

Review Article

The Potential Market of Onco-Wellness for use of Nutraceutical Supplement's Therapeutic Benefits

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ABSTRACT

Lifestyle changes and dietary modifications perform a key role in preventing cancer. This article aims to discuss the current nutraceutical products in the market on natural bioactive extracts mainly distinguished by a specific polyphenolic profile. Researchers are more focused on alternative and complementary therapy which has both nutritional and medicinal importance, pertinent to the prevention and treatment of disease mainly including natural products with the least or no side effects. At present, many well-documented nutraceuticals are accessible commercially in different forms including tablets, powder, vials, capsules and so on, based on the diseases being targeted. Nutraceuticals are being used as pharmaceuticals. Many of them in the range of herbal products and dietary supplements are purchased by the general public as self-medication. According to Fact.MR's (Fact.MR, a market research and competitive intelligence provider) newly published report of GLOBE NEWSWIRE, the global market of nutraceutical supplements is anticipated to expand at a rate of above 8% compound annual growth rate (CAGR) till 2031. In growing day by day, India will be a strong market for nutraceutical products as the player in the industry. India is anticipated to have at least 3.5% of the worldwide market by 2023, with a CAGR of 8%. The acceptance and popularity of these nutraceuticals are very high. The targeted group and herbal, chemical and ingredient-based categories, especially the patented ones are in-depth classified. In this review, we highlighted products that are available on the Indian market that are enriched with supplementary micronutrients, functional foods and nutraceuticals that may suppress the development of cancer cells and promote cancer cell apoptosis.

Keywords: Nutraceuticals Indian market, Functional foods and dietary supplements, Cancer prevention, Chemotherapy-induced side effects

INTRODUCTION

Recently, many studies have indicated that cancer is a worldwide health problem that is a leading cause of death.^[1] Cancer is associated with changes (mutations) to the DNA within cells leading to DNA damage, uncontrolled cell growth, genomic instability and tumour formation. Detection of cancer at an early stage and proper treatment results in increased survival probability and also in preventing the development and progression of cancer disease stages.

The connection between the usage of suitable foods for health and their therapeutic advantages as well as the connection between nutrition and human health was theorized in the 19th century according to Hippocrates' thought 'let the food be thy medicine and thy medicine be the food.'^[2]

Food in terms of nutrition highly contributes to maintaining healthy eating habits and a healthy state as it influences epigenetic phenomena and modifies drug response; genetic mutations, infection or inflammation, exposition to radiation and work pressure leading to potential therapeutic response. The ingredients of nutraceuticals, which are considered to be bioactive

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chemicals, either have known therapeutic action or are chemically defined substances that are widely acknowledged to significantly contribute to the therapeutic activity of medicine.^[3] The major role played by vitamins, minerals and dietary fat in cancer control.

Dietary supplements are known as nutraceuticals and from the viewpoint of nutrition, they are a source of both nutrients (carbohydrates, proteins and fats) and non-nutrients (e.g., prebiotics, probiotics, phytochemicals and enzymatic regulators).^[4] Health and disease effects are significantly affected by nutritional supplements, functional foods and additional micronutrients because of their ability to slow the development of cancer cells, stop their proliferation and trigger cancer cell death.^[2]

Nutraceuticals and dietary supplements minimize the side effect that counteracts the benefits of hospitalised treatment. Specifically, antioxidant and anti-inflammatory activities, as well as the reduction of cell proliferation, have been demonstrated to help patients receiving anticancer treatment respond better and comply with their treatment regimens.^[5]

Epidemiological studies have proven that nutraceutical and dietary supplement intake is one of the crucial determinants of chronic diseases such as cancer and its several types.^[6]

Do dietary supplements assist patients who are undergoing chemotherapy? In cancer patients undergoing conventional therapy, the intake of nutraceutical supplements is also common. Numerous naturally occurring bioactive substances identified in nutraceuticals have been shown to have cytotoxic chemotherapeutic anticancer characteristics. These substances can kill altered or malignant cells by causing cell growth inhibition, cell differentiation and changes to the redox state of cells. High concentrations of the active chemical might reduce the efficiency of chemotherapy by making cancer cells less responsive.^[7]

The requirement, outlook and significance of this article are to give a focused study on this bunch of nutraceutical and other dietary products that have been considered as an effective strategy due to their substantial role in the prevention and treatment of cancer.

NUTRACEUTICALS IN CHEMOTHERAPY

Chemotherapy is conventional cancer therapy but has serious side effects such as vomiting and nausea, hair loss and diarrhoea. To be treated in a better way, doctors follow various combination therapies to treat cancer.

At present, used ingredients listed under herbs and phytochemicals are pharmacologically safe and important nutraceuticals in suppressing tumour progression and alleviating the disadvantages of radio- and chemotherapy. Potent components such as curcumin, ginger and genistein

are more effective in the prevention of chemo-induced side effects [Figure 1].^[8]

Nutraceutical sector is divided into functional food category and dietary supplement category as a therapeutic or complementary medicine, which may help in prevention or treatment of cancer and reducing side effects of chemotherapy and radiotherapy [Figure 1].

NATURAL NUTRACEUTICAL PRODUCTS IN CANCER PREVENTION

Natural nutraceutical products have aided us to fight cancer for more than 40 years. One of the key tactics created to combat cancer is cancer prevention. Drugs, micronutrients and products made from natural sources can all be used to prevent the development of cancer. Therapy is a course of treatment meant to cure a medical condition or its precursor, whereas cancer prevention is recognised as active efforts to minimize the chance of getting cancer and/or its recurrence.^[9]

A diet rich in natural plant products benefits cancer prevention and treatment. Dietary changes and the use of functional foods high in bioactive components can prevent cancer in 32–35% of cases.^[10] Cancer stem cells are a rare group of cancer cells that are responsible for carcinogenesis, cancer development and chemoresistance.^[11] They may self-renew and differentiate. The use of natural nutraceutical products to prevent cancer has gained interest on a global scale. Microbes are a primary source of natural chemicals with anti-tumour action, followed by plant alkaloids, toxoids and podophyllotoxins. A number of these products were initially found as antibiotics. Organisms and plants from terrestrial and aquatic ecosystems are the primary sources of these effective compounds.^[9] Nutraceuticals pure extracted phyto molecule, whereas semi-purified plant substance, is named as functional food, not taken as regular food.^[12]

In addition, some additional micronutrients, nutritional supplements and functional foods may be able to the lower cancer risk or slow the spread of established malignant illness and its metastases. Furthermore, it could lessen the side effects of chemotherapy and radiation treatment and improve living circumstances by lowering cancer cachexia.^[13]

The main advantage of using these natural nutraceutical products is that they do not have any undesirable side effects. This is also the main reason for their increasing demand in the market.

HERBAL-BASED NUTRACEUTICALS PRODUCTS IN CANCER PREVENTION

Prevention is always better than cure. As we can see in the world around us, everyone struggles with their daily health maintenance to avoid the risk of chronic diseases like cancer.

People usually tend to believe in herbal-based nutraceutical products as it has minimal side effects, are pocket-friendly and also chemical free. Nutraceutical accompanied by herbs has an excellent impact on the prevention of different chronic disease such as cancer and sometimes their bioactive ingredients also cure the disease. Boosting the body's defence mechanism is very much essential and hence can be achieved by these herbal based nutraceuticals. Some of them are listed in [Table 1].

Specific nutraceuticals are characterised according to their function, bioavailability and mechanism of action. These products are important to improve the health of a person, to cope with day-to-day challenges such as maintaining physical health and stress management, and to increase activity. At present, the emphasis is on herbs that may be used both as food and medication. Nutraceuticals are now more popular than medications and health supplements among consumers and health-care professionals as a result of progressive action.^[14]

In the body, nutraceuticals may function as phytohormones, and drugs, regulating biochemical metabolites and vital nutrients. Recent studies have cited some notable pieces of data in support of the metabolic action of nutraceuticals in humans that inhibit the growth of cancer.^[13]

1. In addition to preventing cell growth, phytonutrients found in herbal and medicinal plants also significantly contribute to the prevention of chronic degenerative disorders. Evident examples are

Ginseng: The cancer-fighting properties of this herb are remarkable. According to studies, ginseng may be used as an adjuvant or chemopreventive agent. According to some studies, this herb may help cancer patients feel less fatigue. Ginseng is also used to enhance the well-being of those who are recuperating from disease.^[15,16]

Spirulina: In addition to its high nutritional value and immuno-modulatory properties, some research indicates that spirulina may be used as an efficient and secure addition to chemotherapy in patients who have malignant tumours. It is beneficial for both the treatment and prevention of cancer.^[17]

Ginkgo biloba: Many cancer patients also consume ginkgo to cure and prevent the disease as well as to alleviate the harsh side effects of chemotherapy. Ginkgo extracts have been shown in *in vitro* experiments to have anti-infective, chemopreventive, anticancer and cytotoxic properties.^[18]

2. Giloy is advantageous to use in the treatment of various diseases. It possesses various properties such as being effective in digestion, anti-inflammatory, antipyretic and blood purifying. It is also useful in fighting foreign bodies by building up the immune system.^[19]
3. Garlic has a long history of usage as an anticancer agent. Human cancers are resistant to the proliferation of allyl sulphur compounds. This compound is derived from

garlic which shows a wide range of properties in the treatment of cancer.^[20]

4. Tulsi is well known for its medicinal properties and highly revered for its therapeutic uses. Tulsi and several of its main phytochemicals have been proven in numerous clinical trials conducted over the past 20 years to have anti-neoplastic, chemopreventive and radioprotective properties.^[21,22]
5. Amla is also believed to have many beneficial properties that make it useful for both treating and preventing cancer, including chemo modulatory, chemopreventive effects, radio modulator, free radical scavenging, highly antioxidant nature, anti-inflammatory properties, antimutagenic and immunomodulatory actions.^[23]

More herbal ingredients such as Mamejao, Vijaysar, Gudmar, Jamun, Kutki, Kokum, Acerola, moringa, guava, lemon, basil and, Melatonin, Jatamansi, Brahmi, Ashwagandha, Shankhapushpi, Harida, Shirish, Nettle leaf and Yashtimadhu, Kalimirch. Green Tea Extract is used for the prevention of cancer, in place of cancer therapeutic drugs.

Since they stimulate the immune system, *Azadirachta indica* (Neem), *Mangifera indica* and *Carica papaya* have anticancer properties. The effectiveness of the anti-cancer medicine is facilitated by its chemoprotective characteristics as a nutrition treatment.^[24]

ACTIVE INGREDIENTS-BASED NUTRACEUTICALS PRODUCTS IN CANCER PREVENTION

Consuming biologically active components found in fruits and vegetables has been related to reducing the risk of conditions including cancer, cardiovascular disease, obesity and gastrointestinal problems. Additional laboratory studies have shown that several bioactive food components or natural items help protect against cancer.^[21]

Foods that have been processed and added bioactive are referred to as Processed Food products with Added Bioactive. One example is orange juice containing calcium. 2. Milk with omega-3 fatty acid (FA) additions. In contrast hand, bioactive is present in food naturally, such as carrots that contain beta-carotene, but their concentration or amount is altered. (For instance, by breeding or genetic engineering) Examples include (1) Yogurt with higher prebiotic content, (2) tomatoes that have more lycopene in them and (3) eggs with higher omega-3 FA concentrations.^[21]

Such active ingredients or bioactive based nutraceutical products are listed in [Table 2].

Eicosapentaenoic acid (EPA), an omega-3 FA and Vitamins E and C, which are antioxidants, are chemoprotective in the treatment of breast and oesophageal cancer.^[24] Fish oil changed

the membranes of cancer cells to increase tumour inhibition. These nutraceutical products containing bioactive ingredients when given along with the chemotherapy drugs enable their potency. Such as Selenium when combined with Nutrition therapy enables anticancer drugs (like mitomycin) potency.^[24]

Most famous herbal nutraceutical supplement products for onco-wellness in current market is for best immune response,^[25] disordered metabolism,^[26] fatigue and metabolism,^[27] mood and memory improver by reducing stress and anxiety,^[28] detoxification and lowers inflammation,^[29] gut health and cancer prevention^[30] for health issues^[31] etc.

Essential FAs (EFAs) may contribute to the growth of prostate cancer cells. Both omega-6 and omega-3 FAs have been shown to have stimulatory and inhibitory effects in prostate cancer cell lines.^[32] Prebiotic fibre fructooligosaccharide helps support immune response and immune health as it provides high-quality protein. These therapeutic nutritional foods are created especially for those who are affected by or at risk for cancer-related illnesses. The majority of these items are naturally gluten-free and suitable for lactose intolerance.^[33] Active ingredients based nutraceutical products in the current market specifically designed for their unique ingredients which helps in inhibiting the proliferation of cancer cell, reducing side effects of chemotherapy and increase in immunity of a patient such as, fortified Eicosapentaenoic acid (EPA),^[33] Omega 3, 6 fatty acids, lycopene and gengerol have become well known cancer preventive nutraceuticals,^[34] Lipoic acid glutathione, superoxide dismutase, selenium, copper, manganese and zinc (minerals) all function as

anticancer nutraceuticals in the management of cancer by delaying apoptosis as seen in isolated cancer cells. also includes Vitamin C, E and carotenoids are the natural ones and have an antioxidant effect with high biological value,^[10,35] Essential fatty acids,^[36] nano scale silver particles in pure hydro solution^[37] and protein and mineral rich blend^[38] etc.

Lycopene and gingerol have become well-known cancer-preventive nutraceuticals.^[34] Lipoic acid, glutathione, superoxide dismutase, selenium, copper, manganese and zinc (minerals) all function as anticancer nutraceuticals in the management of cancer by delaying apoptosis as seen in isolated cancer cells. Vitamin C, vitamin E, beta-carotene and lycopene (carotenoids) are the natural ones and have an antioxidant effect with high biological value.^[10,35]

GLOBAL DEMAND FOR NUTRACEUTICAL

According to Global newswire, the leading player who is dominating the entire nutraceutical global market is the U.S. which is currently holding a 30% revenue share and is expected to grow progressively in the coming forecast period in the health supplement growing category due to high demand in the elderly population. The value of the market size in 2022 will be USD 493.06 billion and the revenue estimate for 2030 will be around USD 991.09 billion with a compound annual growth rate (CAGR) of 9.0%.^[39]

Due to the substantial presence of top market players, acceptance of healthy lifestyles such as avoiding cancer-related disorders, continuous modernisation and expansion

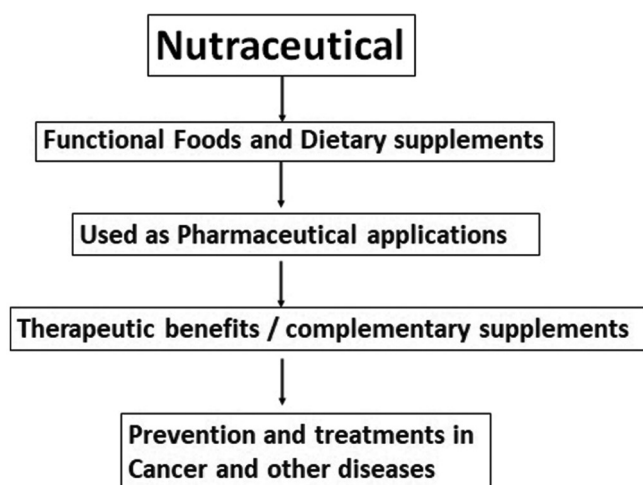
Table 1: Herbal nutraceuticals products in the market established their role in cancer treatment.

Nutraceutical product name	List of ingredients	Functional role in cancer treatments
Naturamore immune plus	Tulsi, Giloy, Amla, Garlic, Shunthi, Curcumin	For the best immune response in a variety of infectious and allergy disorders, a comprehensive natural supplement is used. Balances the metabolism and maintains healthy liver function. Enhances general vitality, cognition and brain function. ^[25]
Naturamore lifestyle plus	Neem, Mamejao, Vijaysar, Gudmar, Jamun, Neem, Kutki, Ginger and Kokum	Clinically proven dietary supplements for inactive individuals, those with a disordered metabolism that causes weight gain and those with high blood sugar levels. ^[26]
bGREEN plant-based natural multivitamin	Acerola, Moringa, Guava, Lemon, Basil and Vitamins powder, B vitamins, Vitamin A, C and D3, K2 (M-K7)	Make up for your daily energy and immunity. It delays fatigue and helps maintain metabolic function. ^[27]
Naturamore de-stress	Melatonin, Jatamansi, Brahmi, Ashwagandha, Ginseng, Shankhapushpi	Reduces stress and anxiety Cognitive enhancement and improved memory improve mood and overall immunity. ^[28]
Yukti herbs aller savior veg capsule	Harida, Neem, Shirish, Ashwagandha, Nettle leaf, Tulsi, Yashtimadhu, Kalimirch	These herbal capsules help to detoxify your blood. These capsules help to boost the immune system's efficiency. It aids in the treatment of respiratory allergies. It lowers inflammation ^[29]
Xovak pharma Organic celery capsules	Celery (<i>Apium graveolens</i>)	It helps prevent cancer and inflammation, improves gut health and lowers blood pressure and cholesterol. ^[30]
Silveredgeimmuno enhance	<i>Ginkgo biloba</i> , Spirulina, Ginseng, <i>G. biloba</i> extract, Turmeric root extract, Green tea extract	By regulating the body's immunity, lowering a bacterial and viral load, decreasing stomach inflammation, relaxing stress, enhancing focus, detecting major threats and preventing them from entering, protection provides a barrier against health issues. ^[31]

Table 2: Active ingredients-based nutraceutical products in the market established their role in cancer treatment.

Nutraceuticals	Ingredients	Mechanism
Vital health omechol softgels 30S - Kiwla Unisex liquid gel adult	EFAs, Omega-3 EFA per soft gel	Since the body cannot generate EFAs, they are considered to as essential since the body needs them. As a result, they must be sufficiently acquired through food or supplements. Each odor-controlled soft gel of Omechol includes 770 mg (77%) of Omega-3 EFA to lessen taste sensitivity. ^[36]
Keva silver plus	Nano-scaled silver particles in pure hydro solution	Helpful in all kinds of cancers. Helpful in destroying the various cancer-causing elements – Carcinogens reduce side effects from chemotherapy and radiation treatments. ^[37]
Prosure EPA fortified for cancer patient's nutrition drink	Maltodextrin, calcium caseinate, sucrose, marine oil, minerals, fructo-oligosaccharides, stabiliser (Arabic gum), vegetable oils (medium chain triglycerides oil, soy oil, high oleic sunflower oil), whey protein hydrolysates, vitamins, antioxidants (mixed tocopherols, soy lecithin) flavouring, taurine, l-carnitine	It is a medicinal food item created with cancer patients' weight loss at risk or as a specific target in mind. ^[33] Has been scientifically demonstrated to: <ul style="list-style-type: none"> • Promote weight gain • Assist in preserving or gaining lean body mass • Enhance appetite and nutritional intake • Actually, reduce the proinflammatory response when used as part of a multimodal cancer-treatment regimen
Pro360 canpro nutrition protein drink for cancer care chemo and radiation therapy patients protein blends	Maltodextrin, calcium caseinate, fructose, vitamins, minerals, fructo-oligosaccharides, vegetable fat powder, whey protein concentrate, soy lecithin, l-taurine, l-carnitine, Catharanthus roseus extract and natural orange flavour	Reduces the constraints that chemotherapy and radiation therapies have on absorption and digestibility. Enhances the immune system's ability to combat infections. Faster healing and recovery from all post-surgical issues. Increase bioavailability. Exerts effects on cancer cells that are anti-proliferative and anti-metastatic and inhibit the proliferation of cancer cells. ^[38]

EFAs: Essential fatty acids

**Figure 1:** Potential of Nutraceutical in Onco-wellness.

of the health sector and well-established healthcare infrastructure, as well as the market's growth are being attributed to these factors.

INDIAN MARKET DEMAND FOR NUTRACEUTICAL SUPPLEMENTS

To fulfil demands, a wide variety of nutraceuticals are targeted from birth in the form of formula milk,

nutritional supplements and protein health beverages. People assume that because these supplements are natural, they are completely safe, even though Indian health officials continue to put a high premium on the safety of nutraceuticals.^[40]

Indian nutraceutical companies are currently supplying nutraceuticals in domestic and international markets. At present, the Indian market is importing around USD 2.7 billion which is more than exporting, that is, USD 1.5 billion worth of nutraceuticals. The market is expected to grow at 22% CAGR by 2023 significantly.^[40,41]

Comparable market revenue is generated by protein, amino acid and herbal supplements. There is a significant demand for herbal supplements. Collectively, half the revenue share is accounted for by these segments only. According to the survey, sales of protein and amino acid supplements are predicted to increase by around 8.7% over the next few years.^[40]

In the upcoming years, there will be a high demand for vitamin and mineral supplements. The Reality By 2022 and 2030, according to MR estimates, the market for nutraceutical supplements is estimated to generate more than 36% of its income from vitamins and minerals. Being the most popular dietary supplement, consumption of vitamins and minerals is anticipated to increase gradually during the projection period.^[39] In the budget for 2021–

22, the Union Finance Minister of India has announced Rs. 2.23 lakh crore (US\$ 30 Bn) for the health-care sector in 2023.

The increasing need for protein and amino acid supplements is due to the rise in daily dietary protein consumption. In India, the need for nutraceutical supplements is due to show positive growth because of the government's focus on upgrading healthcare infrastructure. Almost 40% of nutraceutical supplements demand will get emanated from the Indian market. This will be significantly benevolent to the healthcare providers to provide good nutritional support to patients, which will help them sight the nutraceutical sector.

CONCLUSION

Nutraceuticals square measure out within the sort of isolated nutrients, dietary supplements, functional foods and functional ingredients. They offer all the essential substances that ought to be gifted during a healthy diet for humans. It provides energy and valuable nutrient to the body that is needed for maintaining the best health. The nutraceutical market is widely utilised in the food and pharmaceutical industries. Because of the growing awareness of health among people regarding the use of nutraceuticals when needed, the industry of marketing nutraceuticals is expanding around the world and India has joined them. The Indian people have begun to trust immunity-boosting supplements, which has resulted in a significant change in consumer behaviour. Examples of the flexible shopping habits of health-care customers include vitamin capsules, chewable pills and gummies. For the prevention and treatment of cancer, the market for nutraceutical products based on active chemicals and those based on herbs is increasing.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

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Conflict of interest

There is no conflict of interest.

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