extract of Seabuckthorn is harmless and demonstrated anti-adaptogenic potency. By the amount of protein and albumin in the broncho-alveolar rinsing and the amount of water and staining in the lungs, administration of seabuckthorn leaf extract decreased the low oxygen induced transvascular permeability in the rats' lung.[15] Hexose monophosphate pathway and aerobic metabolism are inhibited during extreme stressful CHR exposure & recovery from stress. In blood, liver, muscle, a single and 5 doses of seabuckthorn solvant extraction limited / Improve the tissue glycogen and enzyme activity during C-H-R exposure, such as glucose-6-phosphate dehydrogenase, hexokinase, phospho-fructokinase, and citrate synthase. Research showed treatment with leaves aqueous extract caused a trend of changing from anacrobic to acrobic metabolism.[16]

2. Antioxidant, Immunomodulatory Activity

In vitro, using rat splenocytes, macrophages, and the C6 glioma cell line, and in vivo, using male albino rats, the antioxidant and immunomodulatory qualities of sea buckthorn were investigated. Apoptosis and the generation of free radicals caused by chromium were inhibited by the alky leaves extract, which also restored the membrane potential of mitochondria and the antioxidant state to manage the cells.[17] With substantial immunomodulatory activity, the extract particularly triggers adaptive immunity mediated by cells. and stimulates production of 2 and interferon in particular cause the cell-mediated immune response when Conparticular is not present. It again inhibit interleukin production caused by chromium. The animals were safe from oxidative damage caused by chromium thanks to leaf alcoholic extract.[18] Sea Alcoholic concentrate made from buckthorn leaves seems to have managed to ability of mature mice to introduce macrophage antigen, proving its anti-maturing and resistant boosting properties. Oriental traditional medicine has long utilized sea buckthorn. medicine to deal with a range of controversial topics. Consequently, the Immunomodulatory and mitigating exercises have been rationally justified in light of these impressions. Yasukawa and associatesal.[19] Hippocampal oil has a significant amount of antioxidant activity, based on their assessment of the seed oil's antioxidant properties both are enternal & external. By adding, seed oil was apparent.[20] 15-day old-chicks, Sea buckthorn fruits also demonstrated aimmunoprotective effect are apposing immunodepression brought on by T-2 toxin.[21] The term "antioxidant effect" in term suppression Oxidase-related activities & rise in antioxidant enzyme activity. Therefore

decreasing the formation of metal ions and oxidase and increasing the production of antioxidant enzymes can result in a good antioxidant effect.[22]

3. Hepatoprotective Activity

The liver is in charge of both endogenous and exogenous medications. detoxification, synthesis, secretion, and preservation. Bioactivation of xenobiotics (drugs or poisonous food) could cause reactive metabolic species to react in the liver. with macromolecules found in cells, producing protein DNA, lipid peroxidation, oxidative stress, and dysfunction damage.[23] There are not able antihepatotoxic effect from buckthorn oil and extract. buckthorn oil may be significant bioavailable lutein and is high in carotenoids.[24] By controlling lipid metabolism in hepatocytes and lowering oxidative stress, carotenoids like lutein have antihepatotoxic properties. Reduced levels of inflammatory factors, oxidative stress, and lipid metabolism regulation may be the mechanisms behind these effects. To further explore the hepatoprotective qualities of sea buckthorn, more in vivo studies are needed.[25] Seabuckthorn extract lowers the levels of serum laminin, and gross bile acid into the liver, suggesting that it prevents the synthesis of collagen and other extracellular matrix. For eight weeks, male ICR mice treated with CC were given seabuckthorn.[26]

4. Anti- Cancer Activity

Traditional medicine has utilized sea buckthorn has health advantages, such as prevention and cure of cancer. Recent research sea buckthorn may has anti-cancer properties through affecting the immune system, apoptosis, and cell proliferation.[27] Consequently, Sea buckthorn leave , nutritional food could be crucial in prevent cancer. However, there is currently insufficient research on the nutraceutical present in sea buckthorn leaf for develop innovative methods of treating prostate cancer.[28] Antioxidants in sea buckthorn are responsible for its antitumor properties. substances, particularly flavonoids and other phenolic compounds which shield oxidative damage to cells, which can result in genetic mutation as well as cancer Christaki (2012)[29] The sea Buckthorn has helpful to prevent and treat cancer; it helps patients receiving chemotherapy recover as well. by significantly enhancing immune system performance and reducing the harm to the hematological system (Olas et al., 2018).[30] The majority of the Laboratory work has been done in this field. creatures. Reports about a Hippophae extract's potential (an extract of alcohol, which would primarily comprise the flavonoids) to guard against harm to the bone marrow caused by to radiation; additionally, this study demonstrated that the extract may aid in the quicker bone marrow cell recovery.[31]

5. Gastrointestinal Activity

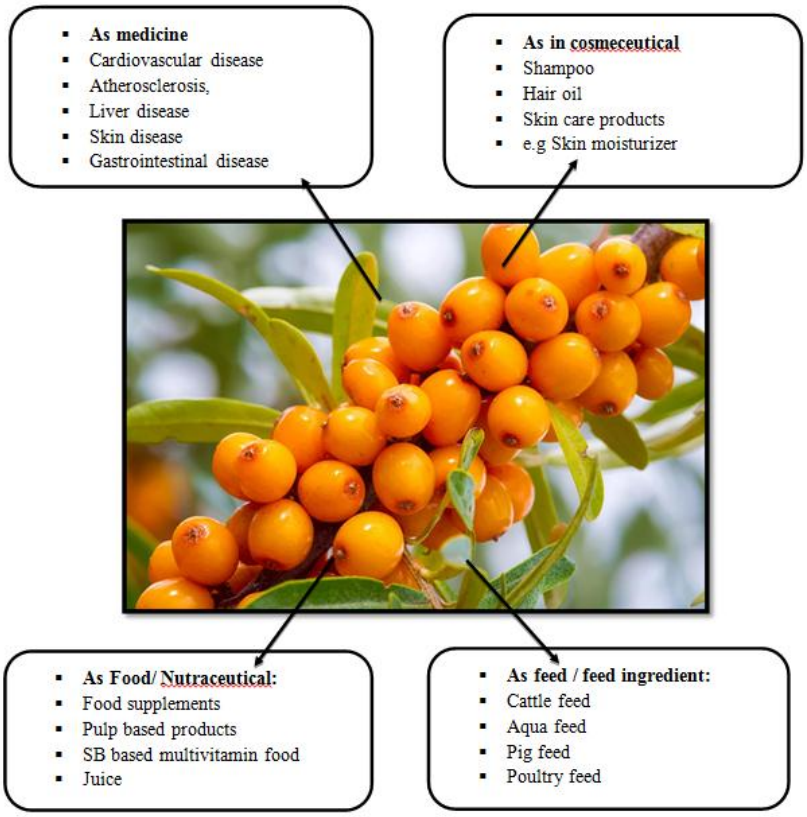
Sea buckthorn's potential as a gastrointestinal remedy Disorders have been researched. Oral delivery ofCO2 As a pre-trial treatment, pulp oil and extracted seed were utilized. For rat groups that had stomach ulcers that were artificially created. The medicinal and prophylactic properties of sea buckthorn oils were looked into. It is raining demonstrated eating Sea buckthorn oil can Speed up healing process for acetic acid-induced stomach ulcers.[32] Hippophae has long been used to treat stomach ulcers, and lab tests have shown that the seed oil is effective in this regard. Because sea buckthorn oil regulates pro-inflammatory mediators, it lowers inflammation and normalizes stomach acid. According to research, hexan extract from hippocampal plants can effectively prevent stomach damage.[33] To treat oral mucositis, rectum mucositis, duodenal ulcers, and gastric ulcers.[34] By regulating pro-inflammatory mediators, it may help to normalize the production of gastric fluids & lessen swelling. Domethacin stress prevented ulcer models were used test the anti-ulcerogenic properties. It stood discovered that Ax result hexane extract from Hippophae was effective in preventing stomach damage.[35]

6. Cardioprotective Activity

Sea buckthorn is one of many fruits and vegetables that are rich in flavonoids, a class of naturally occurring polyphenolic compounds.[36] In which the heart and blood vessel abnormalities. Other major causes of cardiovascular disease include atherosclerosis, stroke, heart attack, peripheral vascular diseases, irregular heart rhythm, coronary heart diseases, coronary artery disorder, elevated lipid levels, and high cholesterol.[37] For instance, the flavonoid and other phytonutrients found at the sea buckthorn help treat cardiovascular diseases.[38] Reports state that flavanols' Having antioxidant properties lower & exposure the Cardiovascular Disease. Flavonoids found in all over the sea buckthorn have protectives Characteristics that protect against cardiac ischemia, oxidative damage, and tumors As well as aging and reperfusion.[39] Sea buckthorn can be eaten as supplements, oils, jams, juices, or fresh fruits. It smells good and tastes both sweet and sour. Most people tolerate it well, and it's safe. Before using sea buckthorn, though, you should always speak with your doctor, particularly when you are giving any medicines or any allergies or may interact with sea buckthorn.[40]

7. Antimicrobial and Antiviral Activity

There are antibacterial and antiviral properties of seabuckthorn. Chaman studied the antibacterial properties of seabuckthorn fruit extracts. making use of the agar well diffusion method. Results showed that while another extract only caused moderate area of inhibits adversary every microorganism, methanol extract generated a fairly potent antibacterial response. Dengue fever is a dangerous infection for which there is not directly use of seabuckthorn leaves extract were checked using contrasted with the commonly used antiviral drug Ribavirin. Since H. rhamnoides leaf extract was just as effective as ribavirin preserving dengue infected cells' viability, it may have potent anti dengue properties and it should used to treat dengue pyrexia.[41] Sea buckthorn has strong anti-viral properties. Strains of HSV-2 that are resistant to acyclovir and penciclovir.[42]



CONCLUSION

Due to its abundance of beneficial biological active compounds, such as vitamin, flavonoids, fatty acid, antioxidants, & minerals, sea buckthorn extremely valuable herbal plant. The plant offers a variety of health advantages due to these natural constituents. Sea buckthorn has been shown in human, animal, and cell studies to have anti-inflammatory, anti-stress, liver-

protective, heart-healthy effects. Strong antiviral, antimicrobial, anti-cancer, anti-ulcer, and antioxidant properties are also demonstrated by it.

All things considered, seabuckthorn is a potent plant & numerous medicinal qualities have enormous potential for use in nutrition, medicine, and illness prevention. To completely comprehend its advantages and long-term safety, however, more thorough research is required, particularly in humans.

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