

BENEFITS OF SOYA PROTIENS

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IMPORTANCE OF PROTEINS

- Proteins is the basic chemical unit of living organisms & is essential for nutrition, growth & repair.
- Proteins consumed in foods are digested into peptides & amino acids & made into proteins needed by body
- Proteins are present in muscle, skin, hair, components of cellular structure & tissues, Enzymes, Hormones, Antibodies etc.
- Proteins are involved in transportation and blood clotting
- Proteins are extremely important in diet & more so in children



HOW MUCH PROTEIN DO WE NEED?

- Average daily intake of protein varies from 0.6gm to 1.2g/kg body wt./day.
- Institute of Medicine recommends adults 0.8g protein per kg body wt. per day
- ICMR recommends 1g protein for adults and more for children and pregnant & lactating mothers



INTRODUCTION TO SOYA BEAN:

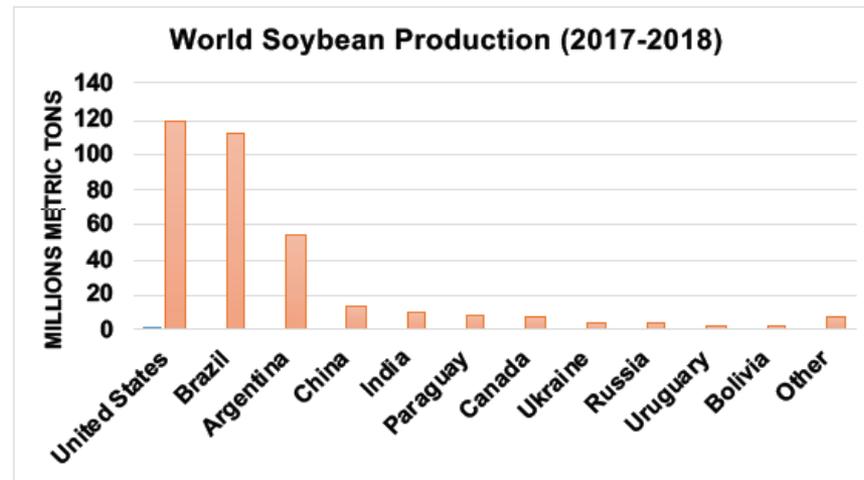
- Soybeans, which are also known as soya beans, are a species of legume that has become one of the most widely consumed foods in the world.
- They are extremely useful for human health and they are easy to cultivate as well. These legumes are produced in greatest numbers in the United States and South America, but they are actually native to East Asia.
- Their scientific name is *Glycine max*, and they are classified as an oilseed, rather than a pulse, like most legumes.



WORLD WIDE SOYA PRODUCTION 2018

(Million Metric Tons)

| | |
|---------------|-------------|
| United States | 119.52 |
| Brazil | 112.00 |
| Argentina | 54.00 |
| China | 14.20 |
| India | 9.50 |
| Paraguay | 9.20 |
| Canada | 8.00 |
| Ukraine | 3.89 |
| Russia | 3.50 |
| Uruguay | 2.52 |
| Bolivia | 2.60 |
| Other | <u>21.8</u> |
| World | 346.92 |



WHAT IS SOY PROTEIN ?

- **Soy protein** is a protein that is isolated from soybean.
- It is made from soybean meal that has been dehulled and defatted.
- Dehulled and defatted soybeans are processed into three kinds of high protein commercial products: soy flour, concentrates, and isolates.
- Soy protein isolate has been used since 1959 in foods for its functional properties.



HEALTH BENEFIT OF SOY PROTEIN

- Soya protein is a complete protein as it contains all the essential amino acids in adequate amounts for human nutrition and is one of the least expensive sources of dietary proteins.
- Digestibility of soya foods is high e.g. soy beans 65%, tofu or soya milk 93% and soya protein isolate 97%
- When protein digestibility corrected amino acid score (PDCAAS) is considered soya protein is equivalent to animal proteins like milk and egg
- Soy protein has been shown in various studies to be beneficial in terms of heart disease risk factors, reducing menopausal symptoms, weight loss, arthritis, brain function and exercise performance



COMPOSITION OF SOYA PRODUCTS

| Food | Calories | Protein, g | Carbohydrate, g | Fat, g | Satd. Fat, g |
|--|----------|------------|-----------------|--------|--------------|
| Soybeans 1/2 cup, cooked | 149 | 14.3 | 8.5 | 7.7 | 1.1 |
| Tempeh 1/2 cup | 165 | 15.7 | 14.1 | 6.4 | 1.1 |
| Textured Soy Protein 1/2 cup, cooked | 59 | 11 | 7 | 0.2 | fat free |
| Soy nuts 1/4 cup | 202 | 15 | 14.5 | 10.0 | 1.6 |
| Tofu 1/2 cup | 94 | 10 | 2.3 | 5.9 | 0.9 |
| Soy flour, defatted 1/4 cup | 81.7 | 12.8 | 8.4 | 0.3 | .02 |
| Soymilk, plain 1 cup | 79 | 6.6 | 4.3 | 4.6 | 0.5 |

VITAMINS & MINERALS

| Food | Niacin mg | B6 mg | Folic Acid ug | Calcium mg | Iron mg | Magnesium mg | Copper mg | Zinc mg |
|--|--------------|----------|------------------|---------------|------------|-----------------|--------------|------------|
| Soybeans 1/2 cup, cooked | 1.35 | .20 | 47 | 88 | 4.42 | 74 | .35 | .99 |
| Tempeh 1/2 cup | 3.8 | .25 | 43 | 77 | 1.9 | 58 | .55 | 1.5 |
| Textured Soy Protein 1/2 cup, cooked | .75 | .12 | --- | 85 | 2 | 86 | .32 | 1.37 |
| Soynuts 1/4 cup | 0.6 | .09 | 91 | 59 | 1.65 | 63 | .35 | 1.35 |
| Tofu 1/2 cup | 0.2 | .06 | 19 | 130* | --- | 127 | .24 | 1.00 |
| Soyflour, defatted 1/4 cup | 0.65 | .14 | 76 | 60 | 2.3 | 72 | 1 | .61 |
| Soymilk, plain 1 cup | 1.4 | .10 | 4 | 93 | 1.38 | 45 | .288 | .54 |
| Miso 2 Tbsp. | 0.3 | --- | 10.1 | 23 | .95 | 14.5 | .15 | 1 |
| Adult RDA | 15 | 1.6-2.0 | 180-200 | 800 | 10-15 | 280-350 | 1.5-3.0 | 12-15 |

NUTRITIONAL & HEALTH BENEFITS OF SOYA

Soybean in comparison to other legumes is far superior in terms of health benefits

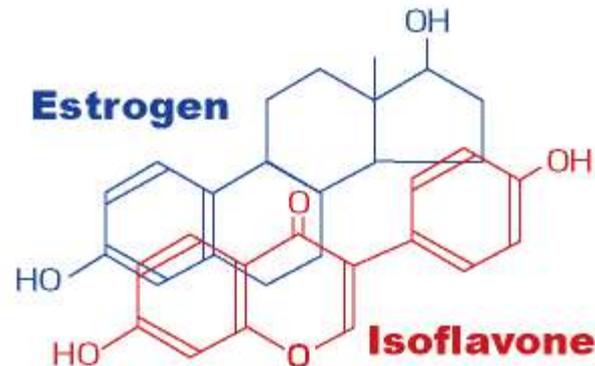
- Low in saturated fat with no cholesterol
- Contains essential heart friendly omega-3 fats
- An excellent source of fiber
- Is a complete protein, containing all the amino acids essential to human nutrition
- Provides important minerals such as calcium, magnesium, iron and selenium
- Rich in probiotics in the form of fermented soy products, such as miso, tempeh, and soy yogurt
- Contains isoflavones which are beneficial in reducing risk of various cancers, heart disease and osteoporosis
- Whole soy foods such as tofu and tempeh form a nutrient rich alternative to meat



ISOFLAVONES

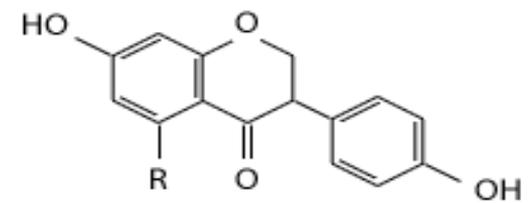
- Many benefits of soy may be attributable to presence of isoflavones
- Isoflavones bind to estrogen receptors & exert hormone-like effect so called phytoestrogens
- They modulate estrogen receptors (ER)
- Their benefit was shown in women transitioning through menopause
- Benefits were shown in cardiovascular disease, osteoporosis, menopausal symptoms relief & breast cancer

Similarity of Isoflavone to Estrogen



ISOFLAVONES IN SOYBEAN

- Soybean derived products have good amounts of isoflavones (25mg per serving of soybean with 8g protein)
- Glycosides of genistein 50%, diadzein 40% & glycitein 10%
- Isoflavone consumption among Asians varies from 10 to 40mg (higher in Japan & Shanghai)
- Isoflavones may be lost in making soy milk and tofu and isolated soy protein but is retained almost totally in textured soy protein
- About 25% non-Asians & 50% Asians have bacteria to convert diadzein to equol, a non-steroidal hormone having benefits in PMS, bone health & prostate cancer



R = H
R = OH

daidzein
genistein

HEART DISEASE

- US FDA in 1999 approved health claim for soy protein in cholesterol lowering
- Some doubts were expressed initially but later it was shown in meta-analysis that claim is true and is similar to that of soluble fibre
- Consumption of soy protein instead of animal protein reduces serum cholesterol, LDL cholesterol & triglycerides
- Cholesterol absorption may be impaired
- Although isoflavone may not directly influence but exert coronary benefits by improving endothelial function
- Phytoestrogens (isoflavones) binding the estrogen receptors may be lowering LDL, increasing HDL, changing arterial wall function
- Study with post-menopausal women showed that isoflavones markedly improved flow-mediated dilation where endothelial function was impaired
- It was also shown that women consuming 25g/d showed reduced progression of subclinical atherosclerosis & in post-menopausal women benefit was much more



OBESITY & DIABETES

- Soy protein contributed to control of hyperglycemia, hyperlipidemia and hyperinsulinemia & helped reduce body weight
- Useful in both diabetic and normal individuals to control obesity & blood sugar



CANCER PREVENTION

- High soy intake among Asian women associated with protection against breast cancer
- Consumption during earlier age more protective
- Isoflavone Genistein reduces risk of cancer
- Breast and prostate cancer
- Genistein blocks cancer development by preventing tumours
- Post-menopausal intake may be less effective in reducing risk of developing breast cancer
- Soy consumption tended to reduce recurrence in tamoxifen users

