Human Health Hazard Combating Effects of Soyabean: An Overview

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Abstract: An increasing amount of attention is being focused now days, on the emergence of nutritious and value added foods. The category has been described by several nomenclature such as nutritional foods, functional foods, medical foods, longevity foods, hyper nutritional foods, super foods and fitness foods etc. soybean and its products contain most of the nutrients in the quantitative and qualitative from required by the human body. They prevent several chronic diseases, are well known for their health fighting property and can be purchased at a reasonable rate even by a common man.

Key words: Functional foods • Combating effect • Diet • Nutrition

INTRODUCTION

Interest in healthy eating has developed all over the world, in recent years. Accordingly, the ingredients perceived as unhealthy such as fat, sugar and salt have been removed from the diets by health conscious human beings. This development is popularly termed as low and light movement low fat, no fat and reduced calorie foods i.e. the desires of the consumers to eat healthier. Most of the people like to eat healthier diets without fundamentally changing their eating pattern and sensory attributes, although poor feed choices and restricted diets can affect their nutritional status and long term life at any stage of life. Many people suffering from chronic disorders want to manage their conditions with food, loosing faith in modern medicines and are taking holistic approach to health maintenance. A growing segment of the younger population are living healthier lifestyles and perceive functional foods like soybeans to be an effective means to maintain good health and combat the diseases. Because of the negative image of the drugs, foods such as soybean are becoming more popular and most of them believe that these foods can replace drugs. Many people with chronic disorders want to manage their conditions healthy by using functional food such as soybean given the choice, most consumers would prefer to enhance or improve their diets by consuming food and drink related products rather than using the more traditional pills or capsules, which may some time cause health hazards.

Protein deficiency is the most prevalent and serious nutritional problem in India and other developing countries. The disease called “Kwasiorkar” is caused due to energy and protein malnutrition in children. This deficiency of protein when in acute form results in severe growth retardation and high mortality rates. Besides, lactating mothers, old people and patients also suffer from protein deficiency to a great extent soybean is rich in protein-the essential component of the diet for healthy person. Regular use of about 50 g soybean or soybean products in daily human diets enhances and protects human health and thereby resulting in longevity-the goal every human aspires to achieve since a long time, soybean has been utilized mainly as a human food in various forms i.e. the whole bean, sprouts, tofu, sauce, misq, tempeh, oil, milk and flour [1].

Soybean as a Boon to Human Health: Soybean has proved as a boon to people as if contains 38-42% protein, being richer than other sources of protein such as meat (18-20%), eggs (13-14%), fish (16-20%), groundnut (20-25%), rice (7-8%), wheat (10-15%) and milk (3-4%). Because of the presence of most of the essential amino acids, soybean is the best source of high quality vegetable proteins. Its protein is equivalent to animal protein in biological value. Sengar et al. [2,3] analysed few varieties of soybean and observed that crude protein content of these varieties varied from 36.73 (PK-1241) to 48.27 percent (PS-1092). Similarly, Wolf and Cowan [4]and

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Table 1: Essential amino acid contents of important protein rich foods.

<table>
<thead>
<tr>
<th>Name of amino acid</th>
<th>Fish</th>
<th>Meat</th>
<th>Skim milk</th>
<th>Soybean</th>
<th>Peanut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lysine</td>
<td>6.6</td>
<td>8.3</td>
<td>8.6</td>
<td>6.8</td>
<td>3.0</td>
</tr>
<tr>
<td>Tryptophan</td>
<td>1.6</td>
<td>1.0</td>
<td>1.5</td>
<td>1.4</td>
<td>1.0</td>
</tr>
<tr>
<td>Phenylalanine</td>
<td>4.1</td>
<td>3.5</td>
<td>5.5</td>
<td>5.3</td>
<td>5.1</td>
</tr>
<tr>
<td>Methionine</td>
<td>3.2</td>
<td>2.8</td>
<td>3.2</td>
<td>1.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Threonine</td>
<td>4.8</td>
<td>4.5</td>
<td>4.7</td>
<td>3.9</td>
<td>2.6</td>
</tr>
<tr>
<td>Isoleucine</td>
<td>7.7</td>
<td>4.7</td>
<td>7.5</td>
<td>6.0</td>
<td>4.6</td>
</tr>
<tr>
<td>Leucine</td>
<td>10.5</td>
<td>7.2</td>
<td>11.0</td>
<td>8.0</td>
<td>6.7</td>
</tr>
<tr>
<td>Valine</td>
<td>5.3</td>
<td>5.1</td>
<td>7.0</td>
<td>5.3</td>
<td>4.4</td>
</tr>
</tbody>
</table>

Table 2: Quality Parameters of Important Sources of Dietary Proteins

<table>
<thead>
<tr>
<th>Name of food</th>
<th>Biological value</th>
<th>Protein score</th>
<th>Net Protein utilization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg</td>
<td>96</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Soybean</td>
<td>72</td>
<td>70</td>
<td>56</td>
</tr>
<tr>
<td>Corn gram</td>
<td>54</td>
<td>45</td>
<td>55</td>
</tr>
<tr>
<td>Wheat flour</td>
<td>53</td>
<td>50</td>
<td>52</td>
</tr>
<tr>
<td>Rice (milled)</td>
<td>61</td>
<td>-</td>
<td>59</td>
</tr>
</tbody>
</table>

Patil and Sinha [5] reported 40.0 percent in whole soybean. Sachan [6] also recorded higher percentage of crude protein (44.6, 42.9 and 47.7) in shilajeet, Alankar and Bragg varieties of soybean, respectively.

Comparative amino acid contents of different dietary sources is presented in following table (Table 1).

From the above table it is quite evident that soybean at though the source of vegetable protein but like animal sources of protein is rich in amino acids content except methionine. It is also clear from the above referred table that in comparison to other vegetable source of protein, soybean is very rich in almost all the essential amino acids. Unlike common cereals with lysine limiting amino acid, soybean is abundantly rich in lysine.

Quality of protein of foods is determined on the basis of biological value and other quality parameters. This has been reported by Kaldy [7] as per following table.

Kim, et al. [8] have also pointed out that soybeans are unique among plant proteins by virtue of their relatively high biological value.

Soybean oil is made up of approximately 12-14 percent saturated oils balance being the unsaturated oils. The saturated fraction of soybean oil is made up primarily of palmitic and stearic acid. The unsaturated fraction includes about 30-35 percent oleic acid, 45-55 percent linoleic acid and 5-10 percent linolenic acid. Soybeans have been reported [9] an excellent and cheap source of calories. They contain 14-25 percent fat. Patel [10] recorded 19.5 percent fat in soybean gram, where as Sengar et al. [3] have observed a range from 15.28 percent (T-49) to 22.6 percent (PK-1092) while screening several newly evolved varieties of soybean.

Maximum (40.89%) and minimum (25.15%) figures of total carbohydrate recorded in PK-1241 and PS-1092 varieties of soybean were the findings of Sengar et al. [11]. In comparison to these results Wu and Change [11] have reported slightly higher values of total carbohydrates whereas the values recorded by Jain [12] were slightly lower.

**Disease Prevention Role of Soybean:** Last two decade’s health benefits of using soybeans have been widely documented. Benefits of soybeans in the reduction of cholesterol level and menopause symptoms and lowering the risk of several chronic diseases such as cancer, heart disease and osteoporosis have been very well demonstrated globally.

**Cholesterol Level and Heart Diseases:** Several studies conducted in past have shown that soy protein is hypo-cholesterolemic. Low blood cholesterol level condition have been reported, where in soy protein was added to the diet or dietary animal protein was replaced with soy protein [13]. The cholesterol-lowering effect of soy have been attributed to the isoflavones, a class of phytochemical, present in soybeans [14]. In patients having high cholesterol levels, despite consuming a diet low in fat and heart health, soy protein drinks containing naturally occurring high levels of isoflavones, caused reduction in total cholesterol and LDL cholesterol, so called, “bad cholesterol” from health point of view. According to Anderson [15] every 1% reduction in cholesterol values is associated with an approximate 2-3% reduction in the risk of coronary heart diseases. Based on the observations made by several researchers [16-18] it was worked out that intake of 20-50 gms of isolated soy protein resulted in 20-30% reduction in heart diseases. Though the mechanism and component of soy responsible for the lowering of cholesterol have not been fully established but changes in endocrine status such as alteration in insulin to glucagons ratio and thyroid hormone concentrations are held responsible for the same. Kritcherisky and Klurfeld [19] suggested that amino acids composition and ratio such as lysine to orginine and/or lysine to methionine appear to play an important role in lowering the cholesterol level and preventing from heart diseases.

Studies conducted by Pakaenkitvatana et al. [20] showed that adequate intake of soybean oil providing 10.6 percent of total dietary energy as 18:2 n-6 can increase serum 18:2 n-6 level in healthy men with concomitant decrease in serum level. Cholesterol and LDL-Cholesterol levels in the absence or presence of cholesterol intake. Linolenic 18:3 n-3 acid is a precursor to
the longer chain omega-3 fatty acid which is increasingly shown to have hypolipidemic functions.

**Cancer Prevention with Soybean:** Barnes *et al.* [21] demonstrated that diets composed of as little as 5% (wt/wt) soybeans significantly inhabited chemically induced mammary cancer in rats by up to 40 percent. Lee, *et al.* [22] reported that 50% decreased risk of breast cancer was associated with regular soy food consumption in premenopausal women. The antiestrogenic effect of soy isoflavones is attributed to genistein and diadzeis, which are biphenolic compounds that bear structural to steroid hormones and which activates tissues with estrogen receptors. The isoflavones also inhibit enzymes such as tyrosine protein kinases involved in cancer growth shown in studies conducted by Sharma, *et al.* [23], Adlercreutz, *et al.* [24] and Adlercreutz [25].

**Role of Soybean in Preventing Osteoporosis:** A large number of dietary and non-dietary factors affect bone health. Dietary calcium, physical activity, genetics and protein intake are considered to be the major factors influencing the osteoporosis. Soy foods play important role in protecting bone health [26]. The isoflavones daidzen and gene stein, found in significant amounts only in soybean and soyfoods, may directly inhibit bone resorption [27, 28]. A study conducted by Erdman and Potter [29] clearly demonstrated significant increase in mineral content as well as density of the lumbar spine after 6 months consumption of 40 g isolated soy protein per day.

**Other Health Hazards Fighting Effects of Soybean:** Soy-based diets can help to control weight by providing high quality protein in a concentrated form and can be met in specially designed low-calorie/high nutrient, ready to eight meals [30]. It has been discovered by the researchers that antioxidant rich soy can prevent damage caused by free radicals, which are said to be responsible for aging and age-related forms of diseases. D’ Amico *et al.* [31] and Kontesis, [32] Genistein is thought to out against cancer in several ways by interfering with cancer promoting enzymes, by blocking the activity of hormones in the body and even by interfering with the process by which tumors receive nutrients and oxygen [33] have reported that glomerulor filtration rate and renal plasma flow of patients were reduced after replacing animal protein diets with soy based diets. With the shown positive effect on kidney functioning, soy protein diets may find increasing role as a non-pharmacological and non-toxic approach in the treatment of kidney diseases.

**CONCLUSION**

From the nutritional point of view, soybean contributes significantly as a source of supplementary and complementary protein as well as source of energy. Well processed soy protein based foods have a high digestibility value with an excellent profile of amino acids. As the consumers are eagerly looking for the health benefits from a food, not just the food that are less harmful. Given the choice, most consumers would prefer to enhance or improve their diet using food and drink related products rather than using the more traditional pills or capsules. Although it has very well been proved that soybean and their products offer positive nutritional and health benefits, the versatility of this food has still continued to be a source of inspiration for scientists to further expose its economical, functional and nutritional properties. It is therefore, envisaged that the utilization of soybean and their product will increase rapidly in the developing countries goal of “Health for all” is the current 21st Century.

**REFERENCES**


