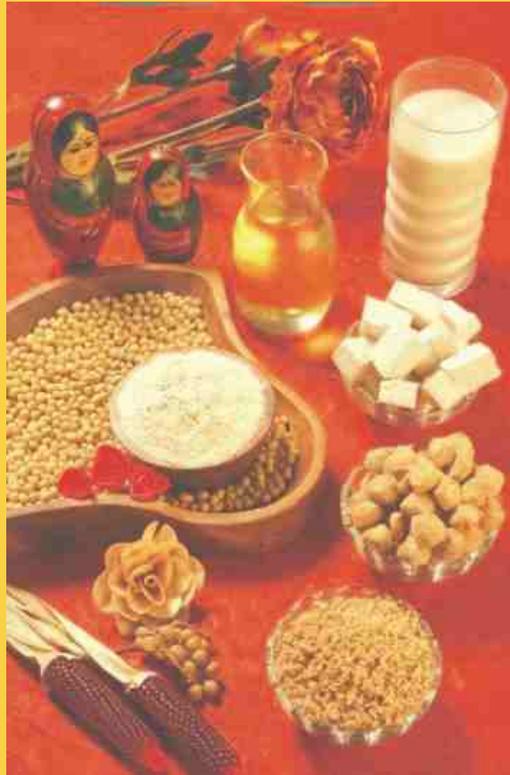


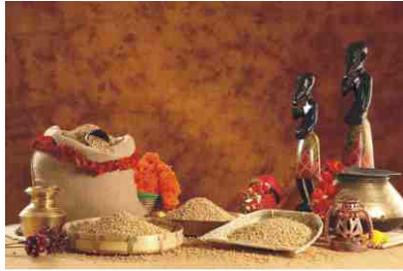
Frequently Asked Questions on Soy Consumption



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Soybean (*Glycine max*) is a leguminous plant. The Chinese have been cultivating and consuming soybeans for over 4000 years. Soy products have been around in India for almost 30 years. But the consumption of these products never took off well in the market till recently.



Indian population is predominantly vegetarian. Our diet is lacking in terms of quantity and quality of protein. Even the majority of non-vegetarians among us do not consume animal products on a daily basis in quantities sufficient to provide the recommended amount of protein.

Soybeans are a rich source of good quality protein and the cost too is low. Soy products can easily meet the protein requirements of a vegetarian diet. Soybean has been perceived more as poultry and cattle feed than as a good source of protein for human consumption by a lot of people. Also the misconception that soybeans are only used in feeding programs conducted by the government for malnourished children has been prevalent. Besides nutritional benefits soybeans provide several therapeutic benefits too.

Soybean is one of the very few plants that provide high quality protein. Soybeans help people feel better and live longer with an enhanced quality of life. Soybeans contain all the three macronutrients required for good nutrition, as well as fiber, vitamins, minerals. Soybean protein provides all the essential amino acids in the amounts needed for human

health. Soybeans have almost 40% protein, making soybeans higher in protein than any other legumes and many animal products. Protein in just 250 grams of soybean is equivalent to protein in 3 liters of milk or 1 kg of mutton or 24 eggs. The quality of soy protein is virtually equivalent in quality to that of milk and egg protein. Unlike many other good sources of protein, soybean not only has higher percentage of oil but also quality fatty acid profile. It has low saturated fat content with high amount of essential fatty acids. Soybean oil is also a good source of omega-3 and 6 fatty acids similar to those found in fish oils and is cholesterol-free. Soybeans are an excellent source of dietary fiber with both soluble and insoluble fiber. Soluble fiber may help lower serum cholesterol and control blood sugar. Insoluble fiber increases stool bulk, may prevent colon cancer and can help relieve symptoms of some digestive disorders. Soybean has more than two times the amount of most of the minerals, especially calcium, iron, phosphorus and zinc, than any other legume and very low sodium content. Soybean has all the important vitamins and is a very good source for B complex vitamins and Vitamin E.

Soybean and Health Benefits

In addition to containing good quality nutrients, soybean has other beneficial compounds such as, phytosterols (isoflavones), lecithins, etc. Soy foods have a number of health benefits such as, cancer prevention, cholesterol reduction, combating osteoporosis and menopause regulation. Human studies suggest that as little as one serving of soy foods each day may be protective against many types of cancers. For the past 30 years, investigators have shown that consumption of soy protein selectively

decreases total and LDL (bad) cholesterol and maintains HDL (good) cholesterol in individuals with elevated blood cholesterol levels. Based on the various research findings, United States Food and Drug Administration has issued a health claim for soy protein in October of 1999. The health claim states “consumption of 25gms of soy protein per day with a diet low in saturated fat may lower the risk of heart diseases”.

Another important aspect of soy protein is combating osteoporosis and relieving menopause symptoms. One factor in bone health is limiting the amount of calcium lost from the body. Although protein especially animal protein contributes to calcium loss, soy protein exhibits less calcium leaching effects. The isoflavones found in soybeans may also directly stop bone deterioration. Recent research has shown that soy foods can relieve most menopausal symptoms, thus reduce risks of cardiovascular disease and osteoporosis. Soybean is considered as a natural alternate for hormone replacement therapy for treating women who are in menopause.

How to Use Soy Daily?

Soy can be used in many ways in our daily life. Regarding use of soybean imagination is the only limitation. Different soy products such as soybeans, soy flour, and soybean oil can be added to variety of traditional foods. Here are some easy tips and ways to consume soybean protein regularly.

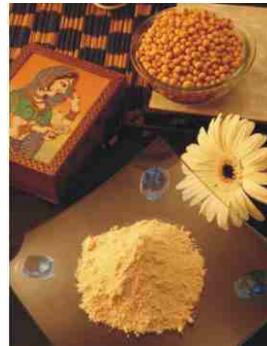
Soybeans: Soybeans as such can be used like lobia. They can also be added up to 20 % in dosas, pesarattu, dahi



bhalla and vadas etc where whole legumes are used. Soak soybeans along with the whole legumes and make the recipe as is usually done. Soybeans can also be added up to 20 % in recipes such as chole, rajma and dal makhani.

Defatted soy flour: This flour has no oil and has 50% protein. This can be added to any preparation made at home out of rice or wheat or chick pea flour to enhance the quality of the finished product. In bakery products defatted soy flour can be added 5-10 % and thereby increasing the protein content and quality.

Wheat-soy flour: This is nothing but addition of 10% defatted soy flour to wheat flour (add 1 kg defatted soy flour to 10 kg wheat flour) to make rotis, chapattis puris etc. Addition of 10% soy flour to wheat flour increases protein in wheat flour from 11 to 16%. Several brands of wheat soy flour mix are already available in the market. If defatted soy flour is not available soybeans (1 kg) also can be added to wheat (10 kg), just roast soybeans in a pan over high flame for ten minutes and add them to wheat and grind into flour.



Besan-soy flour: Add 20 % defatted soy flour to besan and use to make products such as pakora, chilla, kadhi etc. The products made of this mix absorb 10-15 % (based on quality of defatted soy flour) less oil than the products made out of just besan. Protein content and quality of course is enhanced.

Nuggets and Granules (Soy Bari): Nuggets and granules are made of 100% defatted soy flour which has more than 50% protein and less than one percent fat. Nuggets and granules are healthy alternate to meat and can be used easily in Indian cuisine.



Soymilk: Soymilk is extracted from soybeans using modern technology and can be made to taste great while containing all the nutrition of soybean.



Although it does not taste like dairy milk it is tasty in its own right. Soymilk can be handled and used much in the same way as dairy milk. Besides being rich in protein, vitamins and minerals, soymilk is lactose free, cholesterol free

and low in saturated fat. Soymilk can be made into hot and cold beverages like coffee, tea, fruit shakes, yogurt, ice cream, or can be used as such.

Soy Paneer (Tofu): Tofu is the most popular among all the soymilk products. Tofu is made by coagulating hot soymilk and removing the whey. Tofu is a versatile food and can be converted into a variety of value added products. Tofu easily takes the flavor of the product with which it is cooked. Tofu is a highly perishable product just like dairy products. It should be kept immersed in water under proper refrigeration, water

should be changed often and in this manner it can be kept for almost seven days.

Soy Papad: Papad is another potential fortification opportunity for soybean in Indian traditional food products. Soy flour can be blended up to 30-40 per cent in black gram (urad dal) for manufacture of soy-fortified papad. Fortification of urad flour with soy flour at 30% will increase protein from 21% to 30%.

Soy Nuts: Soy nuts are whole soybeans that have been soaked in water and then baked until browned. Most conventional nuts are incredibly high in fat but soy nuts have less fat and more protein compared to conventional nuts. Soy nuts are similar in texture and flavor to peanuts and far less expensive than peanuts. Soy nuts have 50% more protein and 50% less fat than peanuts. Regular consumption of soy products such as soy nuts reduce incidence of various chronic diseases especially heart diseases and cancer.



Soybean Oil: Soybean oil is a natural extract from whole soybeans. Odorless and flavorless, this clear oil is excellent for stir-frying as it brings out the flavor of foods. Due to its versatility, soybean oil is used in a variety of processed foods such as margarine, spreads, mayonnaise and salad oil. Soybean oil has a high smoking point, facilitating the cooking process. Soybean oil is considered heart-healthy oil as it is cholesterol-free and low in saturated fatty acids; it contains 61% poly-unsaturated fatty acids. Two fat components

essential for health and well being, linoleic and linolenic acids, are also found in the right proportions in soybean oil. It is also a good source of vitamin E. Like fish oils, soybean oil contains omega-3, known to be protective against heart disease and cancer.

In the market several other products are available such as noodles, biscuits, bread etc to which soy has been added. Therefore read the labels before you buy a product and make sure you include soy in your daily diet!

Soy Protein

How good is soy protein?

Soy protein is the only plant protein that is equivalent to animal protein. Soy protein contains all the nine essential amino acids. The U.S. Department of Agriculture evaluates protein quality using the Protein Digestibility Corrected Amino Acids Score (PDCAAS). PDCAAS measures the amino acid pattern of proteins and factors in digestibility. Soy protein has a PDCAAS score of 1.0, equivalent to animal protein such as casein (milk protein). Animal proteins are considered to be better in quality compared to plant proteins.

Is soy protein an allergen?

Soy protein can cause allergy like any other food proteins such as milk, eggs, peanuts, tree nuts, fish, shellfish, and wheat. An individual could be allergic to any food, such as fruits, vegetables, and meats. If one is allergic to any food then it is often suggested to read the labels on food products and avoid products that contain the specific food that causes allergic reaction.

What is trypsin inhibitor?

Trypsin inhibitor is a protease inhibitor that affects the digestion of protein. Soybean contains trypsin inhibitor but cooking or processing inactivates it. All the soy foods except soybeans available in the market are processed at high temperatures and the amount of active trypsin inhibitor in them is negligible. Only while consuming soybeans one has to remember to cook them to inactivate trypsin inhibitor.

Is soy protein better than animal protein?

Soy protein and animal protein are both good as far as protein quality is concerned. But when one takes animal foods along with the protein it is more than likely the foods contain good amount of saturated fat and that is not good from health point of view. If white meat is taken then it is quite a good option.

How much soy protein is present in isolated soy protein, soy protein concentrate and soy flour?

On a dry weight basis, isolated soy protein is 90% protein, soy protein concentrate is 65-70% protein and soy flour is 50% protein.

Are there any side effects of consuming soy protein?

There are no side effects of consuming soy protein. Soy is one of the oldest foods known to human kind, and has been a staple of the Asian diet for centuries.

Does cooking reduce soy protein digestibility?

Soy protein digestibility is not affected by heating or cooking and neither its quality affected. Cooking and processing actually increases soy protein digestibility.

Soybeans

Are soybeans and soy products difficult to digest?

Soybeans and soy products are not difficult to digest. If a person who is not used to eating soybeans or soy products and suddenly starts including a lot of soy in the diet the person may experience a discomfort like fullness, flatulence etc. This is because soybeans and some soy products are high protein and high fiber products. Oligosaccharides present in soybeans or any other legume do cause flatulence. Everything eaten soy or otherwise should be in moderation and anything in excess will cause discomfort.

Do soybeans cause digestive problems like stomach pain?

Some people not used to high protein and high fiber foods may have digestion problem but that is true for any food that has a lot of roughage and protein it may be soy or something else. This is not true for everyone but it is possible in some cases. Also if such a problem exists then instead of soybeans one can use soy products like granules and chunks, tofu and soymilk. These are processed foods that are easily digestible. Also high protein food amount in the diet can be slowly increased so that those few people who have problem can get used to the products.

Can we use a year old soybeans?

Nutritionally a year or more old soybeans are also as good. For high quality processed foods it is better to use fresh produce.

How much soybeans can be added to wheat flour and how should they be added?

About 10 % soybeans can be added to wheat. But

soybeans should first be roasted in a pan for 10 minutes on high flame and then added to wheat and ground to inactivate trypsin inhibitor. The roasting makes the whole protein in soybeans digestible. Since we cook roti only for a minute it is not enough to make the trypsin inhibitor in soy inactive.

Adding soybeans means 20 % fat too, so the shelf life of wheat flour reduces. It is better to add defatted soy flour because it is heat treated and the trypsin inhibitor is already inactivated. And since there is no fat there is no question of rancidity or reduced shelf life.

Soy Isoflavones

What are isoflavones?

Isoflavones are a form of phytoestrogens that have a chemical structure very similar to estrogen hormone. Soy is uniquely rich in isoflavones, primarily genistein and daidzein. These isoflavones in soy foods are thought to be responsible for many of the protective effects that soy has shown in animal and in vitro studies.

Is there a recommended daily isoflavone intake?

At present there is not enough information available to give a specific recommendation. The US FDA has approved a health claim stating that "25 grams of soy protein may help reduce the risk of heart disease." Twenty-five grams of soy protein contains approximately 50 milligrams of isoflavones. The isoflavone content of soy foods is available on the SANA soy food fact sheets or visit the isoflavone database on the USDA web site.

Is there a difference between full fat and defatted soy flour in the content of isoflavones?

Isoflavones are attached to protein, 1-1.5 mg of isoflavones per gram of protein. Since defatted soy flour contains 50 % protein compared to 40 % protein in full fat soy flour, defatted soy flour contains more isoflavones.

Does heating (cooking and processing) destroy soy isoflavones?

Processing and cooking does not affect isoflavones in soy foods.

Soymilk and tofu

Can soymilk replace regular dairy milk for children?

Compared to dairy milk soymilk has considerably less calcium. Therefore soymilk can only be a supplement or a beverage but should not be used to replace dairy milk. Of course for lactose intolerant people, those who cannot take dairy milk, soymilk is the best alternative to dairy milk.

What is okara and how can it be used?

Okara is the residue left over after extracting soymilk from soybeans. It is rich in protein, isoflavones and fiber. Okara can be added to bakery products or traditional foods. Okara has very low shelf life, approximately 5-6 hours. If stored in cold it can be kept for about 2 days.

Can you make tea and coffee with soymilk?

You can make tea and coffee with soymilk. Coffee tastes exactly the same as the one made with dairy milk, tea tastes a bit different. May be because coffee is stronger and masks the soymilk flavour.

Can we make cheese from soymilk?

Cheese can be made from soymilk but in India its not yet made or available in the market.

Can you set curd with soymilk?

We can set curd with soymilk just like dairy milk but the starter has to be from the dairy curd. If you are setting curd with one cup of soymilk along with starter add half tsp of sugar and a pinch of salt too.

What is the shelf life of soymilk and tofu?

The shelf life of soymilk is like that of dairy milk. Once the carton is opened it will stay fresh for three days if kept in the refrigerator. The shelf like of tofu, if kept in the refrigerator immersed in a bowl of water, changing the water daily it will stay fresh for a week. If vacuum packed it can be kept in the refrigerator for 3 to 4 weeks.

How do we use tofu?

Tofu is a very easily digestible zero cholesterol product. It can be used in Indian cuisine very easily. Every recipe in which paneer is used can be made with tofu instead of paneer. In recipes like paneer parantha, palak paneer, shahi paneer, paneer pakoda etc replace paneer with tofu and prepare the recipe just the same. The prepared recipe looks and tasted almost exactly as the recipe made with paneer. There is no need to look for new recipes to include tofu.

But tofu does not look like paneer?

Of course tofu does not look and taste exactly like paneer because it is not paneer! Tofu is a healthy product without cholesterol and lactose, it is easily digestible, good

source of good quality protein, and it also has isoflavones therefore protective against many diseases. That is the reason it should be include in the diet. Paneer recipes are suggested because these recipes can be made with a product like tofu.

Soy flour

What is defatted soy flour? And how to use it?

After extracting oil from soybeans the flour made out of the residue meal is defatted soy flour. It contains 50 % protein. Soy flour can be incorporated in wheat flour which can be used to make rotis and also bakery products. Soy flour can also be included in besan (chick pea flour) and used to make traditional Indian recipes. Soy flour can be used to enhance protein content and quality and also for functional benefits.

How much defatted soy flour to add to wheat flour?

About 10 % defatted soy flour can be added to wheat flour to make rotis. If one is health conscious and wants to add more it can be done, but 10 % is the ideal quantity that does not change the taste or appearance of the rotis.

Why should we not add full fat soy flour to wheat flour?

Full fat soy flour can be added to wheat flour but since it contains almost 18 % fat because of which the flour gets rancid. Therefore shelf life of the wheat flour is reduces. Unless the wheat flour in which full fat soy flour has been added is used soon it gets rancid. Hence it is easier to use defatted soy flour than full fat soy flour.

How much defatted soy flour is to be added to besan (chick pea flour)?

About 20 % defatted soy flour can be mixed with besan. Recipes usually made out of besan such as kadhi, pakoda, besan laddu, muruku etc can be made with this mix too and they taste the same and look the same. At the same time the protein quantity and quality is increased and oil absorption while frying is also reduced by about 10-15 %.

What are the uses of soy flour in bakery?

Soy flour reduces the raw material cost in bakery. If soy flour is used in bakery products the amount of expensive raw materials like eggs, skim milk powder etc, needed can be cut down. This not only makes bakery products more economical but also more nutritious.

Granules and Nuggets (Chunks)

Can granules and chunks be used without soaking?

Based on the recipe in which they are being used granules or nuggets can be used as it is or after soaking.

What is the difference between branded (packed) and unbranded (loose and sold from gunny bags) nuggets (chunks)?

There is no difference between the two as far as nutritive value is concerned. Hygiene wise speaking yes there may be a difference because the unbranded ones are kept loose in gunny bags and if they are kept in a place where moisture can be absorbed then shelf life may be reduced. And also the chunks from branded source may be of uniform size and the texture after cooking better.

Do we lose nutrients by washing granules and nuggets and throwing away the water in which they are soaked?

The protein or any other nutrient in granules and chunks is not lost on washing them or by throwing away the water in which they are soaked.

Miscellaneous

Is it harmful to eat raw soybeans?

One cannot eat soybeans raw just like any other legume or grain but even if one does manage to then the whole protein is not digestible. One of the main reasons to include soybeans in the diet is its protein. Therefore the protein not being completely digestible is not acceptable. That is the reason why so much emphasis is placed on cooking or processing soybeans not because of any other reason.

Do soy foods have any effect on thyroid function?

There is no evidence that soy foods have an adverse effect on thyroid function in healthy humans who consume adequate amounts of iodine. Goiters are due to a deficiency of dietary iodine, not consumption of moderate amounts of soy foods as part of a healthy diet.

Can women take soy foods while on hormone replacement therapy (HRT)?

Soy foods can be taken even while the women are on HRT. Isoflavones in soy foods have a very weak estrogen activity and do not affect in any way women who are on HRT. In fact soy isoflavones have specific protective role to play in different tissues.

What is the role of soy in kidney problem patients?

If there is a specific ailment it is always better to consult a doctor or dietician. Usually in people with kidney problems the amount of protein taken in diet is reduced. Since soy products have high protein content this point has to be taken into consideration while planning diets for these patients. After saying that, several studies show that compared to animal protein plant proteins are much easier on the kidney. Therefore within the restrictions soy protein can be included in the diet of these patients.

Does eating soy foods cause infertility in men?

There is no research or scientific evidence that says anything of the sort. People in China and in South East Asia have been consuming soy for hundreds of years and epidemiological studies also do not come up with any result that show soy consumption leads to infertility in men.

How much soy food should one consume?

The US FDA approved health claim for soy protein says "25 grams of soy protein a day as part of a diet low in saturated fat and cholesterol may reduce the risk of heart disease." Based on the protein content of the soy food products which are to be included in the diet plan to get 25 grams protein from the products. That should also provide 30-50 mg of isoflavones too.

Giving children soy can cause them to experience puberty and early periods. Is it true?

There is no evidence from research work that consumption of soy products bring on early puberty in children. It has been observed that age of puberty has come

down in children in general compared to a few decades ago. This has been true even in populations not consuming soy regularly.

What is glycemic index (GI) and what is soy GI?

The glycemic index (GI) is a numerical system of measuring how much of a rise in circulating blood sugar a carbohydrate triggers the higher the number, the greater the blood sugar response. A low GI food will cause a small rise, while a high GI food will trigger a dramatic spike. A GI is 70 or more is high, a GI of 56 to 69 inclusive is medium, and a GI of 55 or less is low.

Soybeans GI is 18-25 and it does come under the list of low GI foods, therefore good for diabetics. Its GI is lower than most legumes.

What is the relationship between gout and soybeans?

Gout is a form of arthritis. It results from excessive uric acid in the blood stream which leaves needle like crystal deposits in the joints causing redness, swelling and extreme pain. High purine foods such as organ meat, beer, sardines have to be avoided and legumes that have moderate amount of purines have to be restricted. Soybeans also come under the medium purine content foods and hence has to be taken in moderation. Tofu has less amount of purine and can be consumed by gout patients.

Can we give soymilk to infants below one year?

Breast milk is the best food for babies. After saying that for lactose intolerant babies doctors usually prescribe soy protein based formulae. Soymilk does not provide all the nutrients in required amounts but infant soy based formulae

available in the market are fortified with all the required nutrients. For premature babies consult the doctor.

Does soybeans have anti-nutrients which affect mineral absorption?

Like many other foods soy has some anti-nutrients like phytates which do affect the mineral absorption. But cooking in acidic medium like adding tomatoes or if you take enough ascorbic acid (vitamin C) reduces this effect and improves mineral absorption.

How much soy can be added in a weaning mix?

Commercial weaning preparations contain about 20-30 % soy protein isolate. The recipe varies depending on the maker. Soy protein isolate is the best for use in weaning mixes compared to flour. If at all flour has to be used then defatted soy flour is better than full fat flour because fat may cause rancidity and the shelf life is reduced.

These are a few questions we have compiled. If you have any more questions please contact us at sitapu@asaasc.com and rkavithareddy2000@yahoo.com. We will greatly appreciate it as our aim is to try to answer any question that arises in the minds of people who want to use soy products.

Thank you

Kavitha Reddy