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## Neutraceuticals Use in the Current Era

*Amina Shahid Shaikh<sup>1</sup>, Nigar Sikandar Shaikh<sup>2</sup>*

Institute Name : G.E.S. College Of Pharmacy (D Pharm )

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### ABSTRACT :

Over the last few decades, the world has experienced the rapid expansion of a multi-billion dollar industry known as nutraceuticals. The term 'nutraceutical' was coined to encompass substances present in food and herbs that, while not technically classified as nutrients such as vitamins or minerals, may significantly benefit the body's health. Nutraceuticals have shown potential in both disease treatment and prevention. Through the use of nutraceuticals, it is conceivable to reduce or eliminate the reliance on traditional medications, thereby lowering the risk of adverse effects. Nutraceuticals often exhibit unique chemical properties that are not found in pharmaceuticals. This article seeks to redefine nutraceuticals and functional foods, while also providing an overview of the application of nutraceuticals.

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### CLASSIFICATION OF NUTRACEUTICALS :

With the exception of probiotics, the food products utilized as nutraceuticals are composed mostly of fruits, vegetables, and various herbal food types. They are categorized as antioxidants, prebiotics, probiotics, omega-3 fatty acids, dietary fibers, and so on based on their potential functions.<sup>1</sup>

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#### Antioxidants :

Antioxidants are compounds that slow down or stop oxidation-related degradation, damage, or destruction. Research over the past few years has proven that many people have the same illness.(CVS, diabetes, cataracts, high blood pressure, infertility, respiratory infection, and rheumatoid arthritis) are linked to low dietary levels of chemicals known as antioxidants and/or tissue deficiencies, making them a crucial component of the nutraceutical industry. Free radicals are produced during oxidation, and these radicals burn everything they come into contact with at the molecular level. Antioxidants are highly abundant and diverse in nature. They work against oxidation mostly by neutralizing free radicals at low concentrations. They may also prevent the chain reactions that oxidants cause, which would

ultimately lead to the reconstitution of the damaged membranes. Antioxidants in food and<sub>some</sub>.<sup>2,3,4,5</sup>

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#### Probiotics :

Probiotics are food ingredients made from live microorganisms that are good for your health. Survival in and adherence to particular regions of the gastrointestinal system, as well as the competitive exclusion of pathogens or toxic antigens, are prerequisites for probiotic function. Probiotics are classified as functional or health foods, meaning that people consume them for their alleged benefits in the digestive tract and/or systemic areas such as the bloodstream, liver, brain, or vagina.<sup>6</sup>

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#### Probiotic bacterial species :

The various types of bacteria that are having the probiotics characteristics are:- Probiotic bacterial species Lactobacilli, Lactobacillus rhamnosus, Lactobacillus reuteri, Lactobacillus case, Bifidobacterium, Bifidobacterium lactis, Bifidobacterium longum, Bifidobacterium breve, Bifidobacterium infantis, Streptococcus, Lactococcus , Lactococcus platinum, Lactococcus reuteri, Lactococcus agilis, Enterococcus , Saccharomyces, Bacillus, Pediococcus.

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#### Characteristics of probiotic bacteria :

Probiotic bacteria should have the following features:

1. A GRAS (generally acknowledged as safe)
2. Pancreatic juice and hydrochloric acid resistance in vitro.
3. Generate antibacterial agents.
4. Fight with harmful bacteria for adherence to the intestinal wall.
5. Struggle for the nutrients and build up your immune system.
6. Modify the balance of the intestinal microflora, prevent the growth of pathogenic bacteria, encourage healthy digestion, strengthen the immune system, and raise infection resistance.<sup>7</sup>

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### Prebiotics :

Prebiotics are non-digestible dietary carbohydrates that reach the colon intact. These substances selectively stimulate the growth of beneficial probiotic bacteria such as

Bifidobacteria and Lactobacilli and act as fertilizers for these bacteria. For example, inulin, a soluble dietary fiber, resists digestion and reaches the large intestine or colon intact, where it is fermented by these beneficial bacteria.<sup>8</sup>

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### Criteria for food components or ingredients as prebiotics :

A prebiotic nature has been attributed to many foods and their components those fulfill the following properties Criteria for food components or ingredients as prebiotics.

1. Resists host digestion, absorption and absorption processes.
2. Fermented by the micro flora colonizing the gastrointestinal system.
3. Selectively stimulates the growth and/or the activity of one or a limited number of bacteria with the gastrointestinal system.

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### ROLE OF NUTRACEUTICAL IN TREATING VARIOUS DISEASE CONDITION :

In Apoptosis and Disease Prevention

Various studies, both in epidemiology and with animal models, have proposed the potential chemopreventive activity of nutraceuticals, primarily phytochemicals obtained from nutritional or medicinal plants like tea, garlic, ginger, and soya bean. The mechanism through which these substances reduce cancer incidence appears to be closely linked to apoptosis. Extensive literature supports the impact of these nutraceuticals on cultured human cells, particularly regarding apoptosis. This section focuses on exploring the effects of specific phytochemicals belonging to structural classes such as carotenoids, flavonoids, stilbenes, and other sulfur-containing compounds.<sup>9</sup>

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### Nutraceuticals in Stem Cell Therapy :

Recently the application of stem cell research is found to be significant in curing various diseases. Some researchers also have investigated the effects of certain nutraceuticals on stem cell growth and proliferation which could stimulate endogenous stem cells to capability of human body. Although any medication including herbs during pregnancy needs to be carefully checked<sup>20</sup>, the effects of nutraceuticals on pregnant women, development and differentiation of the infants and young children are essential for health of new generations. It is believed that nutritional factors during early development not only have short-term effects on growth, body composition and body functions but also exert long-term effects on health, disease and mortality risks in adulthood. There are indications for some beneficial effects of nutraceuticals such as antioxidant vitamins, essential amino acids, and polyunsaturated fatty acids in infant foods on the developing immune response. Actually, mineral intakes such as Ca, P, Mg, Fe, Zn, I, F, and B, as well as vitamins D and K are important for the growth and development of bone and human nervous system.<sup>10,11,12,13.</sup>

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### Nutraceuticals against Alzheimer's Disease (AD) :

Alzheimer's disease (AD), also called senile dementia of the Alzheimer type (SDAT), primary degenerative dementia of the Alzheimer's type (PDDAT), or simply Alzheimer's, is the most common form of dementia. The various nutraceuticals which are used to cure Alzheimer's disease is as follows

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### Antioxidants :

Antioxidants are very essential in the treatment of almost all diseases because most chronic diseases carry with them a great pact of oxidative stress. Oxidative stress plays a chief job in neurodegenerative diseases such as Alzheimer's disease (AD), Parkinson's disease (PD), and Huntington's disease (HD). Oxidative stress is accelerated by the ageing process along with lack of dietary antioxidants. A huge number of studies have found an association between high dietary antioxidant intake and a decreased risk of AD which is very imperative because preventing a disease is significantly easier than

treating it. So prevention is key and researches suggest that preventing AD is actually not that complex. Treatment with antioxidants is a hopeful loom for slowing disease progression.<sup>14</sup>

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### Ginkgo biloba :

Ginkgo biloba is perhaps the most studied herb with reference to memory, cognition, overall brain performance, and certainly AD. Wettstein compared the efficacy of four cholinesterase inhibitors (tacrine, donepezil, rivastigmine, metrifonate) to Ginkgo (EGB 761) in AD patients. The differences in the effects of the active substances and placebo were calculated using ADAS (Alzheimer's Disease Assessment Scale) cognition scale, taking into account the different degrees of dementia and the dropout rate due to adverse drug reaction. The efficacy was expressed as a delay in symptom series or the difference in response rates between placebo and active substrate. Results showed that there was no difference between the four drugs and the Ginkgo extract. This means that they all work equivalently. Having an over the counter dietary supplement work as effectively as a drug is fine. It doesn't even have to work better than the drug; it can work equally to the drug. And in this particular study, the Ginkgo biloba extract was equal in efficacy to those four cholinesterase inhibitors. Wettstein concluded that new prescription medications should be critically reviewed, and that these drugs and Ginkgo should be considered equally effective in treating mild to moderate Alzheimer's dementia.<sup>15</sup>

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### Nutraceuticals for Treating Type 2 Diabetes :

Among many disease or disorders of carbohydrate, fat and protein metabolism, diabetes is a serious disorder effecting large population of the world. It is associated with decreased insulin production or resistance towards its action. Plants have been traditionally used to treat diabetes patients, both insulin dependent & non-insulin dependent diabetes. Nutraceuticals are food supplements and have nutritional value. All the nutrients discussed in this review have exhibited significant clinical & pharmacological activity. The potency of herbal drugs is significant & they have negligible side effects than the synthetic anti-diabetic drugs. There is increasing demand by patients to use the natural products with anti-diabetic activity. The efficacy of hypoglycaemic herbs is achieved by increasing insulin secretion, enhancing glucose uptake by adipose and muscle tissues, inhibiting glucose absorption from intestine and inhibiting glucose production from hepatocytes.<sup>16</sup>

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### Conclusion :

Nutraceuticals are poised to play a pivotal role in future therapeutic advancements, but their success will hinge on maintaining purity, safety, and efficacy while preserving innovation. As they fit well with today's lifestyle, their continued relevance is evident. Some nutraceuticals are thoroughly researched and offer unique ingredients that can deliver health benefits more rapidly than would be achievable through consuming conventional healthy foods alone. Public health authorities view prevention and treatment with nutraceuticals as a powerful tool for addressing nutritionally induced acute and chronic diseases, thus promoting optimal health, longevity, and overall quality of life. The integration of nutraceuticals into clinical practice is on the rise, though it is essential to address critical pharmaceutical and clinical issues through further research.

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