

PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

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SOYA, A POWER PACKED BEAN

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WEBINAR ON RETROSPECTION ON THE NUTRA REGULATION:

FREQUENT CHANGES & STRESS OF COPING WITH COMPLIANCE
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EDITORIAL

Indians love their sweets and mithais. Laddoo, pedha, burfi, gulab jamun, rasgolla, jalebi, Mysore pak and gajar halwa are some of the very popular among all ages and among entire population.

Indians are experiencing some new ones like donuts and not so new ones like cookies, cakes and pastries and chocolates. Young are very keen to try many of these as new variants have appeared in market. There is an explosion of confectionery products. So both traditional and western confections are being consumed by Indians.

There has been standing caution to Indians to control their sugar intake as they are prone to diabetes much more than others. The health professionals are also worried that these calorie-dense products are low in nutrients so they would reduce the consumption of regular healthier foods such as rice, bread or rotis, fruits and vegetables which would have a negative effective on health.

There needs to be some difference which must be appreciated before making sweeping assumptions. Firstly, Indians do not consume sweets as western population does in frequency and amounts. Secondly, the traditional Indian sweets are mostly based on ingredients having higher protein and dietary fibre contents as they are prepared using dairy and/or pulse ingredients in addition to grains.

Even the ones based on fruits and vegetables contain mango, amla, guava, fig, carrot, etc. have nutrients that may offset the negatives. Although some people may consume these regularly in

sizeable quantities, majority consume them on special occasions like festivals, celebrations and some special times so their consumptions are fairly low.

In the US, the FDA discourages the confectionery of calorie-dense foods from being fortified. They feel that such snack foods are not naturally nutrient-dense and fortification would mislead consumers to believe that naturally healthy foods could be substituted with fortified snack foods without any health consequences. It even thinks it inappropriate to fortify unsweetened carbonated beverages and low-calorie & calorie-free snacks.

Such an extreme view should not be taken by our food regulator. These sweets and mithais are going to be consumed whether there are any cautions given. If such foods become vehicle to provide much-needed micronutrients, it would be a blessing in disguise.

Of course, we must ensure that adding only insignificant amounts of nutrients and claiming these sweets to be healthy and people can consume without any guilt as much as they feel should be strictly prohibited. In fact there are regulations now when any such claims are made labels must show much of daily values of vitamins or minerals are provided when fortified.

Further, we must also educate consumers about the benefits of fortification and encourage them to read the labels. This would go a long way in eradicating the deficiency.

Prof Jagadish Pai,
Executive Director, PFNDAI

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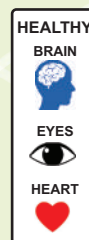
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FOOD FOR THOUGHT OR THOUGHT FOR FOOD



AUTHOR

Dr B Sesikaran,
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Government of India proposed to the United Nations to declare 2023 as International Year of Millets. The proposal was supported by 72 countries and UNGA made the declaration.

Millets were cultivated in Asia more than 5000 years back, while rice cultivation was about 8000 years old. What made the civilization cultivate millets? We may assume that it was probably due to adverse climate events at that time. China claims that millets were cultivated 10,000 years back (Lu et al PNAS 2009). Millets were the staples in east Asia and India and even in parts of Europe until rice and wheat became popular. Millets include Finger millet or Ragi, Sorghum or Jowar, Pearl millet or Bajra, Kodo millet (Kodon or Varagu), Little millet or kutki, Proso Millet, Foxtail millet or kangini etc.

Historically they were used as staples in several parts of India until rice and wheat became popular. Until green revolution, rice and wheat were staples for the affluent or those who could afford them. There were times when millets were given as wages to workers until PDS became a source of food grains for the masses. They were also called as coarse grains while rice and wheat were called fine grains. Governments also offered minimum support prices for the fine grains, which encouraged farmers to go for those crops than millets. There were storage issues and lower shelf life once millets were

dehusked, unlike rice or wheat flour. Despite the commercial disadvantage, several parts of rural India stayed with their traditional food habits, which included millets as staples.

Now the clock has turned a full circle and has brought millets back to its rightful place. With the looming threat of climate disasters, extreme drought, floods and low water availability, higher ambient temperatures, pestilence etc. millets are the preferred crops for the future. There is also a parallel health need. They are nutritious, rich in iron, calcium, protein, and Polyphenols and Gluten free. They have higher fibre content and thus lower glycemic index and lesser glycemic loads. Slower digestibility with earlier satiety, unlike rice and wheat. We now have the grain of the new millennium, a saviour of the planet and our lives - lets go for it.





RELISH SUPER
CREAMY OATS



LONG LASTING
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GRAINS SO SOFT,
THEY BLEND EASILY
IN YOUR RECIPES

REGULATORY VIEWPOINT

AUTHOR

Dr Joseph I Lewis,
Chairman, Regulatory Affairs,
PFNDAI



Does it matter that businesses must comply with regulations not meeting their objectives, in addition to new ones? Is "in consumer interest" sufficient reason to launch another regulation? Does the policy design, if there is one, suggest unrestrained introduction of new regulations and expanding old ones?

To begin with every existing regulation is a cost. A new one, adds to total cost. Every testing parameter in a standard whether significant or not, is an analytical cost, borne in perpetuity. Every standard not meeting its outcome is wasteful expenditure. Every failure not directly impacting consumer health or product quality pursued to prosecution attracts avoidable legal costs. These costs are largely borne by industry and in some measure by government. Both engage in wasteful time, money and resources.

In addition, there are business costs. When an earlier

regulation states "mere combinations of vitamin and minerals formulated in tablets, capsules shall not be covered ... in these regulations, except when combined with a food or in a food format", products had to be withdrawn from the market. At considerable cost. Five years later, the same regulation is reversed stating "mere combinations of vitamins and minerals.... shall be covered in these regulations. Poor regulatory quality is a cost of doing business. Another cost is lost market opportunities when incomprehensible regulations restrict safe innovations or use of a new ingredient or altogether constraining product development. This stifles economic growth.

A cue on what the UK government has done deserves serious and urgent consideration. The One-in, Two-out rule introduced in 2013 ensures that new regulations are introduced only if absolutely necessary. Aptly named the Red Tape Challenge, the One-in, Two-out rule seeks to prevent creating new regulations associated with compliance costs.

Administrations have to remove or modify existing regulation(s) to the value of £2 of savings for every pound of cost imposed. Within a year of its implementation the proportion of businesses that see regulation as an obstacle and burdensome dropped. The US follows the same principle that any incremental costs associated with new regulations to the extent permitted by law, should be offset by costs associated with at least two prior regulations.

These countries share the same framework of FSSA 2006 that establishes a reliable mechanism to balance trade and consumer health. So does Codex. This alone should convince government and policymakers that the "one in, two out rule" is feasible and on sound footing. Otherwise, there is nothing to induce drafters to ask the question, "why this regulation". Consumer interest is not a valid answer.

Neither is standardization. Punitive measures for the whole of industry instead of the few recalcitrant and repeat offenders is what standards do. Reliable data suggests 85-88% of market samples are in compliance. A functioning SME system would reveal that merely 12-15% failures require appropriate measures. And not all would require standards. The promise of minimum government, maximum governance should commence by asking the question "why this standard" followed with "these two are out" before "this one is in".

Rules
Regulation

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IMPORTANCE OF PROTEINS AND HEALTH BENEFITS OF PLANT PROTEINS

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Protein is an important macronutrient that is required in all stages of life of an individual. Our country has overcome

protein deficiency to some extent but at the same time there is a common opinion that animal proteins are superior to plant proteins. With environmental issues such as global warming, agricultural activity leading to greenhouse effects it would be prudent to weigh the pros and cons of both plant and animal sources of proteins and wisely decide on an environmentally friendly as well as highly nutritious option.

Let's take a look at the different Protein Sources:

Animal Sources of Protein

Milk, Yoghurt /
Curd, Cheese
Eggs
Poultry
Beef (Red)
Goat and Lamb
(Red)
Pork (Red)
Fish and other
sea food

Plant sources of protein

Whole grains
Legumes
Lentils/dhals
Seeds
(sunflower,
flax seeds)
Nuts
Vegetables
and other
plant sources

Neither Plant nor Animal

Algae - Red,
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#Creative Visualisation.

*Refers to outcome of a clinical study published in Ind. J. Nutr. Dietet; (2008). Refer pack for more details. Growth and cognitive development are influenced by genetic, nutrition and environmental factors. Complan to be taken as a part of daily balanced diet.

pregnancy, lactation will call for higher protein requirement.

It has been noticed that when animal protein is consumed PER ranges from 3.1 to 3.7 (i.e., 1 gm of protein increases

body weight by 3gms)

And on consumption of plant protein PER ranges from 1.2 to 2.4 (i.e., 1 gm of protein increases body weight by 2gms)

To avoid using animals for testing an alternate method using PDCAAS (Protein Digestibility Corrected Amino Acid Score) is used to derive PER values using a simple conversion as follows: $PER = PDCAAS \times 2.5$ (as given by Health Canada, 2020)

It can be observed that plant proteins contribute to a lower PER value which can be attributed to the following reasons:

- Plant proteins may lack certain Essential Amino Acids (those amino acids that cannot be synthesized by the body and have to be supplied in the diet)
- Plant proteins have lower digestibility as the protein is enmeshed with fibre and other plant components, and anti-nutrients, resulting in lower bioavailability of amino acids.

In this context it is worthwhile understanding the classification of amino acids given by Institute of Medicine

of the National Academies Washington DC. They have classified amino acids into three groups

Indispensable Amino acids-

Those amino acids which are required by the body but the body is unable to make them, so food sources help in providing these amino acids. Histidine, Isoleucine, Leucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan, Valine are the amino acids under this group.

Dispensable Amino Acids-

Body requires these amino acids but not to a large extent and can be synthesized within the body from other amino acids. Alanine, Aspartic acid, Arginine, Glutamic acid, and Serine belong to this group.

Conditionally Indispensable Amino Acid-

Body requires these amino acids under special conditions like pregnancy, lactation or certain illness when the demand for the amino acids increases. Arginine, Cysteine, Glutamine, Glycine, Proline, Tyrosine come under this classification. (Inst of Medicine 2005)

Plant Protein sources can have lower levels of some of these amino acids despite having a good PDCAAS value which can be clearly seen in the following table: (FAO 1991)

Red meat and shrimps have saturated fats and cholesterol respectively which is a negative quality in animal protein sources.

Plant sources are good sources of proteins and is good for vegans too. Algal and seaweed sources of proteins could be best among the three sources as they contain all the amino acids and high protein content.

According to ICMR - NIN RDA published in 2020, PE (Protein efficiency) ratio requirement ranges between 5-15 across all age groups. PE ratio is based on the weight gain of a test subject (normally rats) divided by its intake of a particular food protein during the test period. In humans it depends on the age and physiological condition of the individual.

PE can be expressed as follows when rats are taken as test subjects:

$PE = \frac{\text{Weight gain of weanling rat}}{\text{Weight of protein consumed}}$

The broad range given by ICMR is justified by the fact that high quality protein can be consumed in lower amounts and vice versa, in addition certain health conditions like

Protein Source	PDCAAS (FAO)	Limiting Amino acid/s
Milk	1.0	None
Whey	1.0	Histidine
Soy	0.9	SAA (Meth, Cysteine)
Pea	0.83	SAA, Tryp
Quinoa	0.78	Leu, Lys, Thr,Val

As per this table, milk has a good PDCAAS value and has all amino acids in required levels, whey though has the same PDCAAS value as milk but lower levels of histidine. Similarly, other plant protein sources have good PDCAAS values but have low levels of Sulphur containing amino acids and some essential amino acids.

Though studies show there are some limiting amino acids, plant sources are rich in conditionally indispensable amino acids like Arginine and Glycine which can be understood from the following graph:

It can be concluded that plant proteins are in some way superior even if they are incomplete as they have the indispensable amino acids required by the body.

There are different ways by which Essential Amino Acid intake can be improved by consuming predominantly plant proteins sources:

- By increasing the quantity of protein consumed to compensate for lower digestibility
- By consuming plant protein isolates or concentrates which can provide 20gms per serve and also are more digestible.
- By consuming plant protein from different sources, a combination of roti/rice and dhal balances both lysine (that is absent in rice /roti) and methionine (that is absent in dhal). Plant proteins are higher in conditionally indispensable amino acids such

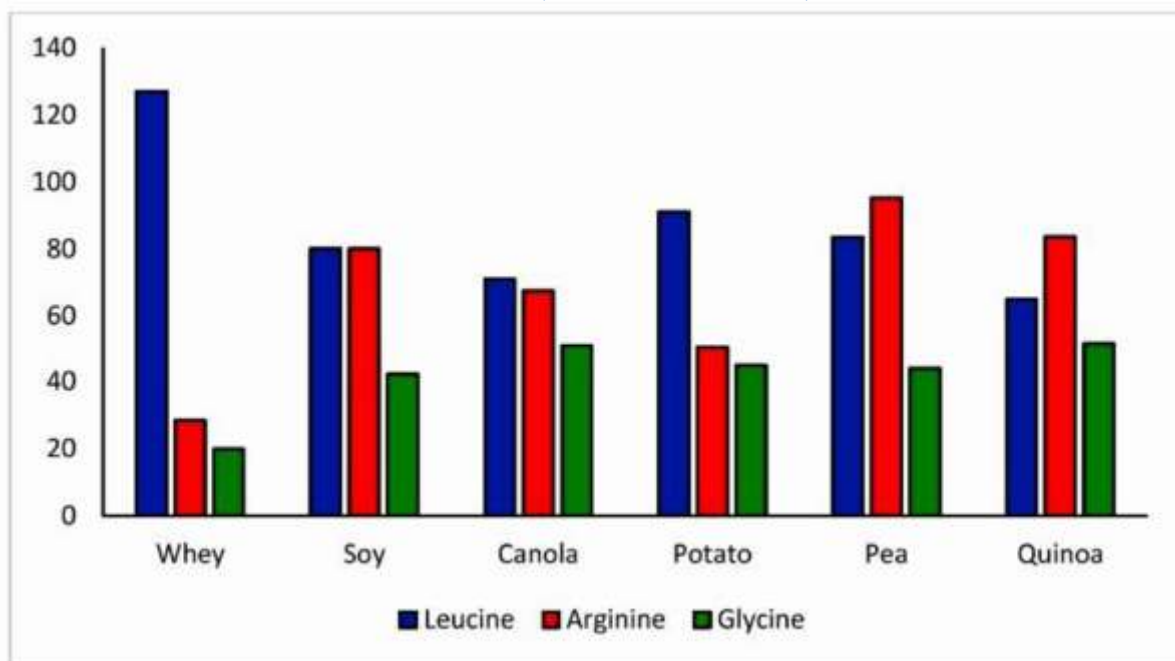


as Arginine and Glutamine.

SOY PROTEIN A VEGETARIAN'S BOON?

Soy Protein is one of the best vegetarian protein sources as it provides all nine essential amino acids, 100gms of raw soy beans provides around 37gms of protein and also records a high digestibility.

Fig: Some proteins though incomplete are rich in conditionally indispensable amino acids (Hertzler et al. 2020)





PDCAAS of Soy protein is almost equal to that of milk (around 1.0) and higher than other vegetarian sources like pea, potato, legumes. Soy protein has a high score of Digestible Indispensable Amino Acid Score (DIAAS) of 0.92, hence it is a highly valued plant protein source.

An Indonesian study on children allergic to cow milk being fed soy milk concluded that their pattern of growth was on par with infants fed with cow milk and no allergic symptoms and intolerance was shown towards soy milk. So, soy protein can easily replace animal protein sources for vegetarians and vegans.

Effect of food produce on Environment

Food production leads to production of greenhouse gases namely carbon dioxide, methane, nitrous oxide, fluorinated gases and according to Emissions Database of Global Atmospheric research (EDGAR) these emissions are highest while rearing lamb, goat and beef, intermediate during production of milk, cheese, pork and poultry and lowest while producing eggs, nuts, rice, lentils and millets. In addition, 6 kg of plant protein is required to produce 1 kg animal protein. Food related emissions make up for 34% of

total greenhouse gases (around 35% of this comes from livestock and rice cultivation)

Disadvantages of Animal Protein

Consumption of animal protein leads to higher risk of

- Heart diseases due to saturated fat content in red meat
- Type 2 diabetes though not directly related but maybe due to obesity related to saturated fat consumption
- Strokes
- Developing certain types of cancer due to saturated fats in red meat
- Ethical consideration as it involves sacrificing animals

Poultry (lean meat) and fish (contains omega 3 fatty acids) are exceptions to these disadvantages

Advantages of Plant Protein

- Relatively less expensive
- Lower emission of greenhouse gases thereby it is sustainable
- A balanced diet that includes plant proteins can lower risk of non-communicable diseases like heart attack, cancer.
- Plants contain phytonutrients like soy isoflavones and carotenoids which are beneficial to health
- Beneficial for chronic kidney disease patient as they are put on a diet that avoids animal protein, so plant protein comes to their rescue as it is not as damaging to the kidneys as animal protein.
- Studies are on to see a direct effect of plant protein in reducing the risk of Type 2 Diabetes mellitus.
- Longevity and mortality reduction can be attained by

consuming plant proteins

It should be noted that health benefits of plant protein are for the whole plant as food and not for isolated proteins.

How does plant protein contribute to Muscle Protein Synthesis (MPS)?

For proper muscle development around 20-40gms of protein intake is needed at least twice a day of which the muscle building protein Leucine must equal 2-4gms and best results have been obtained by a combination of whey and plant proteins. Following studies have been conducted that show how plant protein can replace whey protein:

- Higher levels of Plant protein (>40G/day) needed to increase Leucine to match with Whey for better muscle protein synthesis (Hertzler et al 2020)
- Rice or pea protein at 50 to 75 g/day had same muscle mass increase as whey protein with resistance training (Kalman et al. 2018; Babault, et al. 2015)
- PER determinations in rats with 30:70 animal protein: plant protein, resulted in equivalent or greater PER scores than did the animal protein at 100% (Hernandez 1996).
- Two studies of a protein blend (20 g) containing 25% whey protein isolate, 25% soy protein isolate, and 50% sodium caseinate can promote MPS to a level equivalent to whey protein alone (Reidy, et al. 2014; Reidy, et al. 2013)



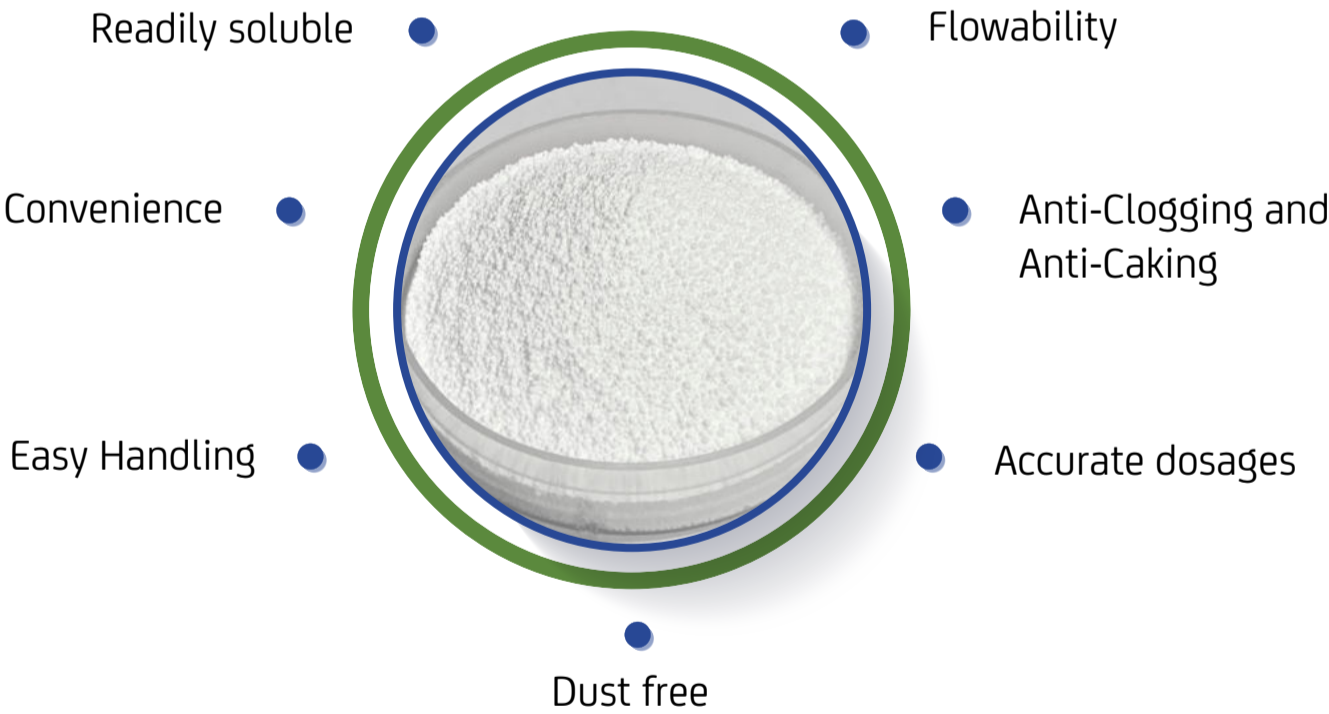
Calcium Propionate (CP) is the calcium salt of propionic acid. It is widely used as a mold/fungal inhibitor to extend the shelf life of food products like breads, other baked goods, and value-added dairy products.

Fine Organics has introduced Calcium Propionate in Granular form. The user can get certain advantages based on applications when compared to CP powder.

Why granules are better?

- Granules prevent dusting thereby reduce time spent on cleaning.
 - Granules dissolve faster in water and are more reliable in the dough mixing bowl because they hydrate faster.
 - Their porous surface area makes water penetration easier.
- Granules flow better through the canister / dropper as there is more air space between the particles allowing them to rub against each other.
 - Granules do not clog. It reduces operational issues and more frequent callouts to sites.
 - Bulk density of granular is higher compared to powder form, hence it requires less space for storage & transportation.

Advantages of CP Granular



- Major applications:
- Breads, Tortillas, Flat Breads, etc
 - Paneer/ Cottage cheese
 - Yeast leavened products
 - Buns & Doughnuts

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Potential Negative effects of Plant proteins

- ❖ Certain antinutrients in plants (e.g., lectins and some saponins), can cause adverse effects- e.g. leaky gut and autoimmune effects
- ❖ Protein maldigestion can occur due to trypsin and protease inhibitors
- ❖ Carbohydrate maldigestion can happen due to alpha-amylase inhibitors, mineral malabsorption can happen due to phytates, tannins, and oxalates
- ❖ Interference with thyroid iodine uptake (goitrogens), gut dysfunction, inflammation is possible
- ❖ Behavioural effects due to conversion of cereal gliadins to exorphins.

All these negative effects can be eliminated by proper processing of the food, so it is practical to cook the plant protein source and reap its benefits.

Allergenicity of proteins

All proteins both animal and plant can have allergenic epitopes. Allergens are thermal resistant and may not be eliminated by processing. So it would be wise to maintain Allergen databases and warning labels should be made mandatory.

In case of known allergies, protein can be replaced by protein hydrolysates which are

known to be less allergenic.

So it can be seen that plant protein matches up to the animal

proteins enabling people who consume only plant proteins to lead a healthy life. Also considering the environmental aspects and sustainability it would be prudent for all to shift from animal proteins to plant proteins or partially replace animal proteins

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MILLETS – MIRACLE CROPS:

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They grow in very adverse conditions of climate like low water and high temperatures, without need of fertilisers. They contain all the macronutrients and micronutrients required by us. Millets are really “Miracle crops”.

They are traditional grains mostly grown in Indian sub-continent with the history of five thousand years. In this period, they have undergone many ups and downs. They were consumed as a staple diet for hundreds of years. Hand rolled flat bread from Jowar has been very common as a part of diet in Western India. Post-independence after Green Revolution, Wheat and Rice started growing in abundance resulting people switching over from Millets. Also, initially in Food for Work programs by Government, Millets were given freely. This made their image as poor man’s food. Research institutes like Indian Institute of Millet Research (IIMR) has done commendable work on all the aspects of these less consumed cereals.

They are classified as major, minor and pseudo-Millets. Sorghum (Jowar), Pearl Millet (Bajra), Finger Millet (Ragi) are major Millets. Minor millets consist of Foxtail Millet (Kannagani), Proso Millet (Chenna), Kodo Millet (Kodon), Barnyard Millet (Sanwa), Little Millet (Kutki). Whereas Buck-

Wheat and Amaranth (Rajgeera) are pseudo-Millets.

Millets have 7-12% proteins, 2-5% fat, 65-75% carbohydrates and 15-20% dietary fibre and are rich in micronutrients like vitamins and minerals. Dietary fibre in Millets helps reduce risk of inflammatory bowel disease. They are gluten free, non-allergenic. They reduce tri glycerides and C reactive proteins helping prevent cardiovascular diseases. They have antioxidant activities

because of many compounds like phytates, polyphenols, tannins, phytosterols etc. Because of all these nutritional benefits they are also called as “Nutri Cereals”. As mentioned earlier they can

grow in adverse conditions like hot climate, less water, low fertile soil. They are promising crops to ensure food security when we have concerns about climate change leading to low yields of crops like rice or wheat.

Millets are gaining importance because of this understanding of their good nutritive value and the climate change compliant crops. India celebrated 2018 as “Year of Millets”. FAO has declared 2023 as “International year of Millets”. Therefore, these crops for self-consumption will turn to commercial crops.





Government of India is taking various initiatives to celebrate "International year of Millets" through different Departments and Ministries. They are described in following table:

also product acceptance. Are we doing enough?

A lot of these questions were answered through dialogue of experts in the third session of PFNDAI annual Webinar on, "Future outlook on Healthy Ingredients with special emphasis on Proteins". We were fortunate to have following spectrum of great personalities to clarify all

Research and Regulatory Affairs, Marico) is well known for his work in products based on Nutri-Cereals and Soy. This session was sponsored by Marico.

Agricultural production of Millets and storage issues: DA&FW and DARE are working in coordination with agricultural universities, research institutes to increase production and yield of the crop. Seed Hub is one such program run by ICAR which helps in this direction. Some state governments like Odisha and Karnataka are encouraging farmers by giving subsidy. FAO data indicates that India's share in world Millet production was 41% in 2020. There is increase in production of Millets of 10280 MT in 2016 to 12490 in 2020. Stability of grains is about twelve months. However, in case of flour the shelf life gets reduced because of lipases from germ, getting activated in milling causing oxidation of fat in Millets which reduces shelf life. IIMR in its finding suggests vacuum packing to improve shelf life. Because of cost of operation, this will work only for export. We think even techniques like Nitrogen flushing may be equally effective. Alternatively dual technology like removal of germ prior to milling will help, which may not be practicable for Millets of smaller size.

Activity	Ministry/ Department
Enhancement of Production and Productivity	Department of agriculture and Family welfare (DA&FW) and Department of agricultural Research and Education(DARE)
Nutrition and health Benefits	Health and FSSAI
Value addition, processing and recipe development	Ministry of Food Processing industries
Entrepreneurship/ start-up/ collective development	Commerce & DA & FW
Awareness creation- Branding. Labelling, Promotion	All
International outreach	Commerce and MEA
Policy interventions for mainstreaming	Dept of Food and PD and DA & FW

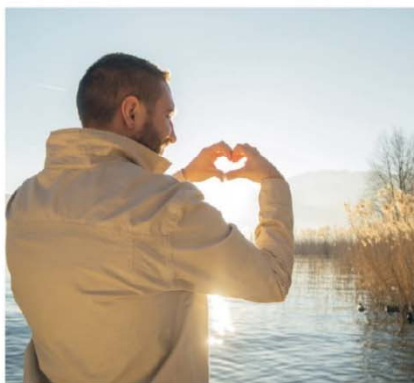
As we are planning to celebrate, "International year of Millets" there will be issues and problems throughout the value chain of "Farm to Fork" for Millets to regain their importance. There will be need to produce more, consumption should increase for these cereals and products based on them. This will involve lot of stakeholders like agricultural and other ministries to increase crop and yield, research institutes and industry R&Ds to develop products. Efforts will be required to make people aware of the products and benefits. The issues will be

these doubts. It was mix of Research and Industry persons. Dr. Sesikera B. (Hon. Scientific Director PFNDAI and Former Director NIN, Hyderabad) was moderator of the discussion. He made the dialogue with experts very interesting. Dr. Dayakar Rao (Principal Scientist, IIMR) was another speaker who has about three decades research work experience on Millets. Dr. Nilkhil Kelkar (Joint managing Director, Hexagon Nutrition) is an entrepreneur of Hexagon, who are experts in Fortification and have range of Nutrition products and Dr. Prabodh Halde (Head



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Formulation (Opportunities, challenges, possibilities)

Urban population may not accept conventional way of eating that is in the form of hand rolled flat breads. In order to popularise Millets, best way is to offer it as products in various formats. They can be offered as snacks which can be enjoyed. Also, as these are Nutri-cereals i.e. having all macro and micro nutrients are ideal candidates for making Health Foods.

There are various issues of formulating the products based on Millets. When consumer taking food products, he is looking for a tasty product, nicely packed, convenient to carry. Main problem of Millets is acceptance of taste. Since consumers are not familiar with typical taste of the Millets, it is a challenge. With new technologies like Extrusion or mixing with other ingredients with neutral taste, good tasting product can be developed. Now a days so many taste masking agents are available which can come to help. At this point, we remember success of similar new ingredient in India, soybeans and products based on it for its taste acceptance. This was more challenging as soy is typically part of Oriental Foods and is not of Indian origin. Still over the period, our scientists and technologists have successfully met the challenge and we have range

of good tasting products based on Soy. Another doubt in the mind of people is antinutritional factors in Millets. The concept of antinutritional is quite old, may be of seventies. With advancement of food science, it is found that processes like extrusion (cooking under high steam pressure), germination or Fermentation takes care of this issue. Then there is valid question about fortification as we are also talking about Health foods. One outwardly looking simple solution is as they are rich in vitamins and minerals, we may achieve proper RDA levels by use of combination of Millets. But still studies are required to prove their bioavailability. Another excellent way for fortification came out during the dialogue was to making comprehensive product of Millets with Mushrooms which are rich in vitamins. Different ICAR institutes are jointly working on the feasibility of such concept.

Commercialization opportunities and challenges:

The first challenge is to create awareness about Millets, their importance with respect to all the good nutritional properties. This is done by government via many domestic and International Trade Fairs and Exhibitions. Another way is Including Millets in PDS or ICDS programs. Then comes making products on commercial scale and market development. Programs like Nutri-hub are conducted by IIMR which encourage start-ups to make Millet based products. This is comprehensive program in

which, grant in aid up to five lakhs is given. Also training, internship is part of this program. The success of program is obvious from the numbers. Two hundred plus start-ups are mentored. Fifty-six plus Millet technologies are commercialized. Sensing the scope and future of this range of products many big businesses are approaching IIMR. There are also challenges like new type of seeds are being imported like Chia seeds, Quinoa etc. However, the market is huge. Especially the Millets based products are likely to have market share at bottom of pyramid of society which is huge market. Prime minister himself is serious about the campaigning of this crop. Therefore, we have no doubt on the success for the future of these “Wonder cereals”.



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HIGH PROTEIN DIET & WEIGHT LOSS

Introduction:

Protein, the essential macronutrient, plays a major role in the functioning and maintenance of the human body. It is a building block right from the RNA, DNA of the human cells to the most complex enzymes, hormones, and the muscles of the fascinating human physiology. Right from the toenails to the hair, protein is a necessity, which should not be taken lightly.

Since the dawn of the century, humans have been researching and coming up with solutions to manage weight. We have gone to both extremes of low carb and low fat, but the solution has not been concrete. There has been one significant criterion, which remains unchanged, which is evidence-based research about how protein helps in weight loss.

Proteins help with

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weight management primarily by lowering body weight through satiety and increasing energy expenditure. Protein appears to improve body composition by increasing the percentage of fat-free mass. Protein aids in weight management through secondary mechanisms such as increasing hunger-inhibiting hormone levels, promoting diet-induced thermogenesis (DIT), and advanced ketone body levels. (5, 6)

Protein and satiety

A high protein diet (HPD) leads to satiety by various pathways which results in keeping the individual full for longer and a lower the chances of overeating. Hormones

that play a crucial role in satiety management are ghrelin & leptin. Ghrelin helps in increase the hunger sensation & leptin helps decrease them. (3,10)

Regulates Hormones

Hormones are game changers when it comes to determining when or how to eat, and what time to stop eating. Making meals rich in Protein up to 20-25% can lead to an increase in the hormones that in turn regulate satiety. This induces an automatic decrease in the hunger hormone, resulting in a greater satiety. (1, 2)



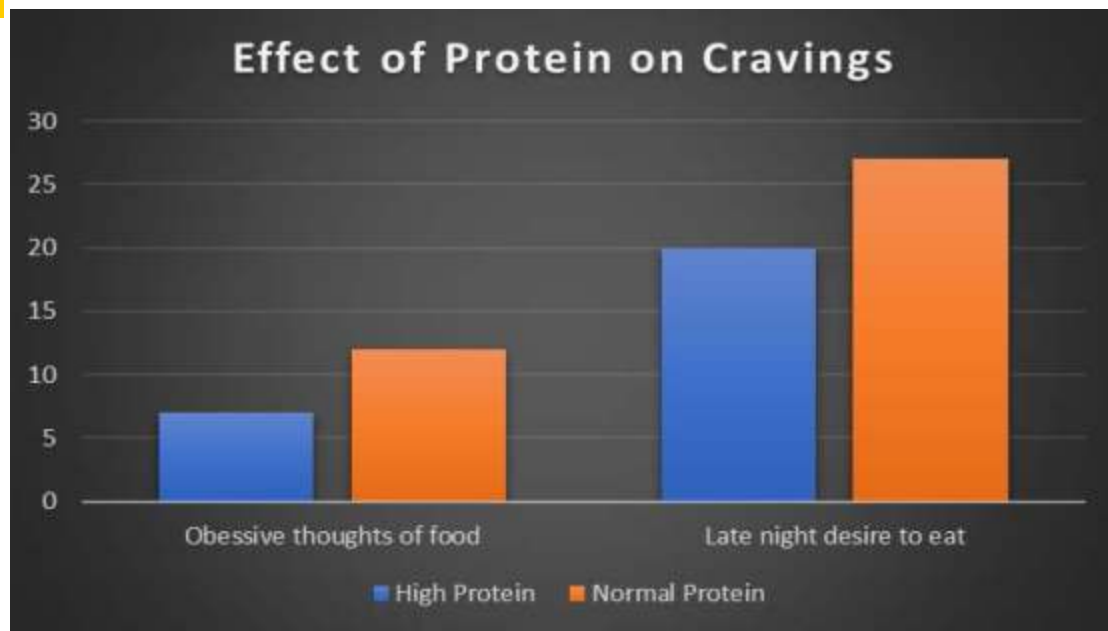


Figure 1. Shows the effect of protein on cravings

Ketogenesis:

High protein low carbohydrate helps in suppressing the appetite, by increasing the content of fasting blood β -hydroxybutyrate concentration, which is known to have a positive effect on satiety. So, a HPD just avoids an increase in appetite rather than stifling it. In other words, one's appetite remains the same with both energy restricted HPD and the standard-energy medium-protein diet, but the high-protein content in HPD aids to weight loss by avoiding excessive food intake at the following meal even if the total energy intake was low. (1, 2, 6)

Sustainable weight management

Eating a high-protein diet can cause weight loss, even

without calorie counting, portion control or carb restriction. Even a humble increase in protein intake can help prevent weight regain. Many studies provide the proof that just increasing protein content can unconsciously help one lose weight, which is a good practice instead of cutting carbohydrates, fats or calories. (3, 5, 6)

Thermic effect

Thermic effect describes the amount of energy spent in digesting and metabolizing food. Proteins have a greater percentage (20-30%) of thermic effect than carbohydrates and fats. Consequently, more calories are expended. Clearly a protein rich diet outshines a low protein diet in terms of metabolism. (3, 6, 11)

Protein can have a powerful effect on both cravings and the desire to snack at night.

A person following a diet plan, or restricting calories falls victim to cravings or temptations. Evidence

suggests that eating night snacking can make a person gain weight as they are most likely to be loaded with sugar or empty calories. Having a high protein diet tends to reduce the craving for snacks and hence helps you manage weight or stay on track. A group of overweight men were divided into two and given Normal Protein diet and High Protein diet. In this study, protein at 25%

of calories reduced cravings by 60% and cut the desire for late-night snacking by half! (3, 12)



Optimal time of consumption of Proteins

Ingesting sufficient quality protein & amino acids including leucine early in the day is beneficial for maintenance & growth of muscle tissue, as utilization of protein is better early in the day than later in the day. The morning/ early day ingestion of amino acids between 5am-10am is beneficial for increasing muscle synthesis. This is due to the circadian clock mechanism present in all cells including muscle cells. (4, 7)



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Ideal Snacking

The conventional thought process about dieting revolves around restriction of calories, which results in increased episodes of stress eating, guilt from indulging, which follows itself by even more stress, resulting in a vicious cycle.

The suggestion would be to have a more inclusive diet where there is substitution of carbohydrate-laden snacks with high protein options.

A wide variety of healthy traditional snack options are developed in various Indian regions. They may be built on a foundation of millets, whole grains, pulses, nuts, suitable dry fruits, fruits, or vegetables. For instance, millet dosa, dal dosa, oats pancake, overnight soaked oats, jowar puffs, makhana bhel, sprout chaat can be good snacking options. Some of the additional side options for the snack accompaniments can be mint/coriander yogurt chutney, hung curd with herbs, hummus, etc. can be used instead of hydrogenated fat laden mayonnaise or other unhealthy high salt, high added sugar sauces and dips. (8)

Conclusion:

Low-protein diets encourage a positive energy balance, whereas HPD (High protein diets) causes a negative energy balance—a condition in which more energy is expended than is consumed. This resonates well with the ideology of calorie deficit for a sustainable weight loss.

Higher-protein diets have been encouraged as a successful strategy for preventing or treating obesity by improving body weight management over the last 20 years. These advancements are thought to be the result of changes in energy metabolism, appetite, and energy intake.



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FORTIFICATION OF RICE



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Rice has been the main staple for Indians and other Asians where it has been consumed for thousands of years. In fact, China and India produce almost half the rice produced globally and over 90% rice is grown in Asian countries. Rice is also grown in other parts including Europe, Americas and Australia ([Britannica 2022](#)). Global rice production in 2020 was over 756 Million tonnes ([FAO Stats 2019](#)) which was almost same as wheat production. India's production was over 178 million tonnes.

Different Varieties & Types of Rice

There are many different varieties and forms of rice ([Rice Asso. 2018](#), [Healthline 2019](#)). Each has different characteristics including size, cooking properties, eating

qualities and nutrition. Each region prefers particular type. There are long grains, medium and short grain rice. Some have typical flavour and taste including the famous Basmati. Some are dry when cooked while some are sticky. This depends on the starch type mostly present, as amylose and amylopectin composition, the latter making it more sticky. Less sticky ones have mostly amylose and are usually long-grained, which are preferred for pulao and biryani. Basmati has all these characteristics and also fragrance.

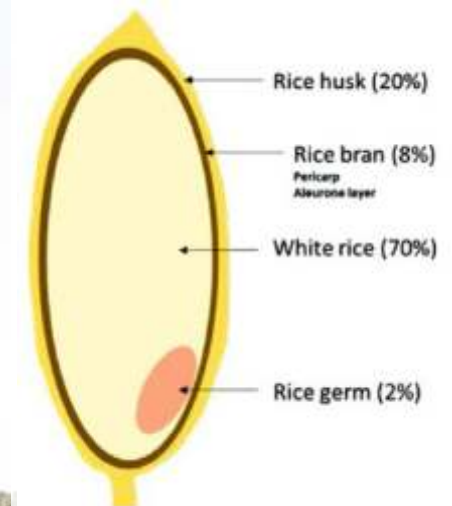
Some varieties are coloured, red and black. They have anthocyanins that not only provide attractive colourful appearance when mixed but also have subtle flavours, making them not just enjoyable but healthy.

Rice as harvested and dried separated from stalks is called

paddy that has outer husk, then bran and attached to white kernel is the germ. Before eating, husk needs to be removed. This can be done with hand pounding, which yields brown rice containing some portion of bran, and germ that contains oil. Rice mills not only remove the husk but also bran and germ to give the polished white rice.

Although brown rice has more fibre, rich in B-vitamins, minerals and healthy phytochemicals including oryzanol, and lower GI, because it takes longer time to

Fig 1: Structure of Rice Paddy
([Shafie & Norhaizan 2017](#))





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cook, it is chewier and has earthy smell, most people prefer white rice. Germ contains oil, which may lower the shelf life.

Thus when white rice is prepared it loses many nutrients while being made more acceptable. There were attempts traditionally to make it more nutritious by preparing parboiled rice. In this process, paddy is soaked and then partially boiled and then dried again before it is milled to remove the husk. In this process the vitamins and minerals from bran are driven to endosperm so after milling the kernels are more nutritious than the white milled rice. The parboiling process also converts part of starch to resistant starch thus increasing fibre content and lowering GI (Walter et al. 2005, Healthline 2019).

Older parboiling process is longer and also causes some spoilage so newer shorter method uses steam. Still some people prefer white rice as parboiled is slightly coloured, heavier to digest and cook. Even milling of parboiled paddy is tougher.

IRRI has also has prepared a more nutritious rice by bio-fortification using genetic engineering techniques. The bio-fortified rice varieties have higher micronutrient content including pro-vitamin A, iron,

and zinc and lower glycemic index.

There are many efforts of making fortified rice by adding nutritional substances to increase vitamin and mineral contents, which are becoming quite successful because of the simplicity involved as well as in many cases the characteristics of original rice does not alter so people find it more acceptable.

Different methods of fortification ([Cochrane Lib. 2019](#))

Addition of nutrients to fortify rice offers a unique problem. Rice is commonly consumed whole so nutrients need to be added on surface. Dusting was the first method tried by adding micronutrient powder to the rice. This was found to be unsuccessful due to typical washing and cooking methods used that result in rinsing away of the fortificants.

Another method that was used was coating in which fortificant mixture and a binder such as wax or gum for fixing the micronutrients was sprayed on to rice. Coating would dissolve during cooking but not during washing. This had a better retention of micronutrients than dusting. However, the most promising method was in which extrusion of rice with premix was carried out and which is used successfully in many countries and FSSAI is recommending it here.

Extrusion Technology for Rice Fortification

Extrusion is preferred for



rice fortification due to stability of micronutrients in rice kernels during processing, storage as well as in the preparation of cooked rice for consumption. The cost is also reasonable.

In this process, milled broken rice is powdered and mixed with vitamins and minerals premix. Then the fortified rice kernels are prepared from this mixture using extruder. These kernels resemble rice grains and are added to non-fortified rice in the proportion of 0.5% to 2% which gives fortified rice which is almost indistinguishable from normal rice in aroma, taste, texture and looks. Considering additional cost of equipment, premix and processing, the retail price is expected to increase for fortified rice about additional up to 10% depending on the nutrients added. FSSAI standards provide addition of iron, and B-vitamins including folate and B12 as prescribed levels. Other vitamins including B1, B2, B3, vitamin A and zinc may also be added. If fortified rice is produced as per the standards prescribed by the FSSAI, then it can carry FSSAI fortification symbol shown in Fig 2.





Fig 2: Fortification Symbol shown with Rice

FSSAI also provides guidance in the preparation of fortified rice. Besides rice and nutrient premix, it permits use of acid regulators and emulsifiers and potable water. The broken powdered rice is mixed with premix, additives and water and mixed and is passed through twin-screw extruder which partially cooks and gelatinises the mix and forms tiny pellets similar in looks to rice kernels. The shape and size is adjusted so these pieces resemble the rice variety to which they are to be added. Extrusion is the most critical process in the entire operation and acceptability will depend on how closely these pieces prepared resemble rice in looks and texture and taste.

After extrusion, the moisture content needs to be reduced by drying to final product with 11-13% moisture. The dried kernels are then mixed with the regular rice and blended to make uniform mix. When mixed in the ratio of one

fortified kernel to about 50, 100 or 200 kernels of regular rice, it becomes indistinguishable when cooked and consumed but the best ratio is 1:100. The lesser than recommended ratio may not provide adequate fortification but more importantly

the fortified kernel should be properly mixed so there is uniform fortificant amount present in each serving. The entire process of fortification of rice by this process has been shown in a video, which nicely shows various steps involved ([FSSAI 2019](#)).

Acceptability of fortified rice has been tested and it was found that colour, texture, odour, taste etc. are quite

acceptable when compared to non-fortified rice. Also the minerals and vitamins retention has been evaluated when fortified rice is soaked, boiled and fried under variety of cooking methods and they were found to be satisfactorily retained.

Fortified rice is mandated in some countries like Costa Rica,



Nicaragua, Panama, Papua New Guinea and the Philippines whereas in some countries it voluntarily fortified e.g. in Brazil, Dominican Republic, Colombia, South Africa and the USA.

Already in India a couple of manufacturers have started producing and marketing the fortified rice as per the standards of FSSAI and are putting the fortification logo provided by FSSAI on their labels. More manufacturers will soon follow. There are other staples like wheat flour, oil, and milk where FSSAI is encouraging fortification with vitamins and/or minerals. Already iodisation of salt is mandatory. With all these developments, the micronutrient deficiency is expected to diminish and there will be decline of deficiency diseases.

Within one year, almost 6.83 lakh MT of fortified rice was distributed among various states and 7.36 lakh MT were under ICDS and PM Poshan schemes according to Ministry of Consumer Affairs, Food & Public Distribution. Thus it is rapidly getting used in various ways in India. This will encourage other countries to follow rice fortification.



ANTI-DIABETIC FOODS AND FOOD INGREDIENTS-III HERBS



AUTHOR

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According to the World Health Organization (WHO), up to 90% of the population in developing countries uses plants and its products as traditional medicine for primary health care (WHO, 2002). Out of 21,000 plants identified with medicinal properties around the world, 800 plants have been reported to show antidiabetic potential. India is the largest producer of

medicinal herbs and is called as botanical garden of the world (Seth, S.D. and Sharma, B., 2004). Though around 400 plant species were explored, only a few plants have been reported with confirmed clinical evidence.

Patients suffering from diabetes are also susceptible to several non-communicable inflammatory diseases such as heart diseases,

hyperlipidaemia, hypertension etc. Hence, the quest for alternate therapeutic agents with multiple health benefits has increased manifold leading to extensive research on herbs.

The antidiabetic potential of herbs is attributed to the phytochemicals present in various parts of herbal plants such as leaves, flowers, seeds, bark and roots. The hypoglycaemic effect of herbs is exhibited through their ability to increase insulin secretion by stimulating pancreatic cells, decrease glucose absorption in the small intestine and increase glucose uptake by skeletal muscle and liver.


Table-1: The most common and effective antidiabetic medicinal plants of Indian origin

<ul style="list-style-type: none"> • Babul (<i>Acacia arabica</i>), • Bael (<i>Aegle marmelose</i>), • Church steeples (<i>Agrimonia eupatoria</i>), 	<ul style="list-style-type: none"> • Eucalyptus (<i>Eucalyptus globules</i>), banyan tree (<i>Ficus benghalensis</i>), • Gurmar (<i>Gymnemasylvestre</i>), 	<ul style="list-style-type: none"> • Purging Nut (<i>Jatropha curcas</i>), • mulberry (<i>Morus alba</i>), • kiwach (<i>Mucuna pruriens</i>),
<ul style="list-style-type: none"> • Bisasar (<i>Pterocarpusmarsupium</i>), • Anar (<i>Punicagranatum</i>), • Giloy (<i>Tinospora cordifolia</i>) 	<ul style="list-style-type: none"> • Ghritakumara (<i>Aloe vera</i>), • Neem (<i>Azadirachta indica</i>) 	<ul style="list-style-type: none"> • Gurhal (<i>Hibiscus rosa-sinesis</i>) • Tulsi (<i>Ocimum sanctum</i>)


<https://www.hindawi.com/journals/idr/2013/712092/>



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Evidence based information on the antidiabetic benefits of selected foods, spices and condiments has been provided earlier. This article focuses on selected herbs with proven antidiabetic potential.

Aloe Vera (*Aloe barbadensis*)

The phytochemicals responsible for the health benefits of Aloe are lectins, mannans and anthraquinones. Besides being hepatoprotective, hypolipidaemic and hypoglycemic, Aloe vera also helps in quick healing of wounds which is of special interest to diabetic patients suffering from leg wounds and ulcers, and which otherwise takes very long.

Ashwagandha (*Withania somnifera*)

Ashwagandha is used in the traditional Indian medical system for more than 100 drug formulations in Ayurveda, Unani and Siddhasince long. It is also called "The Indian Ginseng" due to its effective stimulatory property. The species name *somnifera* means 'sleeping' which indicates its ability to induce sleep. Ashwagandha has also been proved effective as uterotonic (toning the uterine muscles post-delivery/abortion), anti-inflammatory, hepatoprotective, neuroprotective, antidepressant, cardioprotective, anti-obesity, anti-hypertensive and anti-

diabetic agent. Regular intake of *W. somnifera* was reported to effectively control hyperglycaemia, hyperlipidaemia and diuresis (potassium sparing) in type-II DM patients (Andallu and Radhika 2000).
<http://www.scholarsresearchlibrary.com/>.

Azadirachta indica: (Neem)

Neem is well known globally as a medicinal plant with versatile health benefits. Due to its antidiabetic and antioxidant potential, neem leaf/bark extract is used in India for the treatment of diabetes and its complications. The phytochemicals in neem improve insulin uptake and glucose utilisation by skeletal muscle
(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4630690/>).

Caesalpinia bonducella (Gray Nicker)

Gray Nicker seeds are widely used in tribal regions of India to treat diabetes. Seed extracts of this plant have been proved to stimulate pancreatic beta cells to produce insulin, improve glucose uptake by liver and muscle and to reduce carbohydrate absorption thereby reduce blood sugar levels. The seeds also exhibited hypolipidemic effect.
<https://doi.org/10.1155/2021/5570939>

Hibiscus sabdariffa L. (Roselle Plant).

A significant reduction of fasting blood glucose level was observed in prediabetic women

with administration of a tea prepared from 5g of rosella powder along with 125 mg of stevia powder. Thus, roselle plant could be used as a preventive measure in diabetes.

<https://doi.org/10.1155/2021/5570939>

Pipal (*Ficus religiosa*)

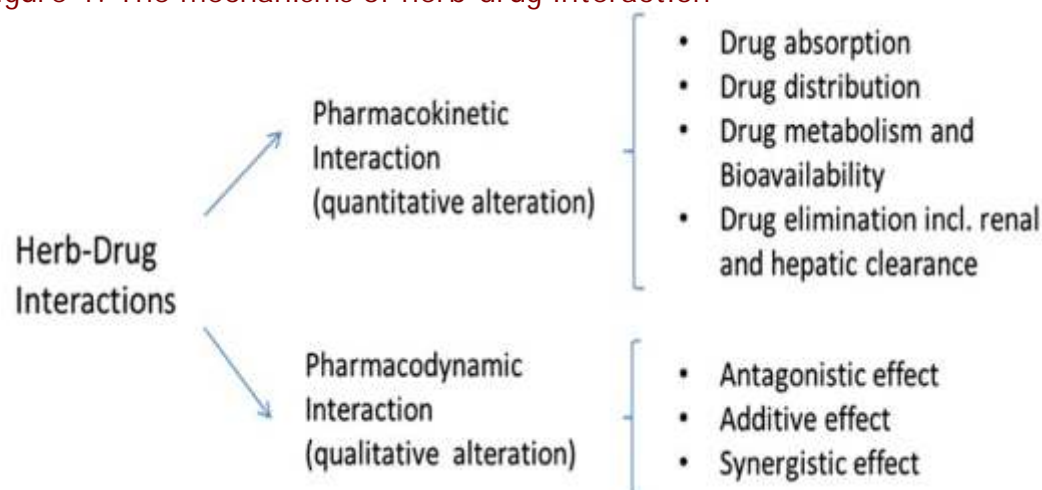
The traditional system of ayurveda uses various parts of pipal tree to treat diabetes as well as its complications. Oral ingestion of aqueous extract of *Ficus religiosa* for 21 days caused a significant lowering in blood glucose levels, elevated of insulin production, improved glucose uptake by skeletal muscle and liver thereby reduced blood glucose levels.

Herb-drug interaction

Up to 70% of people with diabetes used herbal medicines, dietary supplements and other CAM therapies in addition to the conventional medicine [5]. However, the possible interaction between herb and drug cannot be ignored. The interactions could be positive (herbs enhancing the efficacy of drugs) or negative (herbs interfering with the functioning of drugs).



Figure-1: The mechanisms of herb-drug interaction



<https://www.semanticscholar.org/paper/Interactions-between-antidiabetic-drugs-and-herbs%3A-Gupta-Chang/f984f2da0710a0b4c5236c0073aec0a9e7e1492f>

Table-2: Antidiabetic effect of selected herbs-Mode of administration and Active components

Herbs	Mode of Antidiabetic action and associated benefits.	Mode of administration	Mode of administration
Aloe vera (<i>Aloe barbadensis</i>)	<ul style="list-style-type: none"> Stimulation of Insulin synthesis and/or release of insulin from pancreatic beta cells, Reduction in Advanced Glycation End products (AGEs) Anti-inflammatory effect and quick wound healing in diabetes patients.	aloe juice/ leaf powder	Phytosterols (Iophenol, 24-methyl-Iophenol, 24-ethyl-Iophenol, cycloartanol, and 24-methylene-cycloartanol) https://doi.org/10.1248/bpb.29.1418
Babul/ gum arabic (<i>Acacia arabica</i>)	<ul style="list-style-type: none"> Stimulation of pancreas and Increased insulin production https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=ca297b49b9325a7cd9a03ed699499f8025284d53	Seed / decoction of bark/ Gum, Leaves, Flowers, and Pods	Tannins, alkaloids, polyphenolic compounds, and flavonoids etc.
<i>Azadirachta indica</i> : (Neem)	<ul style="list-style-type: none"> Hypoglycemic by increasing glucose uptake and glycogen deposition, Hypolipidaemic, Hepatoprotective and antioxidant effect. https://japsonline.com/admin/php/uploads/68_pdf.pdf	Leaf extract, Leaf powder, root powder	Glycosides, terpenoids and flavonoids
<i>Withania somnifera</i> (Ashvagandha)	<ul style="list-style-type: none"> Hypoglycemic by Increasing glucose uptake by adipose tissue and skeletal muscle, Antioxidant-Protects pancreatic B cells from oxidative damage Stimulates glucose transporters Regulate glucose metabolism Improves insulin sensitivity Protects from complications and co morbidities of diabetes. https://www.researchgate.net/publication/319639901_Phytopharmacology_of_Ashwagandha_as_an_Anti-Diabetic_Herb?enrichId=rgreq	Root powder and leaf powder	Steroidal lactones (withanolides, beta-sitosterol, polyphenols and phytosterols etc.)
<i>Ocimum sanctum</i> : (holy basil)	<ul style="list-style-type: none"> Hypoglycemic, hypolipidaemic and antioxidant effect Reduces the complications of diabetes https://www.researchgate.net/publication/266885994 www.globalresearchonline.net	Dried leaf tea, leaf powder (http://twocleancommunity.com/wp-content/uploads/2014/03/Tulsi-Research-Mohan-Ocimum-sanctum-an-overview.pdf)	Eugenoland ursolic acid

Figure-2: Antidiabetic herbs



Hibiscus sabdariffa L. (Roselle Plant).



Withaniasomnifera (Ashvagandha)



Babhul/gum arabic (*Acacia arabica*)



Ocimum sanctum: (holy basil)



Azadirachta indica: (Neem)



Aloe vera (*Aloe barbadensis*)



Caesalpinia bonducella (Gray Nicker)



Pipal (*Ficus religiosa*)

Conclusion:

Treatment of Type-2 diabetes using medicinal plants/herbs has been practised in India since time immemorial. These natural antidiabetic agents without side effects (if consumed in appropriate dose and form) also help in the prevention and/or management of diabetes complications. However, very few herbal plants have been tested in humans till date thus suggesting a huge research potential in this area.



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SOYA, A POWER PACKED BEAN

AUTHOR

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Food Technologist,
PFNDAI

Protein is a nutrient which has to essentially be part of the diet across all ages. Since India is a land of diverse culture and traditions, the type of food consumed varies throughout the year, our population does not predominantly follow a non-vegetarian diet according to several studies. Soya bean or Soybean, comes to the rescue of vegetarians, to make up for the nutrients present in meat, fish and poultry.

Although this versatile bean is small in comparison to many other beans, it is packed with protein, very similar to the protein in meat, dairy products and eggs. The soybean plant is one of the few plants that provides nearly all the essential amino acids, that make up proteins. The main health benefits in eating soybeans are from the various phytonutrients they contain, e.g. isoflavones. These have been shown to help prevent cardiovascular disease, certain cancers, osteoporosis and other conditions.

Soybean cultivation in India was negligible until 1970, but it grew rapidly thereafter. As per Krishi Jagran news soybean holds a very important position in the Indian agriculture and economy and it has a worth of over Rs 5000 crores. According to Soyabean Processors Association of India (SOPA), India is consistently holding the 5th position in the list of the leading soybean producing countries. Regarding consumption of soybean in India, it holds the 6th position in the leading consuming countries.

Nutrition profile of soybeans

Soy is a high-quality protein. It is one of the few known plant foods (the other is amaranth

seed and to a lesser degree, quinoa) to contain all the essential amino acids, like those found in meat.

The soybean is:

- high in fibre
- high in protein
- low in saturated fat
- cholesterol free
- lactose free
- a good source of omega-3 fatty acids
- a source of antioxidants
- high in phytoestrogen



when the beans are green and sweet tasting. They cook quickly and can be eaten cold or warm, but not with the pod. Shelled beans can easily be added to salads, soups and pasta. They could be snacked

on the go. One can eat them right out of the pod. Edamame is also a healthy substitute for popcorn and chips.

The following nutrition information for 3.5 ounces (100 grams) of soybeans has been provided by the USDA.

Soybean Nutrition

Calories	172
Fat	9g
Sodium	1mg
Carbohydrates	8.3g
Fibre	6g
Sugars	3g
Protein	18g
Calcium	102mg
Iron	5.14mg
Potassium	515mg
Choline	47.5mg

Soy Products and Their Uses

Whole soy foods are a nutritious and a versatile addition to the diet. They are commonly used in the traditional Asian and Indian cuisine. Foods made from soybeans can be classified as unfermented, fermented and second generation (recent products developed to meet nutritional and functional requirements) soy products.

Let's take a look at the unfermented soy products first:

❖ Edamame (Green Soybeans)

These are soybeans harvested



❖ Soy Beans (Dry Soybeans)

They are a species of legume native to East Asia. They can be found as canned or dry in black and white varieties. Their characteristic beany flavour and the presence of anti-nutritional factors are the main reasons for the non-utilisation of soybean at domestic level in rural and urban areas. A study conducted on making soybeans completely free from the inhibitor with simple and inexpensive methods of heat treatment which can be adopted at home level revealed that pressure cooking or twelve minutes of roasting at 85 to 90 degrees or boiling the beans for 20 minutes was found sufficient for complete inactivation of the inhibitors. It is made as a flavourful gravy to accompany rotis or rice in the Indian diet.

❖ Soya Flour

Soya flour is a fine powder obtained from grinding roasted soybeans. When added to baked goods, soya flour can improve their nutritional

value, mainly increasing their protein content, and enhancing



texture via lipid oxidation. Soy flour is a common inexpensive variant that can be easily used to prepare traditional recipes, roti blends, biscuits/snacks, germinated soy bread, fermented products, supplementary foods and therapeutic foods.

❖ Soy nuts

These are soya beans soaked in water, drained, and then baked or roasted. They can be used in place of nuts and are high in protein and dietary fibre. Soy nuts along with various soy products are common in vegan and plant-based diets all over the world as soy is a complete protein and is inexpensive to purchase.



❖ Soy milk

It is a plant-based drink produced by soaking and grinding soybeans, boiling the mixture, and filtering out remaining particulates. It is a stable emulsion of oil, water, and protein.



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Soy milk may be used as a substitute for dairy milk by individuals who are vegan or are lactose intolerant. It can also be fortified with calcium to meet the standards of dairy milk.

Soy milk is also used in making imitation dairy products such as soy yogurt, soy cream, soy kefir and soy-based cheese analogues. It is also used as an ingredient for making milkshakes, pancakes, smoothies, bread, mayonnaise, and baked goods.

❖ Soybean oil

Soybean oil is a vegetable oil that's extracted from the seeds of the soybean plant, which can be used in a variety of cooking methods, including:

- frying
- baking
- roasting



Plus, it's been linked to several health benefits, especially when it comes to heart, skin, and bones. Like other oils it has to be consumed in moderation.

Fermented Soy Products:

➤ Soy yogurt

It is a yogurt-like product made with soya milk. Fermentation improves the nutritive value of the product. Yogurt's creamy texture makes it an easy substitute for sour cream, cream cheese or dairy yogurt. Soy yogurt is rich in protein, calcium, and is a source of probiotics.



➤ Miso

Miso is a traditional Japanese seasoning. It is a thick paste

produced by fermenting soybeans with salt and the fungus *Aspergillus oryzae* and sometimes rice, barley, seaweed, or other ingredients. It is used for sauces and spreads, pickling vegetables, fish, or meats, and mixing with dashi soup stock to serve as miso soup, a Japanese culinary staple.

➤ Tempeh

It is a traditional Indonesian food made from fermented soybeans. It is made by a natural culturing and controlled fermentation process that binds soybeans into a cake form. A fungus, *Rhizopus oligosporus* or *Rhizopus oryzae*, is used in the fermentation process and is also known as tempeh starter.



➤ Soy sauce

It is a liquid condiment of Chinese origin, traditionally made from a fermented paste of soybeans, roasted grain, brine, and *Aspergillus oryzae*. It is considered to contain a strong umami taste.



❖ Tofu

Very similar to cottage cheese, known as soybean curd, tofu is a soft cheese-like food made by curdling fresh hot soymilk with a coagulant. Tofu is a neutral-flavoured product and easily absorbs the flavours of other ingredients with which it is cooked. Tofu can be used instead of cottage cheese in any recipe. Silken tofu, which is smooth and creamy, can be used in place of cream in soups, as a substitute for mayonnaise or sour cream in salad dressings and dips. Soft tofu is moist and firmer than silken tofu. It can be substituted for soft cheese. Firm and extra firm tofu will hold its texture and shape and





'Second generation' soy products

➤ Soy lecithin

It is extracted from raw soybeans. First the oil is extracted using a chemical solvent, like hexane, and then the oil is processed (which is called degumming) so the lecithin is separated and dried. It's generally used as an emulsifier, or lubricant, when added to food, but also has uses as an antioxidant and flavour protector.

The food industry has long recognized the importance of lecithin as a critical component in processing. Lecithin helps smooth the texture of food items such as chocolate and margarine and makes instant foods easy to dissolve.

Some of the food items, which most frequently incorporate lecithin, are:

- Baked goods
- Confections
- Infant formulas
- Cheese products

Beyond its functional characteristics, lecithin has added value because of its well established nutritional value. The phospholipids in lecithin are considered



essential nutrients for proper functioning of the human body.

➤ Soy Nuggets and Granules

Both soya chunks and soya granules are made from soy bean. They are also known as textured or texturized vegetable protein (TVP). The only difference between soya chunks and soya granules is that soya chunks are bigger in size, while granules are smaller.

While both soya chunks and soya granules come from soy bean, they are not actually directly made from soy. Both are a by-product of making soy oil. Once the soy oil is extracted, what is left is the soy flour. This soy flour is then defatted converted into soya chunks and soya granules.

The texture of the granules /chunks quickly changes to soft and spongy as soon as submerged in warm water or added to gravy. These are creamish in colour and easy to digest as compared to beans and flour. They could be added to curries, cutlets, parathas, stir fries, pulavs and various other recipes.

TVP, soya chunks and soya granules, whatever one calls it, is very high in protein. In fact, it has higher protein content than meat, which is one of the primary sources of protein in an average diet. They are also a lot cheaper than meat. Due to this, soya chunks and



soya granules make an excellent alternative to meat, especially in vegetarian and vegan diets. In their dehydrated form, they can be stored for up to 12 months at a time. This is another reason, why they are a good source of protein intake, especially in third world countries, where most people cannot afford meat.

➤ Soy-based infant formula

Soy-based infant formula (SBIF) is sometimes given to infants who are not being strictly breastfed; it can be useful for infants who are either allergic to pasteurized cow milk proteins or who are being fed a vegan diet. It is sold in powdered, ready-to-feed, and concentrated liquid forms.



There is a product available in India formulated specially for infant feeding needs from birth. It is a soy based, milk free, lactose free spray dried infant formula, to meet the special nutritional needs of infants suffering from lactose intolerance, milk allergy and diarrhoea.



➤ Soy nut butter

The soybean is used to make a product called soy nut butter which is similar in texture to peanut butter.]

➤ Coffee substitute

Roasted and ground soybeans can be used as a caffeine-free substitute for coffee. After the soybeans are roasted and ground, they look similar to regular coffee beans or can be used as a powder similar to instant coffee, with aroma and flavour of roasted soybeans.

From the view point of Indian diet, dal analogues using soyabean and soya papad are few more items that Indian food scientists are working on.

• **Dal Analogue:** A nutritious, high protein processed food made from defatted soya flour, wheat and red gram has more

protein and is much cheaper than traditional dals.

• **Soya Papad:** Soya flour can replace 30% of black gram without compromising taste, texture and increased the protein content and reduces raw material cost considerably.



The humble soybean lives up to its reputation of being a power house of nutrients and is a boon for vegetarians and people following vegan diet. Although the advantages of consuming soybean products are many, people could develop allergic reactions due to certain components in the bean. So it's prudent to weigh the pros and cons and eat the right kind of food in moderation.



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WEBINAR ON RETROSPECTION ON THE NUTRA REGULATION: FREQUENT CHANGES & STRESS OF COPING WITH COMPLIANCE

AUTHOR

Dr Shashank Bhalkar,

Asst Director,
PFNDAI



Dr. Shashank Bhalkar,
Regulatory coordinator to give
a brief introduction to the
Webinar.

Dr. Bhalkar in his presentation
described how the Nutra
regulations brought in clarity
to FBOs for this important
category of products also
authorities to regulate such
products. He further explained
how a small change in
Regulation is challenging as it
would trigger a series of
multifunctional activities to
comply with the change for
the FBOs.

Dr. B. Sesikeran, Chairman
Scientific Advisory Committee

PFNDAI was not
able to be present
for the event. He
however shared
his thoughts via
video recording.
In his message he
mentioned how
this 2016
Regulation is
changing and said
this change should
be accepted for

this constantly changing
dynamic segment of
Nutraceuticals. He further
stressed that the new
regulation should be better
than earlier one. Addition of
new substances and botanical
should have proven health
benefits. He
wished success
to the Webinar.

Dr. J. S. Pai,
Executive
Director
PFNDAI
welcomed all
in the
beginning and
requested



Dr Jagadish
Pai



Dr Shashank
Bhalkar

Frequent changes in
regulations are
always challenging
for industry. Because
at times there is
difficulty in
maintaining
availability of
existing leading
brands in
marketplace while
meeting the timelines
set by Regulators. Nutra
regulations which came into
existence in 2016 have
undergone so many changes
over the period.
ProteinFoods and Nutrition
Development Association of
India (PFNDAI) organized a
Regulatory Webinar on
"Retrospection on the Nutra
Regulation Frequent
Changes & Stress of Coping
with Compliance" on 18th
November 2022. The
sponsors of the Webinar
were Herbalife Nutrition,
Abbott Healthcare & Amway
India.



Ms Rini Sanyal,
Director, Global
Regulatory Affairs &
Product Compliance,
Herbalife Nutrition
spoke on “Health
Supplements and
Nutraceutical:
Deviations from Nutra
2016 and global
practice”. In her
informative
presentation
she explained
the journey
of this
Regulation of
2016 which
started with
progressive
thought
process,
underwent so
many small
and big



Ms Rini Sanyal

global practice, he
briefed on the
Evolution of Nutra
Regulation where he
mentioned about
the new
introduction in FSU
i.e., 1. A special
category of food for
Sports person,
2. In March 2022
FSSAI published FSS
(Nutra) Regulation
which was

operationalized with
immediate effect.

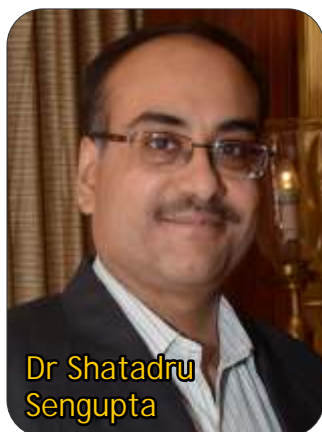
He further mentioned on the
Changes introduced in
Operationalized FSS (Nutra)
Regulation 2022 which are
until now not mentioned in
original or the amended
regulation. He explained in
detail on the Codex General
Standards for Labelling Claims
& Claims for Pre-packaged
food for special Dietary uses
(FSU). He ended his talk by
explaining the Global Food
Regulation
Framework.

Ms Dolly Soni,
Manager Marketing
and Projects
PFNDAI introduced
all the speakers.



Ms Dolly Soni

Dr Shatadru Sengupta, Vice
President - Legal,
Hardcastle
Restaurants Pvt
Ltd; Chairman,
PFNDAI gave a talk
on, “Regulation-making
procedures under the FSS Act,
2006”. In his excellent
presentation explained so
many things about the act
which we ought to know. That
includes basic things like
differentiation between Act,
Rules, and
regulations. Sec 92 of act
gives power
to authority
to make the
regulation
which are to
be placed
before
parliament as
per Sec 93.
While making
standards the
authority must consider local
agricultural as well logistics
conditions and also
international standards and
practices. The standards
should be risk based and made
by a transparent process.

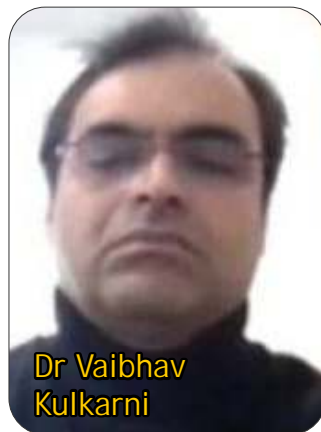


Dr Shatadru Sengupta

changes and now the latest
overhaul draft in 2022 issued
for stakeholder consultation.

She also explained
Administrative and Technical
GAPS identified and addressed
during this evolution. The
impact of frequent changes
on overall business was
discussed as every change
involves cost, time at times
losing consumer confidence
because of no product in
market.

Dr Vaibhav Kulkarni,
Director &
Senior
Leadership Team
Member Abbott
Nutrition
Regulatory Affairs,
Abbott Nutrition
gave a talk on FSU
and FSMP:
Deviations from
Nutra 2016 and



Dr Vaibhav Kulkarni





Dr Adip Roy, Associate Vice President - Regulatory Affairs, Amway India Enterprises Pvt. Ltd presented on "Nutraaceutical Regulation: Innovation Challenges."

He opened his talk by stressing importance of Regulatory compliance which helps smooth, fair operations within the market, finally boosting economy. While describing the evolution of Nutra regulations, he said the original regulations opened eight categories giving new opportunities for differentiated offerings to the consumers.



Dr Adip Roy

However, 2022 amendments redefined these products into five categories. Also because of additives, format restrictions and complexity of schedules have

become more challenging for innovations. Innovations always propel demand for supplements.

For example, tablets capsules are convenient to carry formats and can deliver higher level of micronutrients.

Additive should have been allowed across the categories based on toxicological risk assessment.

Similarly, there is challenge for Vitamins Minerals which to be added with prior approval in FSDU and FSMP. The regulations if mapped to international guidelines would have helped to develop products of global parity.



Dr Joseph Lewis

The last session of panel discussion was moderated by **Dr Joseph Lewis**, Chairman-Regulatory Affairs Committee, PFNDAI.



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Protein Foods & Nutrition Development
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Organized a Regulatory Webinar on

Retrospection on the Nutra Regulation Frequent Changes & Stress of Coping with Compliance

Held on 18th November 2022



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REGULATORY ROUND UP



By
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Dear Readers

Wish you and your family a healthy, peaceful and safe 2023.

Please find below the new notifications, orders, etc since the last round up. Robustness and hence the success of a standard depends on the stakeholders effective participation and involvement. It is important that standards at draft stage are looked at very closely to avoid all heartburns later.

[Latest list of FSSAI approved testing laboratories is published](#)

[Final notification amending](#)



[FSS \(Claims and Advertisement\) Regulation, 2018.](#)

The salient points

are listed below. Please note that these amendments are already operationalized and the industry is already implementing its provisions

- Height of letters in the disclaimer with regard to brand name carrying a health claim is amended and is now related to the surface area of the package
- The conditions for comparative claim is modified. The difference should be minimum 30% in case of macro nutrients and 10% in case of micro nutrients
- Conditions for the "Non Addition" claims in case of Salt and Additives have been modified
- Conditions for nutrient claim in case of nutrients like protein, Omega 3 and 6 fatty

acids, Vitamins, Minerals, Dietary Fibre, DHA have been modified

- A few more synonyms like "lite" have been added for making nutrient content claim.
- Changes have been made in the definition of "Fresh". Products subjected to processing which extends the shelf life shall not be termed as "fresh"





Here is good news for FSSAI license holders. License modification involving standard and non-high risk products would be instant. High risk is not defined but can expect standard foods under milk and milk products, Meat, Poultry and fish may not be able to avail of this instant modification.

Further to the notice regarding the requirement of Health Certificate in the import of certain high risk food products, FSSAI has further clarified the requirements through correlating the products with HSN code. Products not falling under the listed codes, need not produce health certificate.

Scientific panel on Methods of

Analysis and Sampling has developed the following draft methods which are open to public comments and suggestions in the [suggested format](#)

- [Method of determination of Iron as Fe in Fortified Rice Kernel](#)
- [Method of determination of folic acid \(Vitamin B9\) in Fortified Rice Kernel](#)



- [Method of determination of Cyanocobalamin \(Vitamin B12\) in Fortified Rice Kernel](#)
- [Revised Manual of Methods of Analysis Foods - Fish and Fish Products](#)
- [Method of detection of maize starch in Tapioca sago](#)



- [Guides on sampling for microbiological analysis - Ayurveda Aahara products and Food Grain products](#)

In the recently published draft standard on Genetically Modified Foods, Forms [IA](#), [IB](#) and [II](#) (application format for the approvals of Genetically Modified Organisms and ingredients derived thereof) were missed out. These have been now put up at the website for comments.

[Draft regulation detailing the vegan logo specifications in terms size, colour scheme, etc is put up for comments.](#)

[FSSAI has published a procedure for the approval Rapid Kit /Equipment/Method](#)



Eating late increases hunger, decreases calories burned, and changes fat tissue

Science Daily October 4, 2022

While popular healthy diet mantras advise against midnight snacking, few studies have comprehensively investigated the simultaneous effects of late eating on the three main players in body weight regulation and thus obesity risk: regulation of calorie intake, the number of calories you burn, and molecular changes in fat tissue.

A new study provides experimental evidence that late eating causes decreased energy expenditure, increased hunger, and changes in fat tissue that combined may increase obesity risk.

A new study by investigators from Brigham and Women's Hospital, a founding member of the Mass General Brigham healthcare system, found that when we eat significantly impacts our energy expenditure, appetite, and molecular pathways in adipose tissue. Their results are published in Cell Metabolism.

Explained senior author Frank A. J. L. Scheer, PhD, Director of the Medical Chronobiology Program in the Brigham's Division of Sleep and Circadian Disorders, "Previous research by us and others had shown that late eating is associated with increased obesity risk, increased body fat, and

impaired weight loss success. We wanted to understand why. In this study, we asked, 'Does the time

that we eat matter when everything else is kept consistent?'" said first author Nina Vujovic, PhD, a researcher in the Medical Chronobiology Program in the Brigham's Division of Sleep and Circadian Disorders. "And we found that eating four hours later makes a significant difference for our hunger levels, the way we burn calories after we eat, and the way we store fat."

Results revealed that eating later had profound effects on hunger and appetite-regulating hormones leptin and ghrelin,

RESEARCH IN HEALTH & NUTRITION

which influence our drive to eat. Specifically, levels of the hormone leptin, which signals satiety, were decreased across the 24 hours in the late eating condition compared to the early eating conditions. When participants ate later, they also burned calories at a slower rate and exhibited adipose tissue gene expression towards increased adipogenesis and decreased lipolysis, which promote fat growth. Notably, these findings convey converging physiological and molecular mechanisms underlying the correlation between late eating and increased obesity risk.





"This study shows the impact of late versus early eating. Here, we isolated these effects by controlling for confounding variables like caloric intake, physical activity, sleep, and light exposure, but in real life, many of these factors may themselves be influenced by meal timing," said Scheer. "In larger scale studies, where tight control of all these factors is not feasible, we must at least consider how other behavioral and environmental variables alter these biological pathways underlying obesity risk."

Combining time-restricted eating and HIIT improves health measures in women with obesity

Science Daily October 4, 2022

Both time-restricted eating (TRE) and high-intensity interval training (HIIT) have been shown to improve cardiometabolic health in people who are overweight and at risk of serious disease. Now a randomized, controlled trial has tested whether combining these two approaches is more effective



than either of them on their own.

The results show that the combination improved the average long-term glycemic control compared to a no-intervention control group and induced 2-fold greater reductions in fat mass and visceral fat area compared with each intervention in isolation.

"Isolated TRE and HIIT have received increasing attention for being effective and feasible strategies for at-risk populations," says senior author Trine Moholdt, head of the Exercise, Cardiometabolic Health, and Reproduction Research Group at Norwegian University of Science and Technology (NTNU). "We wanted to compare the effects of the combination of TRE and HIIT with their isolated effects and to determine whether TRE and HIIT would act synergistically in improving health in individuals with risk for cardiometabolic disease. This

finding highlights the importance of changing both dietary and physical activity habits for individuals who wish to rapidly improve their health and lower their disease risk."

The trial had four arms: HIT alone, TRE alone, the TRE-HIIT combination, and a control group. A total of 131 women were enrolled, with 32 or 33 in each arm. All of them had overweight or obesity and had

risk factors for cardiometabolic diseases like type 2 diabetes and cardiovascular disease. TRE was defined as consuming all daily calories within a 10-hour time window. HIIT was defined as exercise done at 90% of maximum heart rate for 35 minutes, three times per week. The exercise sessions were supervised by the investigators, and the participants were asked to log their first and last calories every day.



The interventions lasted for 7 weeks. Several measures were taken both before and after the study, including the participants' blood pressure, body mass index, fat and cholesterol levels in the blood, and several measures of blood glucose and insulin levels.

The researchers found that the participants who combined TRE and HIIT were able to improve their average long-term glycemic control measured as HbA1c. They were also able to effectively reduce fat mass and visceral fat and increase their cardio-respiratory fitness measured as peak oxygen uptake. However, there were no statistically significant differences in blood lipids, appetite hormones, or vital signs after any of the interventions compared with the control group.



Dietary fibre is good for you, except when it's not

Science Daily October 13, 2022

Researchers uncover the role of dietary fibre and gut microbes in people with inflammatory bowel disease, a finding that could lead to personalized dietary guidelines.

People who suffer from inflammatory bowel disease may soon have access to personalized dietary guidelines to keep them feeling well, thanks to new research on how dietary fibre affects the disease. The research team discovered that certain types of dietary fibre cause an inflammatory response in some patients, causing symptoms to worsen. They are now working to develop a stool test to examine the microbes found in each patient's gut in order to predict who will have the negative response, so they can tailor dietary recommendations and treatment for individual patients.

Approximately 0.7 per cent of Canada's population, or one in 150 people, has IBD, including Crohn's disease and ulcerative

colitis, and that is predicted to grow to one per cent by 2030.

IBD symptoms may include abdominal pain, diarrhea, bloody stools, weight loss, late puberty, and a long-term risk of colorectal cancer. The exact cause is unknown, but some risk factors include genetics, diet, environmental factors and changes in the gut microbes.

"We know there are health benefits to consuming dietary fibres and they promote good gut health in healthy individuals, but IBD patients quite frequently complain about a sensitivity when they consume dietary fibres," says Heather Armstrong, who started the research as a postdoctoral researcher at the U of A and is now an assistant professor of internal medicine at the University of Manitoba and Canada Research Chair in Integrative Bioscience. "We really wanted to understand the mechanisms behind this."

"By creating this stool test, we are hoping to be able to tell you how to adjust your diet to prevent flares or further worsening," says Eytan Wine, a professor in the U of A's Faculty of Medicine & Dentistry. "It's a dynamic situation so it's possible that a certain food you should avoid now, in a few months you'll be okay to eat that again."

The researchers have identified that specific types of fibres found in foods such as artichoke,



chicory roots, garlic, asparagus, and bananas, are especially hard to ferment if certain microbes are missing or malfunctioning, as is often the case for IBD patients.

Fibre has a beneficial anti-inflammatory effect in most healthy people and aids with digestion, but the researchers have found that select unfermented fibres actually increases inflammation and worsens symptoms in some IBD patients.

"We want to start uncovering why it is that 20 to 40 per cent of patients experience sensitivity," says Armstrong, "while in the other portion of patients these dietary fibres can actually benefit health and protect against the disease and have very positive effects."

Wine and Armstrong both warn that the new dietary guidelines will not replace drug treatments, but should complement them so patients can avoid flares and get back into remission more quickly when they do experience inflammation.





Can obesity and stress influence appetite? New study shows it's all in your head

Science Daily October 19, 2022

In a series of experiments using functional magnetic resonance imaging (fMRI) to measure brain activity across networks in the brain, Johns Hopkins Medicine researchers looked at how stress might increase appetite in obese and lean adults.

The researchers found that stress impacts the brain's responses to food, and that both lean and obese adults react to food cues in areas of the brain associated with reward and cognitive control. The findings of the study were published Sept. 28 in PLOS ONE.

For the study, the researchers analyzed data from 29 adults (16 women and 13 men), 17 of whom had obesity and 12 of whom were lean. Participants completed two fMRI scans, one following a combined social and physiological stress test.

Participants were

given a food word reactivity test during both scans. This test involved looking at how people's brains reacted to food words, such as menu items on a chalkboard. To maximize the appetitive response in the brain, the researchers asked participants to imagine how each food looked, smelled and tasted, and how it would feel to eat it at that moment. They were also asked how much they wanted each food, and if they felt they should not eat that food, to see how they approached decision-making related to each food.

"The experiments showed that obese and lean adults differ somewhat in their brain responses, with obese adults showing less activation of cognitive control regions to food words, especially to high-calorie foods, like for example, grilled cheese," says lead researcher Susan Carnell, Ph.D., associate professor of psychiatry and behavioural sciences at the Johns Hopkins University School of Medicine.

The study also showed that stress impacts brain responses to food. For example, obese individuals showed greater activation of the orbito-frontal cortex, a brain reward region, after the stress test. "We also found evidence for links between the subjective stress experienced and brain responses in both groups. For example, lean individuals who reported higher stress following the test showed lower activation of the dorso-



lateral prefrontal cortex, a key brain area for cognitive control," says Carnell.

Snacking on almonds boosts gut health, study finds

Science Daily October 20, 2022

Eating a handful of almonds a day significantly increases the production of butyrate, a short-chain fatty acid that promotes gut health.

A team of researchers from King's College London investigated the impact of whole and ground almonds on the composition of gut microbes. The study, published today in the American Journal of Clinical Nutrition, is funded by the Almond Board of California.

The gut microbiome consists of thousands of micro-organisms living in the gut. These play a vital role in digesting nutrients and can have a positive or negative influence on our health, including our digestive and immune systems. The mechanisms of how the gut microbiomes have an impact on human health is still being investigated, but evidence suggests eating specific types of food can positively influence the types of bacteria





in our gut or what they do in our gut.

Researchers at King's College London recruited 87 healthy adults who were already eating less than the recommended amount of dietary fibre and who snacked on typical unhealthy snacks (e.g. chocolate, crisps). Participants were split into three groups: one group changed their snacks for 56 g of whole almonds a day, another for 56 g of ground almonds a day, and the control group ate energy-matched muffins as a control. The trial lasted four weeks.

Researchers found that butyrate was significantly higher among almond eaters compared to those who consumed the muffin. Butyrate is a short-chain fatty acid that is the main source of fuel for the cells lining the colon. When these cells function effectively, it provides an ideal condition for gut microbes to flourish, for the gut wall to be strong and not leaky or inflamed and for nutrients to be absorbed.

No significant difference was observed in gut transit time -- the time it takes for food to move all the way through the gut -- however whole-almond eaters had an additional 1.5 bowel movements per week compared to the other groups.

These findings suggest eating almonds could also benefit those with constipation.

Testing showed that eating whole and ground almond improved peoples' diets, having higher intakes of monosaturated fatty acids, fibre, potassium and other important nutrients compared to the control group.

Lead author Professor Kevin Whelan, Head of Department of Nutritional Sciences at King's College London, said: "Part of the way in which the gut microbiota impact human health is through the production of short-chain fatty acids, such as butyrate. These molecules act as a fuel source for cells in the colon, they regulate absorption of other nutrients in the gut, and help balance the immune system. We think these findings suggest almond consumption may benefit bacterial metabolism in a way that has the potential to influence human health."

Diet and exercise for obese mothers protects cardiovascular risk in infants

Science Daily October 24, 2022

IA lifestyle intervention of diet and exercise in pregnancy protects against cardiovascular risk in infants, a new study has found. The study, published recently in the International Journal of Obesity by researchers from King's College London and funded by the British Heart Foundation, found that 3-year-old children were more likely to exhibit risk factors for future heart disease if their mother was



clinically obese during pregnancy. A behavioural lifestyle intervention reduced this risk.

In the UK, more than half the women attending antenatal care are clinically overweight or obese. There is increasing evidence to suggest that obesity in pregnancy is associated with cardiometabolic dysfunction in children, and that serious cardiovascular disease may begin in the womb.

The UPBEAT trial, conducted at Guy's and St Thomas' NHS Foundation Trust, randomised women with obesity (a BMI of over 30 kg/m²) in early pregnancy to a diet and exercise intervention or to standard pregnancy care. The intervention included one-to-one counselling, restricting dietary intake of saturated fat, eating foods with a low glycaemic index such as vegetables and legumes, moderate and monitored physical activity and tools to record exercise.



The intervention arm saw improvements in weight gain in pregnancy, physical activity, a healthier diet, and a healthier metabolic profile across pregnancy.

Follow-up of the children at three years of age showed that children of women with clinical obesity had evidence of cardiac remodelling, a risk factor for future cardiovascular disease. Changes included increased heart muscle thickness, elevated resting heart rate, evidence of early impairment to the heart's relaxation function and increased sympathetic nerve activity ('fight or flight' response) compared to women of normal weight. The children of women who were allocated to the intervention arm were protected from these early changes in heart structure and function.

The study suggests that maternal obesity may have a lasting impact on the child's cardiovascular health. Promoting dietary changes and physical activity during pregnancy may reduce this risk.

'Sedentary lifestyle and sugary diet more detrimental to men

Science Daily October 27, 2022

A new study from the University of Missouri,

School of Medicine is the first evidence in humans that short-term lifestyle changes can disrupt the response to insulin of blood vessels. It's also the first study to show men and women react differently to these changes.

Vascular insulin resistance is a feature of obesity and type 2 diabetes that contributes to vascular disease. Researchers examined vascular insulin resistance in 36 young and healthy men and women by exposing them to 10 days of reduced physical activity, cutting their step count from 10,000 to 5,000 steps per day. The participants also increased their sugary beverage intake to six cans of soda per day.

"We know that incidence of insulin resistance and cardiovascular disease is lower in premenopausal women compared to men, but we wanted to see how men and women reacted to reduced physical activity and increased sugar in their diet over a short period of time," said Camila Manrique-Acevedo, MD, associate professor of medicine.

The results showed that only in men did the sedentary lifestyle and high sugar intake cause decreased insulin-stimulated leg blood flow and a drop in a protein called adropin, which regulates insulin sensitivity and is an important biomarker for cardiovascular disease.



"These findings underscore a sex-related difference in the development of vascular insulin resistance induced by adopting a lifestyle high in sugar and low on exercise," said Manrique-Acevedo. "To our knowledge, this is the first evidence in humans that vascular insulin resistance can be provoked by short-term adverse lifestyle changes, and it's the first documentation of sex-related differences in the development of vascular insulin resistance in association with changes in adropin levels."



Taking vitamin D and fish oil during pregnancy may reduce risk of croup, experts flag

05 Sep 2022 Nutrition Insight

The number of viral croup infections, often revealing itself in the "barking" cough of the infants and children who may contract it, may be reduced by the consumption of fish oil and vitamin D by pregnant mothers, according to a clinical study.

The study was presented at the European Respiratory Society International Congress in Barcelona, Spain.



"There is currently no vaccine against the pathogen that causes this disease," says Dr. Nicklas Brustad, a researcher at the Copenhagen prospective studies on asthma in childhood (COPSAC) at Copenhagen University Hospital in Denmark. "Therefore, other preventive strategies are needed, and measures initiated during pregnancy might be important since croup occurs in babies and young children. For such purposes, there is evidence that both vitamin D and fish oil could have an influence on the immune system."

New cure for an old problem

The study included 736 pregnant mothers who had received care from COPSAC over the past 12 years. They were divided into four groups and given different amounts of fish oil with omega 3 fatty acids and vitamin D from the time they were 24 weeks pregnant until birth.

The first group received 2800 IUs of vitamin D a day along with 2.4 g of fish oil, the second group was given olive oil and 2800 IUs of fish oil a day, the third group was given 2.4 g of fish oil and 400 IUs of vitamin D a day and the last group was given 400 IUs of vitamin D and olive oil everyday day.

The research team found that, compared to pregnant mothers who took olive oil during

pregnancy, children of mothers who consumed fish oil had an 11% chance of developing croup, or 38% less risk. Moreover, they found that when pregnant mothers took a higher dosage of vitamin D their children also had an 11% chance of developing croup, 40% less than children whose mothers took the normal dose.

"Our findings suggest that vitamin D and fish oil could be beneficial against childhood croup in sufficiently high doses," remarks Brustad. "These are relatively cheap supplements meaning that this could be a very cost-effective approach to improving young children's health."

Edited by William Bradford Nichols

Link between diet and seizures? Reducing amino acid consumption could impact neurological disorders

09 Sep 2022 Nutrition Insight

Researchers at Boston Children's Hospital have discovered explanations for the link between fasting and reducing epileptic seizures. They found how fasting affects neurons in the brain, which could create new approaches with medicines, potentially eliminating the need for fasting or restrictive diets.

"This study is the first step in understanding how dietary therapies for epilepsy work," says



Christopher J. Yuskaitis, a neurologist with the epilepsy centre and epilepsy genetics program at Boston Children's Hospital.

It has been researched that the mTOR cellular pathway is involved in many neurological disorders. The over-activation of this pathway in neurons increases susceptibility to seizures. Scientists already knew that signalling a protein called DEPDC5 acts as a brake on the mTOR pathway, and by fasting, the activity from mTORC is inhibited.

DEPDC5 gene mutations are also found in many people with epilepsy. The mutations have been linked to focal epilepsy, infantile spasms, and sudden death in children. However, the study to determine these results did not look at the brain.

"When we used an animal model that knocks out DEPDC5 specifically in the brain, we found that we could reduce seizures by using an mTOR inhibitor, that gave us the idea to explore the connection between DEPDC5, mTOR and fasting," explains Yuskaitis.





It's in the amino acids

From observing a mouse brain during a seizure, the scientists saw a reduction in the mTOR signalling after fasting. The reason for the reduction of this signalling was made clear when studying cultured rat neurons. There was a lack of three amino acids: leucine, arginine and glutamine.

The DEPDC5 protein senses these acids. Therefore, when they are not as present in the brain, the DEPDC5 protein inhibits the mTOR signalling. When the DEPDC5 was taken away, mTOR activity did not reduce, and fasting did not keep seizures at bay.

"Amino acid sensing seems to be critical for the beneficial effects of fasting on seizures. This suggests that patients with DEPDC5 mutations can't sense the loss of amino acids and may not benefit from dietary manipulation. But patients who don't have DEPDC5 mutations may benefit from a targeted dietary strategy," underscores Yuskaitis.

From this, the researchers concluded that the amino acids eaten play a significant role in seizures. Seizures can be reduced by implementing a diet with lower levels of the aforementioned amino acids or medications that block the absorption of those amino acids.

Edited by Sabine Waldeck

Omega 3s may hold the secret to slowing the process of aging, experts reveal

12 Sep 2022 Nutrition Insight

Researchers have found that omega 3 fatty acids may hold the key to defying aging by extending the life and length of telomeres. Telomeres are the ends of DNA strands that shorten over time and parallel the aging process.

Shortened telomeres have also been linked to several age-related diseases.

They further found that omega 3 fatty acids were able to interact with the DNA in such a way as to inhibit the shortening of telomeres they hold could further prevent age-related diseases and prolong youth.

According to the authors: "Maintaining the optimal amount of and the ratio between omega 3 fatty acids and other fatty acids in the diet helps to prevent diseases such as heart attacks, atherosclerosis, thrombosis, arrhythmia, stroke, immune-inflammatory disorders, asthma, arthritis, cancer, type II diabetes mellitus, obesity, and psychiatric disorders."

Focus on fatty acids

The researchers conducted a

review of studies consisting of over 3,000 human participants, as well as some studies conducted on rodents - which have longer telomeres than humans. They found that

variability in the shortening of telomeres suggested that it was a modifiable trait that could be influenced by factors such as inflammation, oxidative stress

and cell division among others.

The health benefits of omega 3 fatty acids have long been known. According to the study published in *Nutrients*, there is research to back most of it up. However, this may be one of the most complicated benefits to be studied yet.

According to the researchers, omega 3s and their derivatives act as "messenger molecules," helping to transmit signals along the nervous system, regulate the blood supply of different organs, transportation of ions across cell membranes and can even act as hormones. Now, the researchers have stated that there is also evidence that omega 3s can inhibit the effect of telomerase, the enzyme that acts to shorten telomeres.

Edited by William Bradford Nichols





Breakfast study challenges previous beliefs on metabolism and time-sensitive eating

16 Sep 2022 Nutrition Insight

Research published in Cell Metabolism funded by the Medical Research Council found that the same amount of calories were burned independent of at what time of day they were consumed. Eating a large breakfast was beneficial for appetite control, which plays a central role in weight management, although it did not affect metabolism.

Although there was no sign of weight gain when eating a more significant portion late during the day, previous studies have shown a higher likelihood of gaining weight if dining in the evening, a belief now challenged by the new findings.

"Perhaps you have heard of the meme 'breakfast like a king and dine like a pauper,' and that is partly what we did. We fed the volunteers with a big breakfast and a small evening meal, or a small breakfast and a large evening meal," says Alexandra Johnstone, professor at the University of Aberdeen's Rowett Institute, UK.

Chrono-nutrition
However, the research also found that those who consumed their most calories

at the start of the day felt less hungry throughout the day compared to those who ate most of their calories during the evening. Appetite control is known to play a crucial role in weight loss. In addition to controlling appetite, the findings suggest that there is no difference between the body's ability to burn calories depending on the time of eating, as previously believed.

"This study challenges the previous belief that eating at different times of the day leads to differential energy expenditure. The research shows that under conditions of weight loss, there is no optimum time to eat to manage weight and that change in body weight is determined by energy balance," says Jonathan Johnston, professor of Chronobiology and Integrative Physiology at the University of Surrey, UK.

Calories during day and night

Previously, industry members have spoken with NutritionInsight on the benefits of chrono-nutrition - consuming the biggest meal at the start of the day and gradually decreasing until evening - explaining that one calorie in the morning counts as 0.9, compared to one calorie in the evening which translates to 1.1. Additionally, researchers in Japan have stressed the importance of a high protein breakfast for skeletal and muscle health, as the average protein intake during breakfast is 15 g and dinner is 28 g, arguing that breakfasts should include higher protein levels. The



study is also built on the concept of chrono-nutrition.

"Our study disproves earlier studies that infer time-of-day calorie intake may influence energy balance through metabolic adaptation and instead implies that changes in appetite may be involved in improving weight loss," the new study notes.

Edited by Beatrice Wihlander

Drinking four cups of tea per day can help reduce type two diabetes, study shows

19 Sep 2022 Nutrition Insight

Consuming tea daily reduces the risk of developing Type 2 diabetes, suggests a study of over one million subjects. Each cup of green, black or oolong tea consumed daily reduces the risk of Type 2 diabetes by about 1%.

A systematic review and meta-analysis of 19 cohort studies involving more than one million adults from eight countries discovered that those who drank one to three cups of tea daily lowered their risk of Type 2 diabetes by 4%. Those who consumed at least four cups daily reduced their risk by 17% over ten years.





"Our results are exciting because they suggest that people can do something as simple as drinking four cups of tea a day to potentially lessen their risk of developing Type 2 diabetes," says lead author Xiaying Li from Wuhan University of Science and Technology in China.

Study finds that drinking four cups of tea per day could decrease Type 2 diabetes risk. However, in one cohort study, researchers found that tea drinkers had a similar risk of developing Type 2 diabetes compared to non-drinkers.

The researchers studied 5,199 adults (2,583 men and 2,616 women) who were recruited in 1997 and followed until 2009. The subjects did not have a history of Type 2 diabetes and were an average age of 42. Forty-six% of participants reported drinking tea, and by the end of the study, 10% of participants had developed Type 2 diabetes. In this cohort study, "we did not look at higher tea consumption," says Li. From the overall results of the meta-analysis, the results were more significant with higher daily tea consumption. The suitable conclusion from the researchers is that only considerable amounts of tea have a potential impact.

In June, research from The University of Penn State and Ohio State University revealed that consuming green tea extracts for four weeks can

reduce blood sugar levels. Last month, the US National Cancer Institute reported that individuals consuming two cups of black tea per day have a 9% to 13% lower risk of early death than non-tea consumers.

Certain ingredients in tea have also been shown to have calming benefits for the mind. L-theanine, an amino acid that supports relaxation and aids in healthy stress response by potentially reducing cortisol levels, is found in tea.

Edited by Sabine Waldeck

Meal timing impacts cognitive health, with "breakfast skipping" being detrimental, research suggests

119 Sep 2022 Nutrition Insight

Maintaining a balanced calorie intake over three main meals is associated with improved cognitive function compared to the other investigated dietary patterns, according to a China-based study. The researchers note that the findings will strengthen the case for future public health recommendations on balanced temporal distribution of energy intake (TPEI) for first-line prevention of cognitive impairment in the aging population if a correlation is shown.

The results showed that, in particular, skipping breakfast was linked to significantly lower cognitive performance and accelerated cognitive aging. The researchers add that additional research is required to confirm the results in various populations and explain the underlying mechanisms. The secondary

finding that higher energy intakes in the morning were associated with better cognitive function and slower decline supported the primary result that breakfast skipping was associated with faster cognitive decline than other TPEIs.

The researchers claim that this study - published in the journal of Life Metabolism - is one of the first population-based studies to investigate the relationship between TPEI and cognitive decline. A total of 3,342 participants from nine Chinese provinces with a baseline age of fewer than 55 years who were middle-aged and older (mean age of 62) were included in the study based on data from the China Nutrition Health Survey (CHNS) public database.

Using linear mixed models, which were adjusted for age, gender, residence, total energy, physical activity, smoking status, alcohol consumption, household income, education level and body mass index, it was determined whether TPEIs are correlated with cognitive function over ten years. Six patterns of TPEIs, including "evenly-distributed" pattern, "breakfast-dominant" pattern, "lunch-dominant" pattern, "dinner-dominant" pattern, "snack-rich" pattern and "breakfast-skipping" pattern, were identified using a data-driven k-means method.





The results showed that those with uneven TPEIs,

particularly those with a “breakfast-skipping” pattern, had significantly worse long-term cognitive function scores than those with an “evenly-distributed” pattern.

Maintaining a healthy balance of TPEIs can potentially improve cognitive health, whereas skipping breakfast can considerably raise the risk of cognitive decline in middle-aged and older people. This study’s conclusion emphasizes the significance of optimal TPEIs for cognitive function.

Edited by Nicole Kerr

Omega 3 fatty acids: DHA linked to higher attention levels in adolescents, study finds

29 Sep 2022 Nutrition Insight



Dietary docosahexaenoic acid (DHA) is related to attention performance in developing adolescents, specifically with selective and sustained attention and detecting and resolving conflict. This is according to a study conducted at the Barcelona Institute for Global Health (ISGlobal) in Spain, demonstrating the importance of consuming sufficient amounts of these polyunsaturated fatty acids (PUFAs) to support healthy brain development.

The study results also showed that increased levels of alpha-linolenic acid (ALA) in red blood cells have a positive

impact on impulsivity and dietary ALA cannot be linked to improved attention performance.

“The role of ALA in attention control is still unclear, but this finding may be clinically relevant, as impulsivity is a feature of several psychiatric conditions, such as ADHD,” says Ariadna Pinar-Martí, study author at the Barcelona Institute for Global Health.

“Our study indicates that dietary DHA most likely plays a role in attention-requiring tasks, but further studies are needed to confirm a cause-effect and understand the role of ALA,” adds Jordi Júlvez, study coordinator and ISGlobal research associate.

Investigating the impact of supplementation

The cross-sectional study used baseline data from the Walnuts Smart Snack Dietary Intervention Trial, a randomized controlled trial that aimed to see if

dietary supplementation with four walnuts per day (30 kernel grams) for six months improved brain neuropsychological and socio-emotional development in healthy teenagers compared to a control group (no walnuts). Over 12 months (2015 to 2016), the researchers recruited 771 participants from 11 Barcelona high schools that were geographically distributed evenly. Computerized assessments were administered to the participants to gauge their levels of impulsivity, capacity for inhibition in the face of distracting stimuli and sustained attention.



The adolescents also responded to a series of questionnaires regarding their dietary habits and provided blood samples to evaluate the levels of DHA and ALA in red blood cells, which are an accurate and reliable indicator of the prolonged dietary consumption of these fats.

Participants – aged between 11 years and 16 years – in the current study had data taken on their blood omega 3 status and neuropsychological tests (amounting to 332 participants). “Despite the established importance of DHA in brain development, few studies have evaluated whether it plays a role in the attention performance of healthy adolescence. In addition, the possible role of ALA, another omega 3 but of plant origin, has not been as extensively studied,” Júlvez explains.

By Nicole Kerr

Sleep quality improves when combining CBD and melatonin, finds landmark clinical trial

30 Sep 2022 Nutrition Insight

The trial aimed to evaluate the effects of different CBD products relative to melatonin, finding that sleep length and quality improved when combined.



"Melatonin is the most studied, proven and widely used non-prescription sleep supplement. It was surprising that the sleep improvement on melatonin alone was not significantly different from most cannabinoid products studied. There were also some surprising preliminary signs in this study to suggest that some cannabinoid products may cause less grogginess than melatonin," says Dr. Jeff Chen, CEO of Radicle Science. "Formulations with cannabinoids may potentially confer more pain and anxiety benefits compared to melatonin alone, although much more research into this is needed."

Prolonged sleep for the majority

In the blinded, randomized and controlled clinical trial, 1,800 people across the US participated. Five products were tested, all containing CBD and some with additional rare cannabinoids such as CBN and cannabichromene. One product contained an extra 5 mg of melatonin. All products were compared to the control product containing only 5 mg melatonin.

The distribution was randomized as the participants were given one of the products for daily consumption over four weeks. The measurement was done by regular reporting on usage, sleep quality, side effects and other health outcomes such as anxiety or pain. Out of five products tested, four showed sleep improvement compared to using melatonin alone as additional minutes of sleep

range from 34 to 76 minutes per night, although with no statistical significance. There was no difference in the frequency of side effects between products.

"These data support that cannabinoid products can be as effective as traditional sleep aides like melatonin, which allows for the development of enhanced therapeutically focused products and simultaneously builds consumer trust in pursuing cannabinoid products as an alternative to traditional sleep aides like melatonin."

By Beatrice Wihlander



Statistical oversight could explain inconsistencies in nutritional research

Science Daily October 13, 2022

People often wonder why one nutritional study tells them that eating too many eggs, for instance, will lead to heart disease and another tells them the opposite. The answer to this and other conflicting food studies may lie in the use of statistics, according to a report published today in the American Journal of Clinical Nutrition.

The research, led by scientists at the University of Leeds and The Alan Turing Institute -- The National Institute for data

science and artificial intelligence -- reveals that the standard and most common statistical approach to studying the relationship between food and health can give misleading and meaningless results.

Lead author Georgia Tomova, a PhD researcher in the University of Leeds' Institute for Data Analytics and The Alan Turing Institute, said: "These findings are relevant to everything we think we know about the effect of food on health. It is well known that different nutritional studies tend to find different results. One week a food is apparently harmful and the next week it is apparently good for you." The researchers found that the widespread practice of statistically controlling, or allowing for, someone's total energy intake can lead to dramatic changes in the interpretation of the results. Controlling for other foods eaten can then further skew the results, so that a harmful food appears beneficial or vice versa.

Ms Tomova added: "Because of the big differences between individual studies, we tend to rely on review articles to provide an average estimate of whether, and to what extent, a particular food causes a particular health condition. "Unfortunately, because most studies have different approaches to controlling for the rest of the diet, it is likely that each study is estimating a very different quantity, making the 'average' rather meaningless."



Senior author Dr Peter Tennant, Associate Professor of Health Data Science in Leeds' School of Medicine explained: "When you cannot run an experiment, it is very difficult to determine whether, and to what extent, something causes something else. That is why people say, 'correlation does not equal causation.' These new 'causal inference' methods promise to help us to identify causal effects from correlations, but in doing so they have also highlighted quite a few areas which we did not fully understand."

Pomegranate extract may help regulate appetite and curb food intake, research uncovers

22 Sep 2022 Nutrition Insight

The polyphenol-rich pomegranate extract Pomanox can increase satiety and the feeling of fullness while reducing the desire to eat following meals. According to a new study, this may present novel treatments and approaches to treating obesity and obesity-related illnesses.

The three-week, placebo-controlled, independent study conducted at Queen Margaret University in Edinburgh, Scotland, included 28 male and female participants from 18 to 65 years of age. All of the participants had a body mass index (BMI) between 18 and 34.9 kg/m² and no history of cardiovascular diseases or diabetes.

The participants were split into two groups of 14 and

given either a Pomanox pomegranate extract capsule with 210 mg of punicalagin and 328 mg of polyphenols or a placebo pill. The volunteers then took the pills before breakfast and lunch every day for three weeks and came back to the university for testing on the last day of the third week.

"On week three, satiety parameters were determined on the testing day after participants ingested a breakfast and a lunch meal with pomegranate juice (PJ) or placebo juice," explains Zangara. "The study found an overall significant difference between the groups with the Pomanox group experiencing significantly greater satisfaction and feeling of fullness than those in the placebo group."

The results reveal that the participants who took Pomanox not only felt less hungry and had higher levels of satisfaction and fullness than the placebo group, but they also enjoyed the smell of the food more than the placebo group, according to the individually subjective questionnaires. This implies that the test group enjoyed the meal more than the placebo group as well.

"Decreasing blood pressure



and increasing satiety, regulating glucose and lipid metabolism as well as targeting adipocyte differentiation, reducing stress hormones and balancing insulin, thus assisting holistically in the management of cardiovascular and metabolic health and weight management," he explains.

By William Bradford Nichols

Tiny molecules in breast milk may protect infants from developing allergies

Science Daily November 15, 2022

A new study finds that small molecules found in most humans' breast milk may reduce the likelihood of infants developing allergic conditions like atopic dermatitis and food allergies.

Breastfed babies are believed to suffer fewer allergic conditions, like eczema and food allergies, than formula-fed babies; yet the reason has not been well understood.



Now, a new study by Penn State College of Medicine finds that small molecules found in most humans' breast milk may reduce the likelihood of infants developing allergic conditions like atopic dermatitis and food allergies. The researchers said the discovery could lead to strategies for mothers -- such as encouragement and support for breastfeeding or dietary and exercise interventions -- to help lower the odds of their babies developing allergies.

Atopic conditions, like food allergies, asthma and a skin condition called atopic dermatitis occur in approximately one-third of children as a result of inappropriate activation of the immune system to environmental exposures. "Infants who breastfeed beyond three months may have a lower risk for these conditions, but we don't fully understand the biology behind this," said Dr. Steven Hicks, associate professor of pediatrics and pediatrician at Penn State Health Children's Hospital. Hicks' research focuses on the relationship between the environment, biology and neurodevelopment and growth in children.

His prior studies demonstrate how micro ribonucleic acids (miRNAs), tiny molecules that

can regulate gene expression throughout the body, can be used to diagnose certain health conditions like concussion or autism. "There are nearly 1,000 different kinds of miRNAs in human breast milk and composition varies due to maternal characteristics like weight, diet and genetics," Hicks said. "We hypothesized that four of these miRNAs could have a protective effect against infant allergies based on prior research showing relationships between these miRNAs and certain allergic conditions."

The researchers followed 163 mothers who planned to breastfeed for at least four months and their infants from birth through 12 months. They tracked how long each baby breastfed, and measured the miRNA composition of each mother's breast milk over the course of lactation (0, 4 and 16 weeks). The team calculated the amount of specific miRNAs infants consumed based on reported breastfeeding patterns and the concentration of certain miRNAs in mothers' milk samples. The researchers evaluated infants for atopic dermatitis, food allergies and wheezing throughout the study.

Of the infants studied, 41 (25%) developed atopic dermatitis,

33 (20%) developed a food allergy and 10 (6%) had wheezing. Infants who did not develop atopy consumed greater amounts, on average, of miRNA-375-3p (miR-375) in their mothers' breastmilk, than infants who developed atopy. There were no other differences in maternal traits, infant traits or environmental exposures between infants with atopy and infants without atopy.

The researchers also found that levels of this miRNA increased throughout lactation and that mothers with a lower body mass index tended to have a higher concentration of miR-375. The results were published in *The American Journal of Clinical Nutrition* on Sept. 27. "The fact that miR-375 content increased during the course of lactation may explain why sustained breastfeeding has been associated with reduced atopy in certain studies," Hicks said. He noted that the greatest increase of miR-375 happened in the first month following birth, but that the upward trend continued between months one and four. "In contrast with formula, which does not contain human miRNAs, miR-375 is present in more than 99% of human milk samples, and it accounts for just under 1% of all miRNAs in breastmilk."



Industry calls on global expansion for supplement bureaucracy, amid consultations for US Draft Strategy Plan

02 Sep 2022 Nutrition Insight

The US National Institute of Health is set to review its Draft Strategy Plan 2022 - 2026 on dietary supplements after the consultation period has ended.

Its top goal is to expand the scientific knowledge surrounding ingredients and broaden the industry workforce. Drafting of the plan was undertaken by the Office of Dietary Supplements (ODS).

Commenting on the strategy, Andrea Wong, Ph.D. senior vice president, scientific and regulatory affairs at the Council for Responsible Nutrition (CRN), highlights a key area of change in the plan is a shift in communication.

"As industry is an important stakeholder in the dietary supplement space, we recommend that specific language is developed in the strategic plan on how to develop and maintain two-way communication and potential partnerships with industry members. Much of the language is one-way, coming from ODS to industry, but does not appear to be encouraged from industry to ODS, beyond commenting on the strategic plan."

&FOOD SCIENCE INDUSTRY NEWS

Wong notes ODS is likely the only government-funded office in the world that supports and funds research, tools and education focused on dietary supplements.

"While we recognize that the stakeholders of ODS are in the US, we recommend that ODS, to the extent possible, extend its efforts globally to help other governments establish similar entities in other countries."

The plan outlines five specific goals:

1. Expand the scientific knowledge base on dietary supplements and their ingredients by stimulating and supporting a full range of biomedical research and by developing and contributing to relevant initiatives, workshops, meetings, and conferences
2. Enhance the dietary supplement research workforce through training and career development
3. Foster development and dissemination of research resources and tools to enhance the quality of dietary supplement research
4. Translate dietary supplement research findings into useful information and

disseminate it to researchers, health professionals, government officials, policymakers, and consumers.

5. Coordinate and support the development of collaborative initiatives to address gaps in dietary supplement research.





According to the ODS, more than 80,000 dietary supplements products contain vitamins, minerals, herbs, botanicals, probiotics, glucosamine and fish oils. "Yet questions remain about the cellular mechanisms, metabolism, efficacy, and safety of many dietary supplement formulations." The plan entails the ODS will identify dietary-supplement-related public health areas and support innovative research to evaluate the health effects of dietary supplements. A core focus will be promoting health and reducing the risk of disease.

A report published by the CRN revealed that using supplements with an eye on preventative healthcare could save the government billions of dollars in healthcare. According to the report, 75% of the health care spending in the US covers the costs of chronic diseases that could "potentially be avoided with preventative care." It highlights that cumulative net target avoided costs for the period 2022-2030 would be \$40.2 billion, for preventative hospitalization costs caused by omega 3.

As part of the strategy, the ONS also seeks to collaborate with stakeholders to inform public health policy in relation to nutrients and supplement ingredients. It is also eyeing a supplement database to

address dietary supplement intakes.

"This work allows for assessments of dietary supplement formulations such as through quantification of ingredients and studies of disintegration, with particular focus on nutrients and supplements of current public health concern. These include iron, iodine, folic acid and folate, prenatal and infant and child multivitamins, and herbal supplements."

According to Wong, dietary supplement use and its contribution to meeting the unique nutrient needs of lactating women is under-researched. "ODS could conduct or support research in this area and educate consumers and healthcare providers on the different nutritional requirements during the post-partum period compared to during pregnancy."

By Andria Kades



Industry asserts vitamin D supplementation effective for COVID-19 prevention

12 Sep 2022 Nutrition Insight

The Council for Responsible Nutrition (CRN) is responding to studies conducted in the UK



and Norway, that unveiled a correlation between vitamin D consumption and the progression of COVID-19. The two studies published in the British Medical Journal found that the best method of preventing COVID-19 is still vaccination. Moreover, vitamin D and cod liver oil supplements shouldn't be given to healthy individuals with appropriate vitamin D levels.

"Two new studies from the British Medical Journal on vitamin D and COVID-19 should be read cautiously, despite some overly simplistic early media coverage," says Luke Huber, VP of scientific and regulatory affairs at CRN. "Reporting on this research that suggests vitamin D levels are not relevant to COVID-19 outcomes ignores the large body of research on this connection and downplays critical limitations of these studies."

Huber notes that the "editorial accompanying the studies highlights some of the limitations of each study and notes that they 'aren't the final word' on vitamin D's role in protecting against COVID-19. For example, the editorial points out that about 50% of participants in the control arm of the Jolliffe et al. UK study were using vitamin D alone."



Analyzing supplementation impact on COVID-19

The initial study was conducted in the UK between May and October 2021. The researchers discovered that the incidence of COVID-19 was unaffected by vitamin D intake. A high prevalence (64.6%) of individuals have inadequate 25-hydroxyvitamin D levels (50 nmol/L).

"To prevent COVID-19, CRN encourages following proper public health measures including vaccination, testing, wearing a mask and maintaining social distance as appropriate, as well as optimizing vitamin D levels, which can be achieved through supplementation," Huber explains. "This isn't an either/or situation. It's a both/and - and those who suggest otherwise are doing the public a disservice."

Meanwhile, the other experiment, which substituted cod liver oil for low dose (400 IU/day) vitamin D supplementation, was carried out in Norway between November 2020 and June 2021.

For six months, the researchers randomly assigned 34,741 participants to take 5 mL of cod liver oil or 5 mL of a placebo. Once more, the researchers discovered no

impact of cod liver oil on any result, including COVID-19, which was validated by a polymerase chain reaction.

Vitamin D deficient individuals

Huber adds that the editorial also notes "these new trials remain compatible with the two large meta-analyses suggesting that vitamin D supplementation may be beneficial for vitamin D deficient individuals."

"Indeed, meta-analyses of studies conducted since the beginning of COVID-19 largely demonstrate a positive role for higher vitamin D levels in reducing the incidence, severity and mortality from the disease. The editorial makes clear, 'For those with inadequate vitamin D levels (<50 nmol/L), supplementation with 1000-2000 IU/day could be a safe, simple and affordable way to restore vitamin D levels, improve bone health and take advantage of any possible protective effect against respiratory tract infections.'"

Vitamin D supplementation and safety

Regarding vitamin D's role and viral infections, it was previously noted in a clinical study that pregnant women who consume fish oil and vitamin D may lower the number of viral croup



infections, which frequently manifest themselves in the "barking" cough of the infants and children who may develop them. However, the French Agency for Food, Environmental and Occupational Health and Safety (ANSES) warned of the risks of vitamin D overload, particularly for infants.

By Nicole Kerr

Enriched seaweed may be a key element in the fight against world hunger, experts flag

01 Sep 2022

A newly developed aquacultural process for growing seaweed enriched with proteins, dietary fibre, minerals and nutrients may help ensure food and nutrition security for generations, according to researchers in Haifa, Israel. The scientists state the enriched seaweed superfood is healthy and fit for both human and animal consumption.





seaweed a superfood that could be used by the health food industry, farmers as a feed source and even the cosmetics industry. The scientists also underscore that it is an unlimited food source.

the production of the desired nutrients within the seaweed.

Furthermore, the researchers found that the enriched seaweed was able to remove nitrogen, nitrates, phosphates and ammonia at a rate of 50-75% from the surrounding water, reducing the pollutants produced by the fish farms.

The researchers, based out of the Tel Aviv University and the Israel Oceanographic and Limnological Research Institute, reveal an environmentally-friendly and sustainable process that provides nutrition in the form of seaweed, and has the added benefit of purifying the water in the areas where they are grown.

"Technologies of this type are undoubtedly a model for a better future for humanity," says Doron Ashkenazi, lead researcher and Ph.D. candidate. "The enriched seaweed can be used to help populations suffering from malnutrition and nutritional deficiencies, for example, disadvantaged populations around the world, as well as supplements to a vegetarian or vegan diet."

Swimming with nutrients

According to the study published in Innovative Food Science and Emerging Technologies, the new process increases the growth rate of the local seaweeds *Hypnea*, *Gracilaria* and *Ulva* by as much as 25% a day. Moreover, the method also increased the levels of minerals, starches, proteins and carbohydrates within the seaweed's tissues.

The researchers further hold that the process makes the

"Seaweed can be regarded as a natural superfood, more abundant in the necessary components of the human diet than other food sources," says Ashkenazi. "Through the technological approach we developed, a farm owner or entrepreneur will be able to plan in advance a production line of seaweed rich in the substances in which they are interested."



The researchers grew the seaweed near fish farms utilizing a "two-step" aquaculture process. First, they grew the seaweeds in proximity to fish farms and diverted the fishes' nutrient-rich wastes into cultivation tanks. Next, they exposed them to abiotic stressors in the forms of nutrient starvation, high irradiance and salinity. These processes stimulated

Ashkenazi states that aquaculture farmers can use the process to customize what nutrients they grow with the seaweed. "For example, seaweed with a particularly high level of protein, seaweed rich in minerals such as iron, iodine, calcium, magnesium, and zinc, or in special pigments or anti-oxidants," he explains.

Additionally, the scientists attest that the practice of aquaculture adds to the sustainability of the process. They state that, unlike land-based agriculture, this process does not require fresh water, large areas or excessive amounts of fertilizer, making the process more environmentally friendly than traditional agricultural practices. This may help combat the effects of climate change by reducing emissions associated with conventional terrestrial agriculture.

Edited by William Bradford Nichols



Supplements hold potential to save billions in preventative healthcare, CRN reports

01 Sep 2022 Nutrition Insight

The Council of Responsible Nutrition (CRN) has released a self-funded economic report saying evidence of using certain dietary supplement ingredients can reduce medical costs “directly and indirectly.”

The findings aim to analyze the potential health care cost savings that could be realized if at-risk individuals were to use certain dietary supplements that have been shown to lower disease event risk.



The Supplements to Savings report refers to chronic diseases and conditions, such as coronary artery disease, osteoporosis, age-related macular degeneration, cognitive decline, irritable bowel syndrome, and childhood cognitive development disorders, as the main field of medical savings.

According to the report,

75% of the health care spending in the US covers the costs of chronic diseases that could “potentially be avoided with preventative care.”

It highlights that cumulative net target avoided costs for the period 2022-2030 would be \$40.2 billion, for preventative hospitalization costs caused by omega 3.

“Identifying at-risk populations early and providing targeted nutritional interventions like dietary supplements is a cost-effective approach alongside other healthy habits,” says Andrea Wong, SVP of scientific and regulatory affairs at CRN.

“A steadily growing body of clinical research shows investing in preventive care through supplementation helps people avoid chronic conditions. This strategy is what we call a no-brainer,”



Wong adds.

Contradiction? Criticism from several directions

The report highlights increased clinical research carried out over the last decades are advancing in the gastronomical field with probiotics and dietary supplements for high risk diseases.

The results showed that different supplements reduced the relative risk rates for different health conditions. Coronary artery disease showed 15.7%, irritable bowel syndrome showed 34.7% reduced risk, and cognitive decline showed 9.5% reduced risk. Testing was carried out comparing an intervention group to a control group.





"From these types of analyses, risk and possible risk reduction can be calculated using a cost-benefit model, which can be useful for key decision makers (including patients, health care professionals, governments, insurance companies, and employers) in determining if a given regimen is cost-effective," says the report.

However, a recent study published in JAMA suggests that the US population spends US\$50 billion a year on vitamin and dietary supplements, referring to it as a "waste of money."

The study argues evidence supporting supplements to have a preventive effect on cardiovascular diseases is insignificant and that a "healthy diet and exercise is the key" to good health, and supplements should only be used for vitamin deficiency as there is no such thing as "a magic pill."

Additionally, research has shown the adverse effects of taking supplements. The French Agency for Food, Environmental and Occupational Health and

Safety recently warned the public about the dangers of vitamin D overdose. It stressed that "too many supplements may be as bad as too little."

Regulatory and authoritative battle

Doctors have also warned of overdosing on vitamin D, presenting an extreme case of a man suffering severe side effects such as kidney injury, leading to hospitalization.

Steve Mister, president and CEO and CRN, has previously criticized the US Food and Drug Administration (FDA) for putting "too much emphasis on risk and not enough attention to the fact that there are benefits from these products. The American Herbal Products Association provided a similar critique to the agency, as health risks outweigh the benefits of supplements in the campaign.



The FDA has also been accused of not doing enough in terms of supplement regulation while responding that a lack of authority from regulation is present, requiring congress to step in.



Missing factors

The research had some limitations, and some factors were not taken into consideration, which the study stresses. "This study does not control for average food intake of these ingredients because it is assumed that most of the clinical studies did not fully control for food intake either, suggesting that the observed effect sizes have taken into account some food-based intake."

"Finally, variability due to differences in sample size, research methodologies and study protocols, and patient population characteristics among the included studies was high, making a comparison of the relative efficacy of dietary supplements unadvisable," concludes the study. The supplements were tested individually and therefore, it cannot confirm that combining supplements has health-beneficial or adverse effects.

By Beatrice Wihlander



REGULATORY NEWS

Verifying vegan integrity: India mandates traceability as key criterion for firms to obtain regulatory approval:

Food Navigator 21 Sep 2022

The Food Safety and Standards Authority India (FSSAI) has specified supply chain traceability up to the manufacturer level as a key criterion for food firms manufacturing vegan products to obtain the relevant regulatory permissions.

interesting addition, which was the mandating of traceability within the production value chain of all foods and beverages looking to make the vegan claim.

"There shall be traceability established up to the manufacturer level, and the [relevant food firm] shall comply with any other requirements specified by the Food Authority to maintain the vegan integrity of the foods or food ingredients or products," FSSAI CEO Arun Singhal said via a formal statement.

unveiled that seafood is a source of highly nutritious food with a comparatively low climate impact. Therefore, switching protein sources could significantly reduce emissions while also providing nutritional benefits.

"Food production and our diets represent a large portion of global greenhouse gas emissions (GHG) and therefore also major opportunities for improvement," Friederike Ziegler, associate professor and senior scientist, Department Food and Agriculture at Rise Research Institutes of Sweden, tells NutrionInsight.

Seafood better alternative for reduced greenhouse gas emissions and improved nutrition, study suggests

13 Sep 2022
Nutrition Insight

Joint research from the Rise Research Institutes of Sweden and Dalhousie University, Canada,

Earlier this year, the agency implemented the enforcement of new vegan regulations with immediate effect but with an





patterns toward species and production methods with improved nutrition and climate performance, considering specific nutritional needs and emission

reduction goals.

"The work study findings could be applied in policymaking in several ways. We show large differences in emissions between different ways a product is produced in - so the same species, but different production methods.

Policymaking should favour the lowest impact production methods for each species and move toward the lowest impact species. Dietary advice could shift to the most nutritious and least impact species and production methods, while also considering the nutrition needs of specific populations or population groups."

Optimizing nutrition and lowering impact

The researchers note that the research can shift seafood production and consumption toward species that optimize nutrition while minimizing climate emissions, both in terms of which species are produced and how. Such recommendations could be tailored to match particular population groups' dietary requirements and emission reduction objectives.

The researchers recommend refocusing and tailoring production and consumption

"Both the food industry and consumers can learn a lot from understanding the differences in nutrition content and greenhouse gas emissions between different species and production methods," continues Ziegler. "By taking these aspects into account in their choice of products or raw materials - or formulation of products - they could achieve more nutritious and lower emission seafood production and consumption."

Assessing environmental impact

The findings suggest significant variations in climate performance among seafood species, even within the same species group or species, depending on the production methods.

Increased intake of small pelagic species, wild-caught salmonids and bivalves would improve nutritional advantages while significantly reducing greenhouse gas



emissions associated with seafood consumption, mainly if replacing red meat.

Ziegler explains the by-catch discarded after seafood fishing: "greenhouse gas emission is only one dimension of environmental impact. We selected it because it can be quantified for all types of food and along a supply chain."

"For wild-caught fish, there is often a connection between fisheries that have a high climate impact and high amounts of by-catch and discard as well as other ecosystem impacts (for example, shrimp trawling). That is not to say low-carbon fisheries cannot have high by-catch. It is important to limit the conclusions from a study to its scope."



Considering if seafood would be a better alternative to plant-based meat substitutes on an environmental scale and health-wise, Ziegler adds: "Seafood contains several nutrients which other research has shown are only found in low amounts or not at all in plant-based foods (for example, selenium and omega 3 fatty acids) and they also seem to be found in more bioavailable forms in animal-based than in plant-based foods."

By Nicole Kerr

Clean label: Banned ingredients, research and consumer influence, driving industry development

01 Sep 2022 Nutrition Insight

With consumers increasingly seeking out supplements for their health, the ingredients and details on product labels have become far more important. As the term "clean label" becomes more of a mainstay in industry, NutritionInsight speaks to experts from ADM, Lonza, Rousselot, Arla Foods Ingredients and Gencor on how the space is adapting to the changes and what challenges remain.

"While there is not one definition for what constitutes 'clean label,' products that have short, recognizable ingredient lists are influencing the majority of shoppers' purchasing decisions," says

Michelle French, director global sustainability programs, ADM.

According to Lindsey Toth, director of global marketing at Lonza Capsules & Health Ingredients, the term "clean label" has evolved to become a broader umbrella trend that encompasses many key consumer preferences - from naturally sourced, vegan and vegetarian to non-GMO, kosher and Halal.



Sustainability positionings and easy-to-understand ingredient lists are also increasingly important.

According to Kenny Suazo, marketing associate at Gencor, some of the challenges that come with clean label consist of the need to review product formulation. Companies have been mass producing products to meet mass consumption for decades; however, consumers today demand products that are considered healthier.

"Therefore, companies must reformulate their

product ingredient list to replace their synthetic equivalent; therefore, R&D efforts are necessary for ingredient replacement," continues Suzao.

Nonetheless, reformulating the ingredient list for an existing product is very complex and presents challenges. "For example, a new recipe for a current product that consumers love that provides the same shelf life, colour, flavour, and texture can result in finished product problems," he adds.

Toth notes another challenge for producers is that the ongoing evolution across the space means there is no official definition by the US Food and Drug Administration for clean labels.

"Creating supplement solutions that deliver a 'clean label' promise can be tricky, especially when combined with other trending supplement positionings."





propyl-methylcellulose (HPMC) or modified starch ingredients are sometimes used instead of gelatin. While both of these alternative ingredients are extracted from

plants, grains or vegetables, they are also chemically modified. Gelatin, on the other hand, enables cleaner labelling, notes Roesems.

Banned ingredients

Colours have been particularly challenging for food, beverage and dietary supplement manufacturers to reach clean label targets, as there are still

ingredients and solutions used that may not meet consumers' clean label perceptions, highlights Hélène Moeller, vice president, global product marketing, flavours at ADM.

"The EU's ban on titanium dioxide was an especially large shift for the industry, as manufacturers sought out alternative options. Common white colour alternatives, such as modified starch, calcium

carbonate and calcium phosphate, can each pose a range of labelling and formulation drawbacks, including poor solubility and requiring chemical modification to overcome complications."

Caramel is another widely used colour in the food industry that has been a subject of scrutiny. As manufacturers move away from this ingredient, there is an opportunity for the introduction of stable, brown

hues that are derived from a natural source, she adds.

"Replacements for carmine and cochineal are also in demand, particularly as

consumer awareness of these sources increases. With that said, plant-based alternative solutions are poised for growth. Innovation in this space continues to expand, and soon we will see new colour solutions that more closely align with consumers' clean label perceptions and can hold up in a variety of processing conditions," concludes Moeller.

By Andria Kades



Mataya Roesems, global marketing and project manager at Rousselot, explains that removing additives from an ingredient list can create issues with mouthfeel, viscosity, taste and even the stability of the final product.

"Gelatin can help with all these functionalities and properties. It is highly versatile and can be used to replace several mono-functional hydrocolloids in a single application. Completely natural, e-number free and instantly recognizable to most people as a staple pantry ingredient, no other ingredient exhibits as many functionalities as gelatin, which makes it an unrivalled asset to formulation design and clean label manufacturing."

Clean labelling is also a challenge when it comes to plant-based formulation. Looking at capsules, hydroxyl-

