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THERAPEUTIC APPLICATIONS OF SEED OIL-A REVIEW

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ABSTRACT :

Indian tropical fruits are abundant in seeds that can be eaten, including chia, hemp, sesame, pumpkin, sunflower, mustard, nigella, guava, papaya, mangosteen, honeydew, pomegranate, fennel, fenugreek, cumin, sweet orange, cucumber, jackfruit, mango, melons, and avocado. These items, for example, the seed piece, which comprises around 10-35% of the weight, offer high dietary benefit and helpful applications. The seeds of some fruits are examined for their functions and applications as sources of food value and bioactive phytochemical constituents, as well as their functional properties, medicinal, therapeutic, and nutritional applications. The seeds contain fundamental bioactive parts like alkaloids, carotenoids, flavonoids, glycosides, saponins, terpenoids, tannins, steroids and polyphenolic mixtures and that display magnificent calming, cancer prevention agent properties, anticancer, against diabetic, hostile to hyperlipidemic, against corpulence, neurological issues, cardiovascular, skin infections and ongoing sicknesses. They are packed with vitamins, minerals, carbohydrates, fats, proteins, and remarkable physicochemical properties. However, extensive research can be carried out to ascertain the bioavailability, potency, and efficacy of the nutritional and bioactive components found in various seed varieties. The medicinal and functional potentials of these fruit seeds can be identified through extensive research using the parts of the seeds. The therapeutic applications and functional properties of seeds found in fruits, vegetables, and medicinal plants are discussed in detail in this review. This review discusses some edible seeds' medicinal and nutritional value, phytochemical composition, bioactive phytoconstituents, therapeutic activity, therapeutic applications and uses, proximate analysis, functional properties, analytical and spectroscopic methods, and human clinical trials.

KEYWORDS: *Seeds, pumpkin seeds, mustard seeds, sesame seeds, medicinal therapeutic, nutritional applications, watermelon seeds, anti- oxidant activity, anti-asthmatic.*

INTRODUCTION:

Seeds are frequently regarded as agricultural-based industries' leftovers. However, research over the years has demonstrated that a number of bioactive components are present in the seeds of various plants. Polyunsaturated fatty acids and antioxidants, such as tocols, bioflavonoids, and phytosterols, are abundant in the seed oils extracted from a variety of plants, including pumpkin, bitter melon, Kalahari melon, kenaf, roselle, hemp, Eruca, Alseodaphne andersonii, Eucommia ulmoides, and Garcinia xanthochymus, among others [1]. The mechanical process, chemical or solvent extraction, and supercritical fluid extraction are just a few of the methods used to extract these seed oils. Every strategy enjoys its own benefits and constraints which are talked about exhaustively in the accompanying segments [2].

The extraction procedure is an essential step in obtaining seed oils in terms of yield and quality in an effective and efficient manner. Soxhlet or solvent extraction, distillation, cold pressing, hot pressing, maceration, and other conventional extraction techniques are used to produce edible oils. The thermally degradable bioactive compounds that are present are destroyed by these methods, which typically require longer extraction times. Due to these challenges, the researchers were eager to develop novel extraction methods. Recent research has focused on the study of novel extraction techniques like supercritical fluid extraction and pre-processing methods like enzyme, ultrasound, microwave, or pulsed electric field-assisted extractions. Seeds from fruit juice processing industries are initially collected for PSO, cleaned, dried, and powdered prior to extraction. Seeds and extracted oil must be stored and preserved appropriately to prevent the production of mycotoxin and deteriorating oxidative reactions [3].

The most widely used technique for extracting oils at a laboratory scale is soxhlet extraction. When it comes to extraction, organic and nonpolar solvents are typically used. The oil present in seeds is perhaps the main part fundamental for keeping up with human well-being and diet since they are gotten as sustainable power assets. Different methods of extraction, such as the hydraulic press, cold press, solvent extraction, and refinement, can be used to obtain seed oils [4]. Seed oils are in high demand, and newer seed resources for oil production are being investigated with great interest. The fatty acid and triglyceride compositions of various oils are primarily what determines their quality characteristics. Seed oils are used as flavoring agents, excipients, and additives in dosage forms and formulations when preparing topical formulations, in addition to their nutritional value for human health [5].

THERAPEUTIC APPLICATION OF SEED OIL:

Phenolics and lignans can be found in the seeds of Sesamum indicum, which belong to the Pedaliaceae family. Against HepG2 cells, the antioxidant and antiproliferative properties were evaluated. The antioxidant and antiproliferative properties of bound phenolics were enhanced by the nonlignan components [6].

Methanol, ethanol, or acetone were used to extract the seeds of Sesamum indicum, and the resulting extracts contain phenolics and flavonoids. It determined the antioxidant, phytochemical, and physicochemical properties. Sesame seeds have a lot of antioxidant power [7].

Sesame seeds were found to have antibacterial, antioxidant, and free radical scavenging properties. Sesamum indicum seed oil contained sesamin, sesamolin, and lignans. Among the studied molecules, sesamol is the most effective antioxidant and free radical scavenger. Sesamol was found to be effective against food-borne pathogens in antibacterial tests [8].

Flavonoids, lignans, and phenolic acids (hydroxybenzoic and hydroxycinnamic acids) are all found in Sesamum indicum. Reversed-phase high-performance liquid chromatography (RP-HPLC) with a diode array detector and quadrupole time-of-flight mass spectrometry (Q-TOF MS) were used to estimate the antioxidant activity. Additionally, some nitrogenous compounds and organic acids were characterized. The extract's antioxidant capacity and total phenol content were determined [9].

Sesamum indicum seeds, which contain both phenolics and flavonoids, were examined to determine their antioxidant capacities. Total phenolic content (TPC) and total flavonoid content (TFC) were measured using ultraviolet (UV)-V is spectrophotometry and Pearson's method, respectively, to determine the antioxidant potential. Utilizing the ABTS and FRAP methods, it was discovered that phenolic compounds found in black sesame seeds are the primary contributors to antioxidant activities [10].

The antioxidant potential of Sesamum indicum seeds was determined. The seeds contained amino acids, total phenolics, sesamine, sesamolin, catechin, epicatechin, and sinapic acids. Amino acids also significantly increased in sprouted black and white seeds, with the greatest variations observed in arginine and tryptophan [11].

GC/MS and an amino acid analyzer were used to identify pumpkin seeds from the Cucurbitaceae family that contained both fatty acids and amino acids. Two varieties of pumpkin were compared to see how many nutrients were in different parts. The unsaturated fatty acids oleic, linoleic, and linolenic acid, as well as the saturated fatty acids capric acid, myristic acid, and stearic acid, were present. The seed contained a significant amount of threonine, serine, methionine, isoleucine, and tyrosine, but only alanine in the hybrid variety's seed [12].

Cucurbita pepo L. seeds containing tocopherols, fatty acids, and phytosterols were studied for their ability to heal wounds. The outcomes acquired showed incredible injury recuperating action [13].

Cucurbita pepo L. seeds containing L-arginine were used to study atherogenic diet-induced atherosclerosis. Serum lipid concentrations in atherogenic rats were also measured for the total cholesterol TC, low-density lipoprotein-C, and high-density lipoprotein-C. Pumpkin seed supplementation protects against atherogenic rats by significantly lowering serum concentrations of total cholesterol and low-density lipoprotein LDL-C in pumpkin seed-supplemented rats [14].

Aqueous and ethanol extracts of Cucurbita pepo L. seeds, which contain cucurbitine, amino acids, fatty acids, and for the first time, berberine and palmatine, were tested for their anthelmintic efficacy against Cucurbita pepo L. in vitro and in vivo. Analyses using LC-MS, IR, and Raman spectroscopy were carried out. Infections caused by gastrointestinal (G. I.) nematodes can be controlled with pumpkin seed extracts [15].

Cucurbita pepo L., a member of the Cucurbitaceae family, was tested for its anticancer activity. Wistar rats given pumpkin seed extract containing 1, 2-dimethylhydrazine (dmh) developed colon cancer. When consumed in moderation, pumpkin seed may lower the risk of CC [16].

Triacylglycerol, palmitic, stearic, oleic, and linoleic acids, as well as some bioactive components like tocopherols, carotenoids, and -sitosterol, were analyzed in this study in three major pumpkin species, Cucurbita maxima L. These pumpkins contain monounsaturated and polyunsaturated fatty acids [17].

Chlorogenic sunflower seeds from Helianthus annuus, a member of the Asteraceae family, were found to have anti-obesity properties. The lipid profile, fat mass, and body weight all benefit from sunflower extract consumption [18].

Using the LC–TOF–MS/MS method, antioxidant activity and the phenolic profile of Helianthus annuus, which contained mono- and Di caffeoylquinic acid isomers as well as caffeic acid hexose, were investigated [19].

The common cold, rheumatoid arthritis, gout, respiratory disorders, and other conditions can all be treated with black mustard. Asthma, arthritis, headache, nasal congestion, intestinal worms, toothache, and other conditions have all been treated with black mustard seed. The seeds of watermelon, Citrullus lanatus, belong to the family Cucurbitaceae. Watermelon is primarily grown in many parts of the world. More than 1,000 different varieties are currently available. Vitamins and antioxidants are abundant in watermelon. It contains the compound lycopene, which is significant for heart and may safeguard the skin from UV beams. Citrulline, a compound found in watermelon, is an excellent source of amino acids. Watermelon's citrulline boosts immunity, protecting the body from viruses. A lack of citrulline has been linked to increased cardiovascular risk factors and a decreased immune response. Musk Melon is a watermelon and honeydew melon-related semi-sweet fruit. It is also a member of the same plant family as pumpkins, cucumbers, and others. Musk melon's antioxidant has anti-inflammatory properties. They have free radical scavenging activity, which reduces the likelihood of developing serious health issues like diabetes, heart disease, arthritis, and others by causing oxidative stress and cell damage. Both vitamin A and vitamin C, which are found in musk melon, are essential for healthy skin. Vitamin C supports the natural production of collagen, and vitamin A helps shield the skin from UV rays. The two carotenoid compounds that give fruits and vegetables their yellow and red colors are lutein and zeaxanthin, which are found in Musk Melon. These antioxidants, when used in conjunction with vitamin A, play a crucial role in maintaining healthy eyesight and vision. Vitamin A-like beta carotenes found in Musk melon may aid in the prevention of respiratory conditions like bronchial asthma. Musk melon contains choline, an antioxidant that may also reduce inflammation in people with chronic bronchitis.

Pomegranate may even help prevent cancer and heart disease. The seed of the pomegranate is used to treat a wide range of conditions, including diabetes, heart disease, hypertension, and as an energy booster. The herb fennel plant produces the spice fennel seed. Fennel seeds have a sweet flavour and have traditionally been used as a cooking spice. However, fennel seeds can be used in a variety of dishes and recipes.

The anticancer activity of mustard seeds Brassica nigra, which belong to the Brassicaceae family and contain sinigrin and myrosinase, was evaluated using an orthotopic rat bladder cancer model [20].

Ascorbate, riboflavin, and polyphenols, gallic acid, caffeic acid, quercetin, and kaempferol dry seeds, were identified by HPLC analysis of the extract of Brassica Juncea for their antioxidant activity [21].

The antioxidant capacities of Brassica nigra and Brassica alba were investigated. Oleic, linoleic, and linolenic fatty acids were identified, while erucic (6.87%), oleic (5.08%), and linoleic (1.87%) acids were the predominant fatty acids in yellow mustard seed [22]

On the human non-small cell lung cancer cell lines A549 and h1299, the ethanolic extract of Brassica nigra was tested to see if it had any anticancer effects. B. nigra remove showed a significant development inhibitory impact as it diminished the practicality and clonogenic endurance of A549 and H1299 cells in a fixation subordinate way. B. nigra seed concentrate might be a significant anticancer potential against human cellular breakdown in the lungs [23].

In a pilot study on infections of the respiratory tract, Brassica nigra mustard seed footbaths were used to identify infections of the respiratory tract. 103 patients were remembered for the mediation bunch and 36 patients were remembered for the benchmark group. Members of the mediation bunch who utilized mustard seed footbaths for six back-to-back days showed an improvement in four of the five subscales of the Herdecke Warmth Discernment Poll HeWEF survey [24].

Nigella sativa seeds were studied for their ability to lower lipid levels. The seeds decreased total cholesterol, triglycerides, low-density lipoprotein, and increased high-density lipoprotein. The current study demonstrates that a combination of 8 weeks of aerobic exercise and N. sativa supplementation results in improved lipid profile parameters [25].

Gas chromatography-mass spectrometry was used to identify tetrdecanoic acid, pentadecanoic acid, hexadecanoic acid, octadecanoic acid, and hexadecanoic acid, respectively, in watermelon and muskmelon belonging to the cucurbitaceae family [26].

Linoleic, stearic, palmitic, and oleic acids are found in Citrullus lanatus, as are myristic, heptadecanoic, arachidic, 9-hexadecenoic, and 14-eicosenoic acids. The effects of oxidizability, antioxidant activity, peroxide value, and total phenolics were determined [27].

Mice with hypercholesterolemia developed atherosclerosis in Citrullus lanatus containing citrulline. In hypercholesterolemic mice, C. lanatus "sentinel" extract reduced body weight gain, decreased plasma cholesterol concentrations, improved homeostasis of pro- and anti-inflammatory cytokines, and slowed atherosclerosis development without affecting systolic blood pressure [28].

Pomegranate seed extract was used to study the effects of tramadol on testicular damage in adult and adolescent rats. The pomegranate seeds' high content of antioxidants may account for this effect [29].

CONCLUSION

The useful properties and phytochemical structure of a few seeds found in leafy foods are examined in this article. The seeds that are the focus of this analysis are taken from edible fruits. They can be utilized directly as raw materials for pharmaceutical formulations due to their sufficient nutritional value, therapeutic efficacy, and food value. because they contain a lot of alkaloids, glycosides, saponins, flavonoids, terpenoids, tannins, steroids, and polyphenolic compounds, some of them may be the source of raw materials and lipids. There are a lot of areas that need more research, like the study of bioactive phytoconstituents, therapeutic activity, analytical and spectroscopic methods, and clinical trials, so this article can be used as a reference for future research.

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