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Moringa oleifera-AN ANTI-CANCER AGENT

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Abstract: Cancer is the leading cause of mortality worldwide. According to the cancer reports published by the World Health Organization (WHO) and the World Cancer Research Fund, the incidence of cancer is still increasing especially due to diet, environment and carcinogenic virus infections. *Moringa oleifera* (*M. oleifera*) or drumstick is a member of Moringaceae, *Moringa* has been shown in studies to have an anti-tumor capacity. *Moringa* contains benzyl isothiocyanate. There are many studies that have shown this chemical and compounds derived thereof to have anti-cancer and chemoprotective capabilities. This chemoprotective aspect is critical for those who are battling cancer; this helps strengthen cells so that they can tolerate chemotherapy. The plant has numerous medicinal applications and is used as a traditional medicine for the treatment of various illnesses such as skin diseases, respiratory distress, ear and dental infections, hypertension, diabetes, anemia, and cancer. It is a challenging task for Oncologists and Medical Scientists to devise the best treatment regimen that kills the maximum number of cancer cells with minimal side effect rendering maximum benefits to the cancer patients.

Keywords: *Moringa oleifera*, Anti-Cancer, chemoprotective.

Introduction: Ayurveda, a traditional Indian medical practice using plant drugs has been successful from very early times in using these natural drugs and preventing or suppressing various tumours with different lines of treatment [1]. In India, people of different ethnic groups inhabiting various terrains, possess their own distinct culture, religious rites, food habit and a rich knowledge of traditional medicine [2]. They practice herbal medicine to cure a variety of diseases. Natural products, especially plants have been used in the treatment of various diseases for thousands of years.

Cancer is a group of diseases caused by loss of cell cycle control. Cancer is associated with abnormal uncontrolled cell growth [3]. Cancer is caused by both external factors (tobacco, chemicals, radiation and infectious organisms) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism). Cancer is a significant worldwide health problem generally due to the lack of widespread and comprehensive early detection methods, the associated poor prognosis of patients diagnosed in later stages of the disease and its increasing incidence on a

global scale. Indeed, the struggle to combat cancer is one of the greatest challenges of mankind [4]. Cancer is one of the most prominent diseases in humans and currently there is considerable scientific and commercial interest in the continuing discovery of new anticancer agents from natural product sources [5]. Chemoprevention is recognized as an important approach to control malignancy and recent studies have focused on the search for desirable chemopreventive agents. Natural products, particularly dietary substances, have played an important role in creating new chemopreventive agents [6].

Moringa oleifera is a tree brought from the mind of Nature to the hands of man. Sahijan, Shigru, *Moringa*, Drumstick are few vernacular names of a common but the most underutilized medicinal tree *Moringa oleifera*. The most common name of this tree, *Moringa* is derived from Tamil word *murungai* or Malayalam word *muringa*. It is indigenous to the sub-Himalayas of India and now naturalized to various tropical and subtropical regions of the world viz. Middle East, Africa, the Americas, Asia, the Philippines, Cambodia, and the Caribbean islands.

Ayurveda, the oldest Indian indigenous medicine system of plant drugs is known from very early times for preventing or suppressing various tumors using these natural drugs. And nowadays scientists are keener to researches on complementary and alternative medicine for the management of cancer. In Ayurvedic concept, according to 'Charaka' and 'SushrutaSamhitas' cancer is described as inflammatory or non-inflammatory swelling and mentioned either as 'Granthi' (minor neoplasm) or 'Arbuda' (major neoplasm).^[7] The nervous system (Vata or air), the venous system (Pitta or fire) and the arterial system (Kapha or water) are three basics of Ayurveda and very important for normal body function. In malignant tumors all three systems get out of control (Tridoshas) and lose mutual coordination that causes tissue damage, resulting critical condition. Tridoshas cause excessive metabolic crisis resulting in proliferation.^[8]

The modern cancer therapy which is known to be burdened by drug-induced toxic side effects hoping perfect cure of disease form the complementary and alternative medicine system. The main goal of Ayurvedic therapy is to find the ultimate cause of an illness while the therapeutic approach of Ayurveda is divided into four categories as Prakritisthapanichikitsa (health maintenance), Rasayanachikitsa, (restoration of normal function), Roganashanichikitsa (disease cure) and Naishtikichikitsa (spiritual approach).^[9] Commonly used herbal decoctions reported in Ayurveda are made of multiple herbs possessing great potential for a cancer cure; scientifically these formulations work on multiple biochemical pathways and influence different organ systems all together and nourish the body as a whole by supporting body's defence systems. Herbs help total healing, reduces the side effects and cancer-associated complications. *Moringa oleifera*, having scientific evidence of anticancer property^[10].

Moringa oleifera for Cancer Prevention or Treatment: As we learn more about cancer, we are empowered to use more of the tools which nature has created for us to help battle this terrible disease. The fight against cancer exists on many fronts, encompassing both prevention and treatment methods. In the past we have put all of our faith in pharmaceutical drugs, however these are not the only weapons we have at our disposal to do battle with cancer. *Moringa oleifera* is a plant which is known to have many medicinal properties. It is becoming very clear

that this natural resource is a helpful ally in a comprehensive treatment of cancer.

Moringa has been shown in studies to have an anti-tumor capacity. *Moringa* contains benzyl isothiocyanate. There are many studies that have shown this chemical and compounds derived thereof to have anti-cancer and chemoprotective capabilities. This chemoprotective aspect is critical for those who are battling cancer; this helps strengthen cells so that they can tolerate chemotherapy.

Moringa oleifera has other characteristics which make it a good complement to a cancer prevention or treatment plan. It contains an enormous amount of nutritional content; *Moringa oleifera* contains vitamins, minerals, and amino acids which are critical for good health. It is loaded with calcium, iron, potassium, protein, Vitamin A and C, and many more properties

which promote a healthy body that has the tools to fight cancer. It is known to have anti-inflammatory, anti-viral, antioxidant, anti-allergenic, and pain relief uses. It has also been put to use to fight a variety of infections.

This incredibly useful tree has grown popular of late due to its ability to help sustain populations that have otherwise been fraught with nutritional problems. It tends to grow in areas where access to food and clean water are more complicated. The successes that many have had with *Moringa oleifera* in promoting good health in some of the most devastated areas have lead many scientists to examine its properties closely. It is fast emerging as a means to prevent cancer. It is also gaining notoriety as a product which helps cancer patients who are currently undergoing pharmaceutical treatment.

Fighting cancer is about equipping your body with the tools to fight every day. While drug therapies are very useful in this fight, it is also key that naturally occurring dietary options are used as well. Total health will give a cancer patient the endurance to battle the disease with full energy. The anti-tumor properties in *Moringa oleifera* will be of special interest to cancer patients. Also, for those undergoing chemotherapy, the chemoprotective properties associated with this wonderful plant will empower the patient to stand strong when using chemotherapy to fight cancer. Investigate the studies which show this plant to be useful in a comprehensive battle against cancer. Always be sure to discuss all of your treatment options with your doctor, including your choice of

dietary supplements, as interactions between chemicals must always be closely monitored when undergoing drug treatment. *Moringaoleifera* has exciting potential as an ally in the war against cancer.

Moringaoleifera's extremely high nutritional content, which has made the plant very popular in parts of the world struggling with malnutrition, helps cancer patients stay strong for their fight thanks to the vitamins, minerals, and amino acids that it provides. *Moringaoleifera* also contains forty antioxidant compounds that help the body to rid itself of free radicals, substances which have been shown to cause cancer. One compound in particular, niazimicin, has been shown to actively restrain the growth of cancer cells. *Moringaoleifera* also contains the chemical benzyl isothiocyanate which increases the strength of cells; critical for cancer patients that require chemotherapy as part of their treatment.

Although further research is needed, studies have shown that a natural medicinal like *Moringaoleifera* can play a very important part of a comprehensive treatment plan for patients fighting to beat this terrible disease. Even though tests using animals have yielded positive results, researchers believe that further rigorous study is required before we'll know if this natural resource can work consistently in humans. Always consult with your physician to discuss your treatment options before using *Moringaoleifera*.

Anticancer potentials of *Moringa oleifera* L. is not uncommon in folk medicine. Bose et al., discussed the role of this plant extracts in the treatment of epithelial ovarian cancer based on the presence of isothiocyanates group of phytoconstituents^[11]. Earlier workers have reported the chemomodulatory effects of the hydroalcoholic extract of drumsticks against 7,12 dimethylbenz(a) anthracene induced skin papillomagenesis^[12], and hepatic carcinogenesis in Mice^[13]. Budda et al., have shown the chemopreventive effects of freeze-dried pods against azoxymethane induced and dextran sodium sulfate promoted colon carcinogenesis in mice^[14]. Sreelatha et al., have reported the antiproliferative and proapoptotic potentials of the *Moringaleaf* extracts using human tumor cell line^[15]. Gismondi et al., have demonstrated the anticancer activity of the leaf fractions of this plant against B16F10 melanoma cells^[16]. Although, thiocarbamates including niaziminin, isolated from the *Moringa* leaves possess antitumorpromoter properties against

teleocidin-B4 induced Epstein-Barr Virus activation in Raji Cells^[17-18].

Ayurvedic Uses of Moringa: In Ayurveda, Shigru or *Moringa* is used for time immemorial to treat wide variety of diseases. Its roots, bark, leaves, seeds and flowers are used therapeutically. The roots are bitter and acrid. They have thermogenic, digestive, gas preventing, anti-parasitic, constipating, pain relieving, inflammation reducing, emmenagogue, sudorific, urine production stimulating, ophthalmic, cough relieving, haematinic, stones preventing, alexipharmic, stimulant and vesicant/cause blistering properties. Roots are used in vitiation of Vata/wind and Kapaha/mucous dosha. The bark is acrid, bitter, thermogenic, abortifacient, antifungal and cardiac and circulatory stimulant. Bark is indicated in ascites, ringworm and diseases due to vitiation of Vata and Kaphadosha. The leaves reduces inflammation, relieves pain, kills parasites. They contains many minerals and vitamins and are particularly rich in vitamins A and C. They are useful in scurvy, wounds, tumours, inflammations and parasitic infestation. The seeds are acrid, bitter, anodyne, anti-inflammatory, purgative, antipyretic and ophthalmic. They are useful indicated in swelling, intermittent fever, eye diseases and nerve pain.

Medicinal Uses of Moringa: *Moringa* has swelling reducing, anti-tumour, anti-cancer, antibiotic and abortifacient properties. It has blood pressure lowering, anti-spasmodic, anti-tumour, cholesterol lowering, urine production stimulating, blood sugar lowering, anti-cancer properties. The leaves extract is given to treat hyperthyroidism and as an anti-Herpes Simplex Virus medicine. Below is given few therapeutic uses of *Moringa*. Various parts of *Moringa* are non-toxic and safe to use. They all are edible and used both internally and externally.

Conclusion- It is estimated that more than 80% of the world's population cannot afford modern medicines. In addition to cost, current cancer therapies are minimally effective and exhibit toxicities that are intolerable in most cases. *Moringa oleifera*, a common vegetable plant in many Asian and South East Asian countries possesses numerous compounds with excellent health benefits including anti-oxidant and anti-cancer properties. The plant exhibits anti-cancer potential by interfering with the signal transduction cascade that promotes cancer cell proliferation and progression. The inhibition of

cancer cell proliferation is mainly due to the presence of eugenol, a phenolic natural compound which targets E2F1/survivin in cancer cells, D-allose, isopropyl isothiocyanate etc. *Moringa oleifera* also contains the chemical benzyl isothiocyanate which increases the strength of cells.

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