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Review Article

Nutraceutical Based Protein Rich Powder

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ABSTRACT

Nutraceuticals-based protein-rich powder is a functional food formulation designed to provide essential nutrients along with additional health benefits beyond basic source nutrition. It combines high-quality protein sources such as soy, whey, casein, or plant-based proteins with nutraceutical ingredients like flax seeds, sunflower seeds, herbal extracts, vitamins, and minerals. This formulation not only supports muscle growth and tissue repair but also enhances immunity, metabolism, and overall wellness. It serves as a convenient dietary supplement for individuals seeking weight management, muscle development, or recovery after illness. The incorporation of nutraceutical components provides bioactive compounds with antioxidant, anti-inflammatory, and cholesterol-lowering properties, making the powder beneficial for maintaining long-term health. Thus, nutraceutical protein-rich powders represent a modern approach to balanced nutrition, merging the therapeutic potential of nuraceuticals with the essential benefits of dietary protein.

INTRODUCTION

In 1989, Dr. Steffen De Felice, the chairman of the foundation for innovation in medicine, created the phrase "nutraceutical" By fusing the words "pharmaceutical" with "nutrition" represent a rapidly growing sector in the field of health and wellness .nutraceuticals are the nourishing components that are biologically active and possess capability for maintaining optimal health and benefits. Nutraceuticals are characterized as' specially designed preparations', formulated with the aim of fulfilling specific dietary requirements or offer preventive health care. This bioactive compound derived from foods, herbs, and dietary supplements have gained significant attention for their potential health –promoting and disease-preventing properties. Nutraceuticals have received considerable interest because of their presumed safety and potential nutritional and therapeutic effects. Protein is a macronutrient that is essential to building muscles mass. Protein is a development of muscles, help with bone metabolism, maintain ideal weight, prevent heart related disease, Control sugar level, promote the

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brain function, improve immune system, hormone balance, prevent hair damage, make skin healthy, eliminate anxiety. Proteins play a Key role in many biological processes including the building of muscles and other tissues.

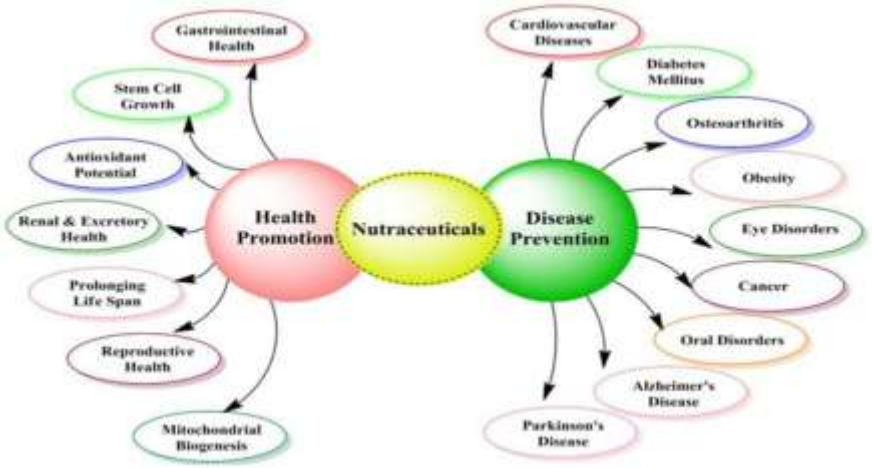

Fig no. 1

Protein supplement are considered a sports food, which is a specialized products to provide a practical source of nutrients when it is impractical to consumed every day foods. A protein supplement is a dietary supplement or a body building supplement, and usually comes in the form of a protein bar, protein powder, and even readily available as a protein shake. Protein supplements are widely consumed by athletes as well as young adults and teenagers going to the gym and are an excellent source to increased protein intake, build muscle mass, an enhance recovery . protein supplements are based on powdered whey proteins, caseins , egg and soy proteins that are reconstituted with water or milk. The growth of the protein supplement industry is mainly due to increasing health awareness and the easy availability of supplement in different formulations . the amount and timing of consumption of protein supplement are considered to play a role in muscle hypertrophy and recover.

Fig no. 2 Role of protein

Types of protein powder :

There are several different types of protein powder. Whey is the most popular protein supplement and the one that researchers have tended to focus on, but it is not the only one. Common types of protein powder include

- Whey protein: whey come from the lipid part of milk that's left over after cheeses production. It includes concentrate and whey isolated. Whey protein concentrated contain protein as well as vitamins, minerals and branched chain amino acid which help repair and build muscle. Is is not suitable for vegans.

- Casein proteins: casein is the other by product of milk production. This type of protein is rich in glutamine, an amino acid that may speed up muscle recovery after exercise. The body digest this protein more slowly so it may be best to take it at night. Casein isn't suitable for vegans or those with lactose intolerance.

- Egg white protein: egg white protein come from eggs, which have few health benefits. It is complete protein, and it has a higher net protein utilization rate. It can increase muscle mass and strength, help lower cholesterol, reduce visceral fat.

- Soy protein : soy protein is made from the humble soybean. It is complete protein and rich in branched chain amino acid (BCAAS). It helps to reduce cholesterol, lower blood pressure, build muscle. It contains all the essential amino acids. It is a great vegan.

- Pea protein: Pea protein powder is made from ground yellow split peas. Pea is are a protein rich food. It is high in fiber also high in lysine which is great for the human system. It can increase muscle strength and lower blood pressure, blood glucose and cholesterol. It is vegan and hypoallergenic .

- Hump protein : hump protein powder is made from hump seeds. Which come from the cannabis sativa L. plant. Hump is high in fiber, antioxidant and omega-3 fatty acids. It may help reduce cholesterol and protect against cardiovascular diseases .

- Rice protein : Rice protein powder is made from drumroll pleasa rice. It may protect against high blood sugar, high cholesterol, and cancer, and it can improve muscle strength and recovery.

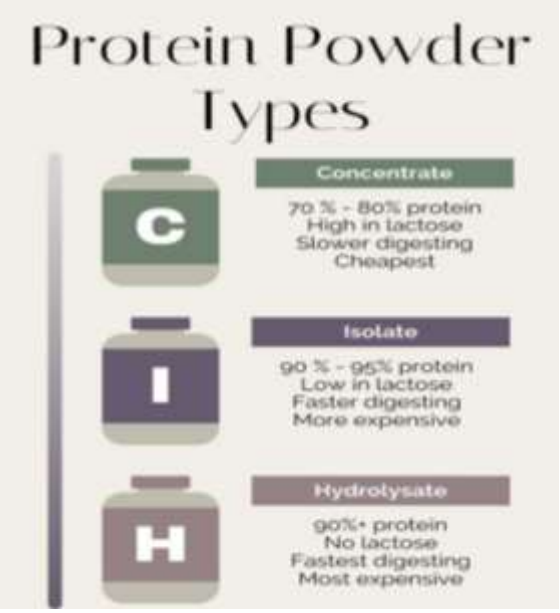

Fig no.3 Types of protein powder

FUTURE SCOPE :

In addition to increased demand arising from population growth, increased demand for protein globally is driven by socio-economic changes. Here 's an overview of the scope for protein powder

1. Growing health and fitness awareness –

With rising awareness about nutrition, fitness, and wellness, more people are adding protein powders

to their daily diet. As consumers focus on preventive health care and balanced nutrition, the demand for natural and clean- label protein powders is increasing.

2. Expanding nutraceutical market -

The nutraceutical industry is expanding rapidly worldwide, especially in india. protein rich powder are increasingly positioned as functional foods for weight management, immunity boosting, and overall health. The demand for plant base, herbal protein powders are also increased rapidly.

3. Personalized nutrition -

In the future ,protein powders may be customized based on individual health needs- such as powders for diabetic patient, weigh gain, weight loss, or muscle recovery. It aims to improve specific health outcomes, manage conditions, and promote overall well-being. The goal is to provide more effective and lasting dietary guidance that supports individual health and behavior change

4. Growing sports and fitness industry -

With more people taking up gym training, yoga, athletics, and other fitness activities, protein powders will continue to play a key role in muscle building, endurance, an recovery nutrition. The sports and fitness industry is growing globally and within india, driven by increased health awareness rising disposable incomes, government initiatives, and technological advancement like AI and wearable tech.

5. Rising demand in clinical nutrition -

Protein-rich powder are being widely used in hospitals and healthcare setting for patient suffering from malnutrition obesity sarcopenia, post-surgical recovery, or chronic illness. This growth is driven by rising health consciousness, proliferation of plant-based diet, product innovation with functional ingredients, and improved accessibility through e-commerce.

6. Export and global opportunities -

The Asia-pacific region is the fasted- growing market, with countries like china, India and Japan showing high demand due to urbanization and a rising middle class. There is growing demand for protein powders with additional functional ingredients like Probiotics for gut health, collagen for skin health, and vitamin. beyond sports nutrition, the market for protein powders is expanding into medical nutrition for the elderly, clinical patients and those recovering from illness. Online retail is the fastest- growing distribution channel, making it easier for niche brands to reach a global audience without the burden of physical retail costs.

NUTRACEUTICAL FOR PROTEIN RICH POWDER

Nutraceutical ingredients for protein powder include both the protein source and added nutrients or compounds, such as animal-based protein, plant based protein, and enhanced. In protein powder use additives such as creatine, glutamine, sugar, artificial sweeteners , or herbal sweeteners. Here's an overview of nutraceutical which is used in protein powder.

1. **Lotus seeds:**

Fig no. 3 Lotus Seed

Synonym - lotus seed, Makhana, Fox nuts, Gorgon nuts

Botanical Name - *Euryale ferox*

Biological Source - It is derived from the seeds of prickly water lily plant, *Euryale ferox*

Family - *nelumboneceae*

Nutritional composition -

- Protein – It contain about 10-12% protein. It help to support muscles building and repair.
- Carbohydrates – Provide energy and aids digestion.
- Fiber- Makhana is a good source of dietary fiber, which aids in digestion and can help with weight management.
- Fats- It contain very low amount of fat .
- Minerals- It contain calcium, magnesium, potassium, phosphorous, iron

Bioactive components -

- Flavonoids and polyphenol – Antioxidant, anti-aging properties.
- Alkaloids – anti-inflammatory and neuroprotective effect .
- Glycosides and saponins- beneficial for heart and metabolic health

Health benefits as a nutraceutical -

1. Antioxidant properties- Protect against oxidative stress and aging
2. Cardioprotective- help reduce cholesterol and improves heart health.
3. Anti diabetic- low glycemic index, regulate blood sugar
4. Weight management – low calories, high satiety snack.
5. Renal and reproductive health- traditionally used for kidney strengths and fertility
6. Bone health- rich in calcium and phosphorus.
7. Nuroprotective- may improve cognitive function and reduce stress

2. Oats

Fig no. 4 Oats

Synonyms - Common oats, cultivated oats, rolled oats, white oats

Botanical Name - *Avena sativa*

Biological Source - It is obtain from *Avena sativa*

Family - *poaceae*

Nutritional composition-

- Macronutrients- Carbohydrates (66%) , Proteins (12-15%), fat(7%), dietary fibers (soluble+insoluble)
- Micronutrients – Iron, magnesium, zinc, phosphorus, manganese, b-complex vitamins

Bioactive compound-

- B-glucan (soluble fiber)
- Avenanthramides (unique polyphenols)
- Tocopherols and Tocotrienols (vitamin E)
- Phytosterols

Health Benefits-

1. Hypocholesterolemic effect

- B-glucan reduces LDL Cholesterol and total cholesterol .
- Supports cardiovascular health.

2. Anti-diabetic effect

- Lowers postprandial blood glucose by slowing digestion.
- Improves insulin sensitivity.

3. Weight management

- High fiber content promotes satiety and reduces over eating.

4. Gastrointestinal health

- Act as a prebiotic, improves gut microbiota, prevents constipation

5. Antioxident and anti-inflammatory

- Avenanthramides reduce oxidative stress, protect against cronic diseases.

6. Immune modulation

- B-glucane enhances immune response and infection resistance.

3. Soya Chunks

Fig no. 5 Soya Chunks

Synonyms - Soynuggets, Soy Meat, Vegetarian Meat, Soy Protein Chunks

Botanical Names - *glycinemax*

Biological Source - soya chunks are obtained from defatted soy flavor, product of soybean.

Family - *fabaceae*

Nutritional Composition -

- Protein - 50 -52% (complete protein with all essential amino acids)
- Carbohydrates - contain 30%
- Fats - less than 1% (due to defatting process)
- Minerals - calcium, iron, magnesium, phosphorus, zinc.
- Vitamins - B-complex , Isoflavones.

Bioactive Components:

- Isoflavones - It is plant-based estrogen-like compounds
- Saponins - anti-oxidants and cholesterol-lowering
- Lecithin - improves brain and liver health
- Oligosaccharides - prebiotics effects

Health Benefits -

1. Cardiovascular health - lower LDL cholesterol, improve lipid profile
2. Bone health - Isoflavones and calcium reduce risk of osteoporosis
3. Hormonal balance - useful in managing menopausal symptoms due to phytoestrogenes
4. Weight Management - high protein and fiber promote satiety
5. Diabetes Management - improve insulin sensitivity regulates blood sugar
6. Cancer prevention - isoflavones may reduce risk of hormones- related cancer (breast prostate)
7. Gut health - prebiotic action of soy oligosaccharides supports microbiota

4. Almond

Fig no. 6 Almond

Synonyms - sweet almonds, bitter almonds, Badam , amygdalae

Botanical Name - *prunes dulcis*

Biological Source - almond consist of the dried mature seeds of prunes *dulcis*

Family - *Rosaceae*

Nutritional Composition -

1. Macronutrients :

- Protein - ~20%
- Healthy fats -contain 50-55% (mainly monounsaturated and polyunsaturated)
- Carbohydrates - contain 20-22%
- Fiber - contain 10-12%

2. Micronutrients :

- Vitamin E, B- complex vitamins
- Minerals - magnesium, calcium, phosphorus, potassium, zinc.

Bioactive Compounds -

- Flavonoides, phenolic acid .
- Phytosterols
- Polyunsaturated fatty acid

Health Benefits -

1. Cardioprotective effect - Rich in monounsaturated fats & phytosterols – reduce LDL cholesterol & support heart health.
2. Anti-oxidant & anti-aging - high vitamin E & polyphenol protect against oxidant stress.
3. Anti- diabetic effect - improve glycemic control, enhance insulin sensitivity, lower postprandial glucose.
4. Bone & muscle health - calcium, magnesium and phosphorus, strengthen bone ; protein aids muscle growth.
5. Cognitive & nervous system health - vitamin E % unsaturated fats support brain function and memory .
6. Weight management - high protein and fiber promote satiety, reduce in overeating
7. Skin & hair benefits - almond oil is use traditionally as emollient; supports skin hydration and repair.

5. Roast gram

Fig no. 7 Roast Gram

Synonyms - roasted chickpeas, roasted garbanzo beans, roasted Bengal gram, green gram,

Botanical Name - *cicer arietinum*

Biological source - Roasted gram consist of the roasted mature seeds of *cicer arietinum linn*.

Family - *fabaceae (leguminosae)*

Nutritional composition

1. Protein -it contain 18-22% (high quality plant protein)
2. Carbohydrates - it contain 55-60% (complex carbs, low glycemic index)
3. Fat - it contain 4-6% (mainly unsaturated)
4. Vitamins - b-complex (B1, B6, folate), vitamin c (trace)
5. Fiber - it contain 10-12% (dietary fiber for gut health)
6. Minerals - it contain iron, magnesium, calcium, potassium, zinc, phosphorus

Bioactive Compounds -

- Saponins
- Isoflavones
- Phytosterols
- Polyphenols

Health Benefits -

1. Anti-diabetic- low glycemic index: regulates blood glucose $improves insulin sensitivity.
2. Cardioprotective – High fiber, saponins, and unsaturated fats reduce cholesterol and improve lipid profile.
3. Weight Management – high protein & fiber provide satiety preventing overeating.
4. Digestive Health – prebiotic fiber improves gut microbiota & prevents constipation.
5. Bone &Blood Health – rich in calcium, iron, folate- prevents anemia and supports bone strength.
6. Antioxidant Activity - polyphenols protect against oxidative strss & chronic diaseases.
7. Hormonal Balance – isoflavones may reduce menopausal symptoms.

6. Walnuts

Fig no. 8 Walnuts

Synonyms - English walnuts, Persian walnut, akhrot

Botanical Name - *juglans regia*

Biological Source - walnuts consists of the dried mature seeds of *juglans regia linn,.*

Family - *juglandaceae*

Nutritional Composition -

1. Macronutrients

- Protein - It contains 15-18%
- Fat – It contains 60-65% (mainly polyunsaturated fatty acids)
- Carbohydrates – It contains 13-15%
- Fiber - It contains 6-7%

2. Micronutrients

- Vitamins - vitamins E, B6, folate
- Minerals -Magnesium, Copper, Phosphorus, manganese, Zinc

Bioactive compound -

- a-Linolenic acid (Omaga-3 fatty acid)
- polyphenols & flavonoids
- Tocopherols
- Melatonin

Health Benefits -

1. Cardioprotective effect - omega-3 fatty acids and phytosrerols lower LDL cholesterol and improve heart health.
2. Neuroprotective/brain health - walnuts enhance memory, learning ability, and may reduce risk of neurodegenerative diseases.
3. Anti-diabetic effect - improve insulin sensitivity and help maintain blood glucose levels.
4. Antioxidant &Anti-inflammatory properties - polyphenols and vitamin E neutralize free radicals, reducing oxidative stress.
5. Weight Management - High fiber and polyphenols inhibit tumor cell growth and protect DNA from damage.
6. Anti-Cancer potential - Ellagic acid and polyphenols inhibits tumor cell growth and protect DNA from damage.
7. Gut Health - Walnuts support beneficial gut bacteria, improving digestion and immunity.

7. Dried Dates

Fig no. 9 Dried dates

Synonyms - kharek, khajur, chuara, dried date fruit.

Botanical Name - *phoenix dactylifera*

Biological Source - Dry Dates consist of the dried ripe fruits of *phoenix dactylifera linn.,*

Family - *Arecaceae*

Nutritional Composition -

- Carbohydrates - it contain 70-80% (mainly natural sugars-glucose, fructose,sucrose)
- Protein - it contain 2-3%
- Fiber - it contain 6-8%
- Fat - it contain 1%
- Vitamins - A, B1, B2, B3, B6, C, and K
- Minerals - Iron, calcium, potassium, Magnesium, Zinc, Copper, Phosphorus

Bioactive compound -

- Phenolic acid
- Flavonoids
- Tannins
- Carotenoids

Health Benefits -

1. Instant Energy source -High natural sugar content makes it a healthy energy booster.
2. Digestive health - High fiber content aids digestion and prevents constipation.
3. Anemia prevention- Rich in iron; supports red blood cell formation.
4. Heart Health - Potassium and antioxidants help regulate blood pressure and reduce cholesterol.
5. Bone Health - calcium, phosphorus, and magnesium strengthen bones and teeth.
6. Anti-inflammatory & Antioxidant - polyphenols protect cells from oxidative stress and inflammation.
7. Reproductive Health - Traditionally used to enhance fertility and sexual vitality
8. Immune Support - Vitamins and minerals strengthen immunity and overall wellness.

8. Peanuts

Fig no. 10 Peanuts

Synonyms - Groundnut, earthnut, moongphali, phalidana

Botanical Name - *Arachis hypogaea*

Biological Source - peanuts consist of the dried seeds of *Arachis hypogaea linn*

Family - *Fabaceae (Leguminosae)*

Nutritional Composition

- Protein - 25-30% (high quality plant protein)
- Fat - 45-50% (mainly monounsaturated and polyunsaturated fatty acids)
- Carbohydrates - 10-15%
- Fibers - 5-8%
- Vitamins - E, B-complex (Niacin, Folate, Thiamine)
- Minerals - Magnesium, phosphorus, Potassium, Zinc, Iron

Bioactive Compounds-

- Resveratrol (antioxidant polyphenol)
- Phytosterols
- Coenzyme Q10
- Isoflavones
- Arginine (amino acid for heart health)

Health Benefits-

1. Cardioprotective effect - Monounsaturated fats, arginine, and phytosterols improve lipid profile and heart function.
2. Antioxidant and Anti-aging nProperties - Vitamin E and resveratrol protect against oxidative stress.
3. Anti-diabetic Effect - Low glycemic index; helps regulate blood glucose and insulin levels.
4. Weight Management - High protein and healthy fat increase satiety, reducing hunger.
5. Brain Health - Niacin and Coenzyme Q10 support memory and cognitive function.
6. Cancer Prevention - Polyphenols and isoflavones may reduce the risk of colon and prostate cancers.
7. Skin and Hair Health - Vitamin E and healthy fats nourish skin and promote hair growth.

9. Cashew nuts

Fig No.11 Cashew Nuts

Synonyms - Kaju, Magilam, Karkat Phal, Cashew Kernel

Botanical Name - *Anacardium Occidentale*

Biological Source - Cashew nuts are the dried seeds of *Anacardium Occidentale linn.,*

Family - *Anacardiaceae*

Nutritional Composition

1. Macronutrients-

- Protein - 18-21%
- Fat - 43-46% (mainly monounsaturated and polyunsaturated fatty acids)
- Carbohydrates - 30-32%
- Fiber - 3-4%

2. Micronutrients-

- Vitamins - B-complex (B1,B2,B3,B6), Vitamin K, Vitamin E
- Minerals - Magnesium, Copper, Phosphorus, Zinc, Iron, Manganese

Bioactive Compounds

- Phytosterols
- Flavonoids and polyphenols
- Oleic acid and linoleic acid
- Anacardic acid (in shell, some antioxidant properties)

Health Benefits

1. Cardioprotective Effect - Healthy fats, magnesium, and phytosterols reduce LDL cholesterol and improve heart health.
2. Antioxidant and Anti-inflammatory - Flavonoids and polyphenols protect cells from oxidative stress and inflammation.
3. Bone Health - Magnesium, phosphorus, and copper support bone formation and density.
4. Metabolic Health - helps regulate blood sugar and may aid in preventing type 2 diabetes.
5. Brain Health - Rich in magnesium and healthy fats, supporting cognitive function and nerve health.
6. Weight Management - Protein and healthy fats promote satiety and help maintain healthy body weight.
7. Skin and Hair Benefits - Vitamin E and antioxidants help in skin repair, hydration, and hair strength.

10. Pumpkin Seed

Fig no. 12 Pumkin seed

Synonym - pepitas, kaddu, squash, field pumkin

Botanical Name - *cucurbita maxima*

Biological source - pumpkin seeds are the dried ripe seed of *curcubita maxima linn.,*

Family - *cucurbitaceae*

Nutritional Composition:-

- Protein - it contains 30-35% (rich in arginine and glutamate)
- Fat - it contains 45-50% (mainly unsaturated fatty acids- omega-3 &omega-6)
- Carbohydrates - it contains 10-15%
- Fiber - it contains 5-10%
- Vitamins - Vitamin E, K, and B-complex (Niacin ,Folate)
- Minerals - Magnesium, Zinc, Iron, Phosphorus, Manganese, copper

Bioactive Compound:-

- Phytosteroid
- Polyphenols
- Tocopherols (Vitamin E)
- Squalene
- Carotenoids

Health benefits

1. Heart Health - Rich in unsaturated fatty acids, magnesium, and phytosterols-helps reduce LDL and improve cholesterol profile.
2. Antioxidant & Anti-inflammatory - polyphenols and Vitamin E protect against oxidative stress and inflammation.
3. Prostate Urinary Health - Shown to support prostate health and reduce urinary track symptoms (especially in men).
4. Anti-diabetic properties - Helps lower blood sugar and improves insulin sensitivity.
5. Sleeps Regulation - contains tryptophan,a precursor of serotonin and melatonin, which aids good sleep.
6. Immune System Support - High zinc and magnesium content strengthen immunity.
7. Bone & Hair Health - Minerals like Magnesium, Zinc, and iron promote strong bones and healthy hair.

11. Flax seed

Fig no.13 Flax seed

Synonyms - Linseed, alsi, jawas, Atasi

Botanical Name - *Linum usitatissimum*

Biological source - Flax seeds are the dried ripe seeds of *linum usitatissimum Linn.,*

Famity - *Linaceae*

Nutritional composition

- Protein - it contains 18-25% (rich in essential amino acids)
- Fat- it contains 35-40% (mainly a-linolenic acid omega-3 fatty acid)
- Carbohydrates - it contains 25-30%
- Fiber - it contains 20-30%
- Vitamins - B1 (thiamine), B6,E, folate
- Minerals - magnesium, Phosphorus, zinc, calcium, iron

Bioactive compounds -

- Lignas (secoisolariciresinol diglucoside) – phytoestrogenic antioxidant
- Omega-3 Fatty acids
- Flavonoids and phenolic acids
- Mucilage

Health Benefits

1. Cardioprotective Effect - omega-3 fatty acids and lignans lower cholesterol, reduce blood pressure, and prevent atherosclerosis.
2. Antioxidant & Anti-inflammatory - lignans and phenolics protect against oxidative stress and inflammation.
3. Digestive Health - High fiber content improves bowel movement and prevent constipation
4. Anti-diabetic properties - helps regulate blood sugar and Improves insulin sensitivity.
5. Hormonal Balance - Lignans act as phytoestrogens that may help relieve menopausal symptoms.
6. Cancer prevention - Lignans and omega-3 fatty acids show protective effects against breast, colon, and prostate cancers.
7. Skin & Hair Health - omega-3 and vitamin E nourish skin and promote hair growth.

12. Sunflower Seed

Fig no. 14 Sunflower seed

Synonym - sunflower, surajmukhi, suryamukhi,

Botanical Name - *Helianthus annuus*

Biological Source - Sunflower seed are the dried ripe of *Helianthus annuus Linn.*

Family - *Asteraceae*

Nutrition Composition

- Protein - it contains 20-25%
- Fat - it contains 45- 50% (mainly polyunsaturated fatty acids- linoleic, acid, oleic acid)
- Carbohydrates - it contains 15-20%
- Fiber - it contains 6-8%
- Vitamins - Vitamin E, B-complex (B1,B3, B6,Folate)
- Minerals - magnesium, Selenium, Iron, Phosphorus, Zinc

Bioactive Compound

- Tocopherols (Vitamin E)
- Phytosterols
- Polyphenols
- Flavonoids
- Squalene

Health Benefits

1. Cardioprotective Effect:- high in unsaturated fatty acids and phytosterols, which reduce LDL cholesterol and improve heart health.
2. Antioxidant & Anti-aging - Vitamin E and polyphenols protect calls from oxidative stress and delay aging.
3. Skin and Hair Health- Vitamin E and linoleic acid maintain skin elasticity and promote healthy hair.
4. Anti-inflammatory - Effect:- Flavonoids and phenolic acids reduce inflammation.
5. Metabolic and Liver Health - Helps regulate cholesterol metabolism and supports liver detoxification.
6. Immune Support - Rich in Zinc and selenium, Which enhance immune defense.
7. Diabetes and Weight Control - High protein and fiber content help regulate blood sugar and appetite.

13. Blackberry (Jamun seeds)

Fig no. 15 Blackberry

Synonyms - Black plum, Gava plum, Jamun, Bramble

Botanical Name - *Rubus Fruticosus*

Biological Source - Blackberry seeds are obtained from the dried ripe fruit of *Rubus Fruticosus Linn.,*

Family - *Rosaceae*

Nutritional Composition-

- Protein - 15-20%
- Fat -10-15% (mainly omega-3 and omega-6 fatty acids)
- Fiber - 40-45% (excellent source of insoluble fiber)
- Carbohydrates - 20-25%
- Vitamins - Vitamin E, Vitamin C, and B-complex
- Minerals - Magnesium, Zinc, Iron, Potassium, Calcium

Bioactive Compounds-

- Anthocyanins (antioxidants)
- Ellagic acid
- Flavonoids
- Tannins
- Polyunsaturated fatty acids

Health Benefits-

1. Antioxidant and Anti-aging - Polyphenols and anthocyanins neutralize free radicals, reducing oxidative damage and slowing aging.
2. Cardioprotective Effect - Omega-3 and Omega-6 fatty acids maintain heart health by improving lipid profile and reducing inflammation.
3. Anti-inflammatory Properties - Ellagic acid and Flavonoids help reduce inflammatory markers in the body.
4. Digestive Health - High dietary fiber content improves bowel movement and gut microbiota.
5. Anti-cancer Potential -Ellagic acid and anthocyanins show potential in reducing the risk of colon, breast, and prostate cancers.
6. Skin Health - Vitamin E and antioxidants protect skin cells and improve elasticity.
7. Immune Support - Rich in Vitamin C and polyphenols that strengthen the immune system.

14. Coca Seed

Fig no. 16 Coca seed

Synonyms - Erythroxy seed, Coca, Huanuco, Koka

Botanical Name - *Erythroxylum coca La*

Biological Source - Coca seeds are obtained from the plant *Erythroxylum coca Lam.,*

Family - *Erythroxylaceae*

Nutritional Composition

- Protein - 12-15%
- Fat - 12-15% (mainly unsaturated fatty acids)
- Carbohydrates - 55-60%
- Fiber - 5-6%
- Vitamins - B-complex (B1,B2,B3), Vitamin C (trace)
- Minerals - Calcium, Iron, Magnesium, Phosphorus, Potassium

Bioactive Compounds

- Alkaloids (low amounts in seeds compared to leaves)
- Polyphenols
- Flavonoids

- Tannins

Health Benefits

1. Antioxidant Properties - Polyphenols and flavonoids help reduce oxidative stress.
2. Energy and Stimulant Effect - Traditionally, coca seeds were chewed to reduce fatigue and enhance stamina
3. Digestive Health - Fiber content aids in digestion and gut health.
4. Mineral Supplementation - Rich in calcium, magnesium, and iron, supporting bone and metabolic health.
5. Anti-inflammatory Activity - Polyphenols may help reduce low-grade inflammation.

15. Candy Sugar

Fig no. 17 Candy sugar

Synonyms - Rock sugar, Sugar crystals, Mishri, Misri

Botanical Name - *Saccharum officinarum*

Biological Source - Candy sugar is obtained from the sucrose-rich juice of sugarcane

Family - *Poaceae*

Nutritional Composition

- Major Component - Sucrose (98-99%)
- Minor Components - Trace minerals (calcium, potassium, magnesium) depending on source
- Caloric Value - High energy source (387 kcal/100g)
- Physical Form - White or brownish crystalline granules

Bioactive Components

- Polyphenols/ Flavonoids (trace) - Depending on the processing, unrefined candy sugar may contain minor phenolic compounds that have antioxidant properties.
- Amino Acids/ Organic Acids (Trace) - Small residual amino acids or organic acids may remain, slightly enhancing nutraceutical value.

Health Benefits

1. Instant Energy Source - Provides rapid energy due to its simple sugar content.
2. Digestive Aid - Traditionally used to relieve indigestion and acidity in small amounts.
3. Soothing Effect - Used in Ayurvedic formulations for sore throat, cough, and oral care.
4. Cooling Effect in Ayurveda - Believed to balance Pitta dosha and reduce heat-related conditions.
5. Mineral Supplement - Some natural candy sugar retains trace minerals like calcium and magnesium.

Health benefits of protein powder

1. Promote muscle growth -

Protein is one of the most important nutrients for maintaining or preventing muscle loss, especially as you get older. It can support the growth and recovery of cells necessary for muscle energy, tissue growth, and restoration.

2. Lower blood pressure -

High blood pressure (hypertension) is one of the leading risk factors for heart disease. It may help reduce systolic blood pressure.

3. Help manage type 2 diabetes -

Type 2 diabetes is a chronic disease characterized by high blood sugar and impaired insulin function. Protein may help manage diabetes in several ways, including:

- Lowering blood sugar levels after eating
- Increasing insulin level and sensitivity to its effects
- Managing blood glucose level
- Increasing levels of fullness
- Lowering lipids, such as triglycerides

4. Help reduce inflammation -

Inflammation is part of the body's response to damage. It can be beneficial, but under certain circumstances, it may become chronic. It including heart disease, diabetes, and arthritis, and it may reflect underlying health conditions or lifestyle habits that could harm health. Protein helped reduce C-reactive protein (CRP) and interleukin-6 (IL-6).

5. Help manage inflammatory bowel disease -

Inflammatory bowel disease (IBD) is a condition characterized by chronic inflammation in the lining of the digestive tract. Protein help to promote inflammatory bowel disease remission and prevent flare-ups by:

- Secreting an intestinal protein called mucin
- Reducing inflammation
- Improving the function of the intestinal barrier
- Supporting the gut microbiome and improving overall gut health

6. Enhance the body's antioxidant defenses -

Antioxidants are substances that act against oxidation in the body. This means they reduce oxidative stress and lower the risk of various chronic diseases. Protein boost natural antioxidant defenses, especially glutathione, which his produced by our body.

7. Beneficial effects on blood fats -

High cholesterol, especially LDL cholesterol, is risk factor for heart disease. Protein help to reduce LDL cholesterol and total cholesterol, especially in people younger than 50 years old.

8. Help reduce hunger -

Satiety is a term used to describe the feeling of fullness we experience after eating a meal. It's the opposite of appetite and hunger, and it should suppress cravings for food and the desire to eat. Protein is the most filling of the three macronutrients. It can help increase several fullness hormones, including:

- Glucagon-like peptide-1 (GLP-1)
- Cholecystokinin (CCK)
- Peptide ttyrosine-tyrosine (PYY)

9. Help support weight management -

Increased consumption of protein is a well known weight loss strategy. Eating more protein may help support fat loss by:

- Increasing feelings of fullness
- Reducing hunger and cravings throughout the day
- Increasing the thermic effect of food
- Maintaining muscle mass

Protein has been show to be particularly effective< especially when combined with frequent exercise and maintaining a calorie deficit.

10. Increases muscle mass and strength -

Protein is the building block of your muscles. Eating adequate amounts can help maintain muscle mass and promote muscle growth during strength training.

Advantages

1. Promote muscle growth and repair
2. Aids in weight management
3. Convenient source of nutrition
4. Support recovery
5. Boost energy and metabolism
6. Support bone health
7. Improve hair, skin and nail health
8. Beneficial for vegetarians and vegan
9. Increases fat burning
10. Improve function of immune system
11. Promote long- term wellness
12. Enhance athletic performance

Disadvantages

1. Digestive issues
2. Kidney strain (with excess use)
3. May contain additives or artificial sweeteners
4. Allergic reaction
5. Expensive
6. Not a substitute for whole foods
7. Possible weight gain
8. Overuse or misuse
9. Lack of regulation and quality control
10. Reduce appetite
11. Weight gain

What are the possible side effects of protein powder ?

Protein is well tolerated when consumed at the recommended dosage. Some people report that taking too much protein may cause mild gastrointestinal symptoms. These possible symptoms may include:

- Bloating
- Diarrhea
- Cramping
- Allergic reactions
- Flatulence
- Abdominal pain
- Acne
- Nausea
- Headache
- Hunger
- Nutrient imbalance
- Dehydration
- Fatigue

CONCLUSION

Protein rich powder formulated with nutraceutical ingredient offers a balanced approach to health nutritional. It not only fulfills the body's protein requirements for muscle growth, repair, and energy but also delivers additional therapeutics benefits through bioactive compounds. The inclusion of nutraceutical such as herbal extract, seeds, vitamins, and minerals enhance immunity, supports metabolism, and promotes over all wellbeing. Unlike convention supplements nutraceuticals-based protein powder proved both nutritional and preventive health benefits, contributing to the management of life style disorders such as obesity, diabetic, and cardiovascular disease . therefore, Nutraceutical-based protein powder can be consider an effective and safe functional food supplements for promoting long term health and vitality.

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