

Perspective

Nutraceuticals: Pros and Cons

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DOI: <https://doi.org/10.24321/2278.2044.202208>

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How to cite this article:

Murugan R. Nutraceuticals: Pros and Cons. Chettinad Health City Med J. 2022;11(1):41-44.

Date of Submission: 2022-01-25

Date of Acceptance: 2022-02-16

I N T R O D U C T I O N

Nutraceuticals (NCT) are considered as food or part of food, which can provide therapeutic as well as health benefits, comprising the prevention of diseases along with the treatment of various metabolic disorders. NCT are commodities, which are derived from foods, but they are used in various forms like pills, capsules, or liquids, and again render demonstrated physiological and biochemical profits. There are several classes of functional foods, and NCT are gaining prominence and becoming widely available in the market,¹ despite some challenges faced by NCT producers because such products must address sensory acceptability, which is not always necessary for NCT or pharma products. NCT products range from isolated nutrients, supplements from dietary sources, and customised diets to r-DNA based designer foods, medicinal products, and various forms of processed foods such as beverages, cereals, and soups.²

Nutraceutical Categories

There are various categories of NCT and their health benefits listed in Table 1. Several types of natural products are considered under the NCT category, which are as follows:

- Nutrients like fatty acids, amino acids, various vitamins, minerals, and antioxidants
- Herbals products: Herbs or medicinal products like concentrates as well as various forms of extracts
- Phytochemicals including secondary metabolites like polyphenols, flavonoids and their subclasses, glucosinolates, anthocyanidins, phytosterols, phytoestrogens, terpenoids, carotenoids, limonoids, and polysaccharides
- Probiotics that help in improving the gut microbiota (i.e., live microbial feed supplement) (*Lactobacillus* bacteria and bifidobacteria)
- Prebiotics: A fermented form of the dietary ingredient for the growth of microbes (allows precise alterations in the composition as well as in the activity of the gastrointestinal microbiota)
- Nutraceutical enzymes
- Dietary fibres: These fibres are non-starch polysaccharides like pectin, lignin, cellulose, hemicelluloses, gum, resistant dextrins etc³

Health Benefits of Nutraceuticals

It's believed that from consumers' point of view, NCT products may offer

numerous benefits like improving the overall value of our diet, extending the life span, avoiding specific therapeutic conditions, psychological benefits, perceived as more natural than the traditional system of medicine, present specific food for a certain group of populations with special needs (e.g. nutrient or protein-rich foods for ageing).¹ Recent findings in disease control and prevention, and improved body function in the field of NCT have received more attention. Evaluation of NCT products is based on certain parameters like chemo profiling and metabolic analysis, quality, safety efficacy (Figure 1).⁴

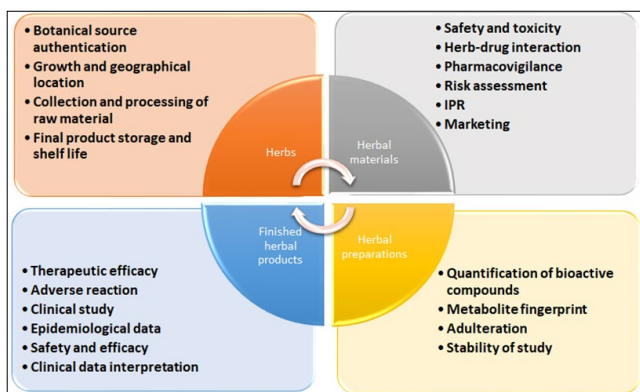


Figure 1. Evaluation of Nutraceuticals

Table 1. Phytochemicals as Nutraceuticals and their Health Benefits

Chemical Constituents	Source of Nutraceuticals	Health Benefits of Nutraceuticals
Lycopene	Papaya, guava, watermelon, pink coloured grapefruit, tomatoes	Help to reduce cholesterol, antioxidants, and anti-cancer activities ⁵
β-Carotene	Fruits, vegetables, oats, carrots	Antioxidants, offer protection against UV light ⁶
Lutein	Corn, spinach, avocado, egg yolk	Offer protection to eyes against muscular degenerations, cataracts, anticancer activity (colon) ⁷
Tocotrienol	Palm oil, different grains	Cardioprotective effect, anti-cancer activities (breast cancer) ⁸

Saponins	Beans like soya beans, chickpeas	Anti-cancer properties, help to reduce cholesterol levels ⁹
Flavanones	All citrus fruits	Antioxidant and anticancer activities ^{10,11}
Flavones	Different types of fruits, soya beans, vegetables	Antioxidant and anticancer activities ¹²
Flavonols	Broccoli, onions, tea, fruits like apple	Antioxidant activity ¹²
Curcumin	Turmeric root	Antioxidant, anti-inflammatory, effective anti-clotting ¹³
Glucosinolates	Cauliflower, cruciferous vegetables	Anti-cancer activity (protection against bladder cancer) ¹⁴
Isoflavones	Beans like soybeans, legumes	Help to reduce LDL cholesterol, antioxidant, offer protection against prostate, breast, bowel and other cancers ¹⁵
Lignans	Rye, vegetables, flaxseed	Offer protection against cancer development (colon and breast cancer) ¹⁶

Negative Sides of Nutraceuticals

Even though NCT possesses various health benefits, it has some negative sides also. Inappropriate usage and/or overuse of these NCT products may carry some health risks. Whatever we consume, whether it's food, drug, supplement, syrup, concentrates, or extracts, based on time, quantity and species, and route of administration, might possess either positive or negative effects. The protective effect of these NCT products on customers' health generally depends on the type of NCT consumed, time, and quantity consumed.¹⁷

Compared with allopathic medicines and other drugs, NCT products are recommended due to their fewer or no side effects. The reason is NCT are used to achieve appropriate therapeutic effects with no or limited side effects. Health benefits of NCT products depend on the capacity of free radical scavenging activity, anti-oxidant properties, cytoprotective, membrane stabilising, anti-diabetic and lipid-lowering etc., against various diseases or metabolic disorders.^{11,18} Academic bodies, scientific communities, and regulatory organisations must consider protocol in order to create scientific study-based reports that support the functional components of NCT.¹⁹

Two important challenges are faced by NCT industries; the first one is regulatory credibility and the second one is undefined privileges in labelling. The deficiency of a proper quality control system is one of the important issues for NCT products. Lacuna or non existence of a proper system for quality checks will certainly increase the health risk of customers, hence adequate research is needed on the specific concern, which contributes to demonstrating the potential health benefits of NCT products or confirms their safety. It is foremost important to ensure the safety of NCT, and to check that NCT products are authenticated, honest, and non-misleading. Data from certain scientific studies, particularly the clinical study findings on specific NCT products would help to validate the possible medicinal or health benefits of these NCT products.¹

Regardless of their safety profile, only a few NCT products have been reported, such as adulteration with hazardous heavy metals toxicants, pesticides, toxic plants, fertilisers, and mycotoxins. Regrettably, the detailed safety profile of a huge number of NCT products is yet to be explored. It is critical to understand the safety profile, including toxicokinetics of each drug's pharmacokinetic behaviour.²⁰

Conclusion

Even though the NCT products are proven to be beneficial for health, these products should be subjected to quality check. The pharmacological and toxicological efficacy of these NCT products has not been thoroughly evaluated. However, when compared with synthetic medicine, NCT products are considered as safe and good for health.

Conflict of Interest: None

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