PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN NOV 2022

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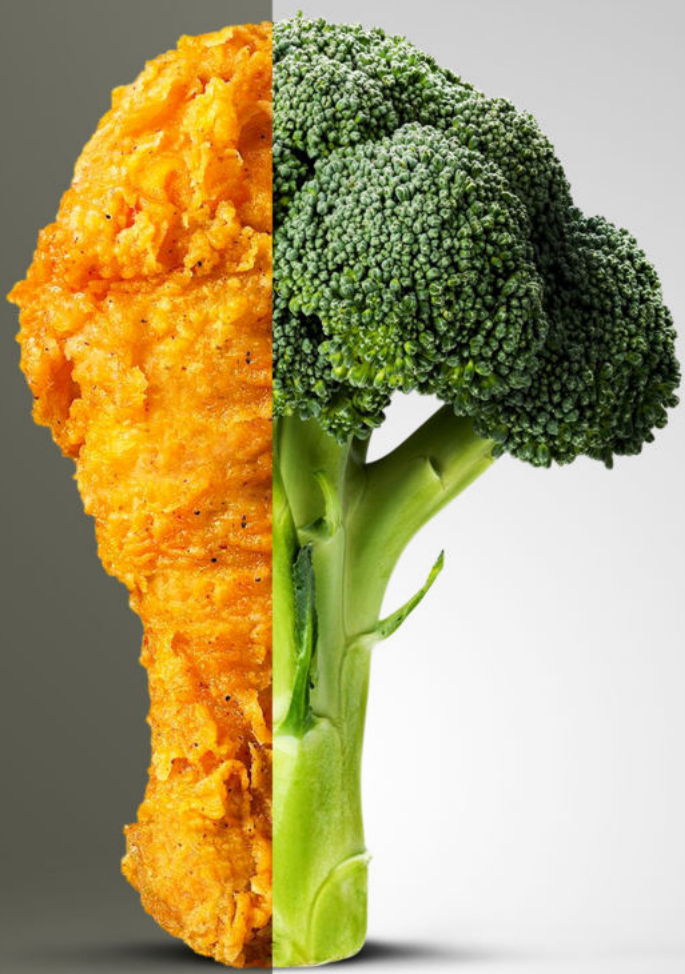

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Cover Design & Bulletin Layout by Ms. Leena Shanbhag

EDITORIAL

One of the most popular spices in Indian cuisine is turmeric, which every Indian consumes right from the childhood. Although many like the yellow colouring to foods containing turmeric, it has benefits far more important than just the cosmetic effect. Many studies have shown that turmeric has benefits for our body and brain, mostly because of its main active ingredient curcumin. Curcumin has powerful anti-inflammatory effects and is a very strong antioxidant. Since inflammation plays a role in heart disease, cancer, metabolic syndrome, Alzheimer's disease etc. curcumin with anti-inflammation property can be useful to fight these.

Curcumin can also boost brain-derived neurotropic factor that plays role in memory and learning and may be effective in delaying many brain diseases and age-related decreases in brain function. It has also shown promise in treating depression. Curcumin supplements are also useful to arthritic patients as it was shown to be more effective than an anti-inflammatory drug in rheumatoid arthritis.

Turmeric, which is used as spice in cooking, has only 3% curcumin and many benefits have been shown to be at much higher level of consumption than would be available through turmeric. So many supplements are prepared by using concentrates or isolated purified curcumin preparations. Then the amount of curcumin that one can consume goes much higher. There is another problem and that is bioavailability of curcumin. It is fat-soluble and so unless there is oil or fat in food it would be difficult to get benefit of curcumin.

They also found out that its bioavailability improves tremendously when a substance from black pepper namely piperine is present with it. Piperine enhances the absorption several times.

This is where care needs to be taken when such a supplement is available in the market. A powerful substance with very high biological activity when taken in large quantity along with a substance which increases its absorption tremendously, should be taken with care or under supervision of a medical professional. There are capsules and tablets available in market, which contain 1 to 1.5g per capsule along with piperine. There have been several cases reported in Italy and France of hepatitis involving people who consumed turmeric supplements. Possibly these people took many capsules per day. They probably wanted health benefits faster and to a greater extent.

One supplement in the market claims to have curcumin in one capsule equivalent of 32 kg turmeric root. It also has piperine that improves absorption of curcumin. If someone were to consume several capsules without realising harmful effects of excess consumption, there would unhealthy consequences. While marketing such products, warning should be given on label of adverse effects when consumed in excess. We hope that bioactive substances can provide healthy benefits if consumed in proper amounts, but if consumed in excess they could be dangerous.

Prof Jagadish Pai,
Executive Director, PFNDAI

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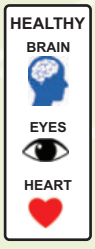

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FOOD FOR THOUGHT OR THOUGHT FOR FOOD

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ALL THAT IS BROWN IS NOT WHOLE WHEAT BREAD

There is a misconception amongst consumers that brown bread is healthier than white bread. We also assume that brown bread means whole wheat bread and is healthier than white bread.

Breads may be called by different names but in India we did not have any clearcut regulation until the recent FSSAI notification differentiating Brown bread from whole wheat bread. Information available on the internet (cheatdaydesign.com) contains description of 16 types of bread, many of them are not available or made in India. The following definitions/ descriptions are for some commonly known varieties of bread.

For example,
Wheat bread – Bread made with Wheat Flour. It may be made with refined flour with a little more fiber than the common white flour or Maida bread or White bread.

Whole Wheat bread – Made from wheat kernels, which may be left intact, and by definition, this is the genuine whole grain bread.

Multigrain bread- made with flour sourced from multiple varieties of grains, need not necessarily be whole grain. It could be processed grain from multiple types of grains

Whole grain bread where the grains are left intact

Sprouted grain bread- this is self-explanatory

Sourdough bread where the rise in the bread is through fermentation rather than with yeast like the regular bread

Brioche bread- made by addition of butter, milk, and eggs- a calorie rich high fat high protein bread.

Brown bread may just be like white bread with addition of molasses to make it brown or using any other substance that imparts the brown color e.g. Coffee. Hence it is not a healthier choice than white bread.

The present FSSAI regulation states that whole wheat bread should be made of at least 75% whole wheat flour and Brown bread contains at least 50% whole wheat flour. Once this is implemented both whole wheat and brown bread will be a relatively better choice than White bread.

These are expected to come into force from May 2023.

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REGULATORY VIEWPOINT

AUTHOR

Dr Joseph I Lewis,

Chairman, Regulatory Affairs, PFNDAI

Foods for one or more reasons are associated with age.These may be due to physical status, prevailing disorders and medical conditions. They arise at birth or during one's lifespan.

What are the criteria to associate age with foods. To start with, infants are the earliest consumers of foods placed on the market. During the first six months, infant food substitutes are available for infants in good health as well those with conditions like lactose intolerance, allergen, and in born errors of metabolism (IEM). Moving up from 6 to 24 months are infant foods, follow up formula, milk and cereal based complementary foods. These age related foods, under the Food Category System 13.1 and 13.2, must be suitable for the claimed nutritional purpose.

When associating age with foods two things must be clear; consistency in age-person definitions and second, the nutrition and/or physiological criteria that uniquely separates them from general foods. The Labelling and Display regulation defines child or children as 'a person under 18 years of age. The definition embraces all age groups. By this definition the applicability of complementary foods to children turning 18 is quite puzzling. Recognizing its "broadness", the definition then concedes to "age limit for a specific category may be indicated".

Age related recommendations or restrictions may be for several reasons. Apart from specially formulated products (infant foods, FSMP), they could be associated with sensitivity to substances or inappropriateness. The regulation permitting foods with 1-3g plant sterols/stanols requires a statement that such foods are "not nutritionally appropriate" for children under the age of 5 years, suggesting its cholesterol lowering benefits are more appropriate for other groups. When age-related restrictions change without reason, it raises questions on whether this is from emerging scientific evidence or lack of due diligence.

In 2016 only health supplements were restricted to children above age 5years, while other categories had no such binding. Six years later Nutra draft 2022, stipulates these foods are intended for persons above age 2 years. Schedule IV (Plant and botanicals), however has about 12 ingredients not recommended for children below 5 years and another group restricted for children below 16 years. Apparently, age restrictions here are related to ingredient levels of use and not to product or category. The note attached to the Schedule specifying daily intakes for children between 2-5 years to one fourth adult dosage and one half for children between 5-16 years clarifies this. Products prepared under Ayurveda Aahara too are intended for persons above 2 years.

Apparently there is a cut off point that emerges at age 2 years. Also, from this age onwards food products are acceptable for general consumption, unless there is a specific sensitivity or necessity. It may be noted, EU defines infant as a child up to 12 months and young children between 12 to 36months. Interestingly, Codex under its guidelines on nutrition labelling provides Nutrition Reference Values (NRVs) for the general population identified as individuals older than 36 months.

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FORTIFICATION- CHALLENGES AND OPPORTUNITIES TO COMBAT MALNUTRITION

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Fortification is an effective technology of deliberately increasing the content of one or more micronutrients (vitamins and minerals) in a food or condiment to improve the nutritional quality of the food supply and provide a public health benefit with minimal risk to health. It is also a means to restore the micronutrients lost during processing.

Globally, 92 countries have legislation to mandate fortification of at least one industrially milled cereal grain. Mandatory regulations are most often applied to the fortification of food with micronutrients such as iodine, iron, vitamin A and folic acid.
Of these, the iodisation of salt is the most widely implemented globally. In 2008 and 2012, the Copenhagen Consensus ranked food fortification as one of the most cost-effective development priorities.

In October 2016, FSSAI published the Food Safety and Standards (Fortification of Foods) Regulations, 2016 for fortifying staples namely Wheat Flour and Rice (with Iron, Vitamin B12 and Folic Acid), Milk and Edible Oil (with Vitamins A and D) and Double Fortified Salt (with Iodine and Iron) to reduce the high burden of micronutrient malnutrition in India. The '+F' logo has been notified to identify fortified foods.

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Fortification is an evidence-based intervention that contributes to the prevention, reduction and control of micronutrient deficiencies. It can be used to correct a demonstrated micronutrient deficiency in the general population (mass or large-scale fortification) or in specific population groups (targeted fortification) such as children, pregnant women and the beneficiaries of social protection programmes. When the vitamins and minerals are not added to the foods during the processing but just before consumption at home or at schools or child-care facilities, it is called **point-of-use fortification**. It has the potential to reach the smallest of the corners of the world and does not depend on the literacy levels of the populations.

One of the biggest success stories in combating the micronutrient deficiencies is iodised salt. Many governments around the world have mandated the enrichment of salt – an inexpensive food item consumed regularly by all people – with iodine as a means to ensure that nutritional needs are met and goitre belts have been removed from the face of the earth. To address anaemia and micro-nutrient deficiency in the country, Government of India approved the Centrally Sponsored Pilot Scheme on "Fortification of Rice & its Distribution under Public Distribution System" for a period of 3 years beginning 2019-20 with total budget outlay of Rs 174.64 Cr. Amongst the 15 states, Fortified rice will be supplied across the Targeted Public Distribution System (TPDS) under the National Food Security Act (NFSA), Integrated Child Development Services (ICDS), Pradhan Mantri Poshan Shakti Nirman- PM POSHAN (erstwhile Mid-Day Meal Scheme) and other welfare schemes in a phased manner by 2024.

While governments play a key role in legislating fortification standards, it is important to improve the awareness amongst the healthcare workers working at the grass-root level. Food fortification isn't the fanciest of all nutrition solution and it doesn't impact food preparation methods, lifestyles, or flavour which is why it is such a grand success at the grass root level.

Some of the interesting Food Fortification Success Stories

1920s: The United States Fought Iodine Deficiency by Fortifying Salt: the prevalence dropped until iodine deficiency diseases were "virtually eliminated," according to the CDC, and more than 70% of American households had access to iodised salt. Now, salt is fortified on a mandatory or voluntary basis in over 120 countries.

1970s: The Guatemalan Government Mandated Vitamin A in Sugar: Decreases Child Blindness. While there is the potential for overconsumption of sugar, which may cause adverse effects, the Guatemalan program brought vitamin A deficiency down from 22% to 5% in the first year – and it was soon adopted by countries across Central America.

Way back in 1950's, India started with fortification of Vanaspati hydrogenated edible oil with vitamin A and vitamin D. Then later, in 1986, a national policy of universal salt iodisation was adopted. The National Nutrition Policy (1993) identified and placed fortification of essential foods as a short-term direct nutrition intervention and states that essential food items shall be fortified with appropriate nutrients. Promoting food fortification has been a part of 10th, 11th and 12th five-year national plans of the country.

WHO Recommendations for Fortification:

The World Health Organisation recommends large-scale food fortification as a powerful evidence-informed and cost-effective intervention to fight vitamin and mineral deficiencies, including iodine deficiency disorders, anaemia and iron deficiency, among others.

Recommendations in all settings include:

- universal salt iodisation
- fortification of maize flour, corn meal, wheat flour and rice with vitamins and minerals.

For children living in different settings:

- micronutrient powders containing iron for point-of-use fortification of foods for infants and young children 6–23 months old or children 2–12 years.

Need for Food Fortification in India:

Malnutrition manifests in several ways – deficiencies or excesses of macronutrient and energy intake. Around the world, more than 2 billion people – nearly one out of four – suffer from "hidden hunger" in developing countries including India. Conditions due to vitamin mineral deficiencies account for 7.3 % of global disease burden.

Hunger and malnutrition lead to loss of human capital, low economic productivity, low cognitive and learning skills, low retention rates in school and thereby leading to poverty. These effects are irreversible in nature but preventable in nature. India has been struggling to break the intergenerational cycle of malnutrition. At one end, the masses have poor access to food on the other hand, there is urbanization and poor lifestyle choices. This adds to the burden of non-communicable diseases. In this fast-paced world, improving the nutritional quality of food that's consumed by the masses could be an effective strategy to ensure optimum intake of micronutrients.

A large population in India, can be easily catered to through food fortification. Fortified staples commonly available in India are wheat flour, rice, oil, milk, and salt. Indian diets are rich in staples such as rice and wheat provide calories but not enough micronutrients. Consumption of fruits, vegetables, meat, eggs are considered to be the richest source of vitamins and minerals but is very low among Indian population. Hence, staples are a great way to reach maximum beneficiaries.

More than half of the population in India across any age group consume less than 50% of their daily needs of iron, zinc, vitamin A, Folate, and other B vitamins. In India this hidden hunger which may or may not present visible changes, have a long lasting and devastating consequences on health.

Research in India suggests fortification effectively improves biological markers of nutritional status, particularly when fortifying with multi-micronutrients (MMNs) or iron. MMN fortification consistently improved anthropometric but not cognitive outcomes. Fortification had limited impact on morbidity symptoms. Evidence of fortification effects on other functional outcomes is scarce.

With the vast geography in India, and poor literacy rates, access to health care, fortification offers promising benefits. In the quest to combat nutritional deficiencies and boost overall public health in India, food fortification clearly plays an important role.

Food Fortification Vehicles in India

Fortification vehicles in India are- the Public Distribution System (PDS), Mid-day Meal Scheme, Integrated Child Development Scheme (ICDS), and Rajiv Gandhi Scheme for Empowerment of Adolescent Girls (SABLA) are key vehicles of food fortification. POSHAN Abhiyan specifically takes care of the nutritional needs of children, pregnant and lactating women. POSHAN Abhiyan was launched in 2018 with the vision of a malnutrition-free India by 2022.

Is food fortification harmful?

Fortification is a carefully planned public health intervention with scientific basis. It is often debated that fortification may lead to toxicity. However, there is seldom a chance of over consuming the selected staples which are used as vehicles of fortification. For e.g. If an average person consumed 6-7 rotis a day, and on a given day, he/she feels hungrier, and decides to consume more food, there is less likelihood that he/she consumes more than 12 rotis or 20 rotis. The level of fortification recommended by FSSAI considers these factors, such that at any given point, the levels fortified in the staples cannot lead to toxicity, even when two staple foods like rice and wheat are consumed simultaneously.

Are fortified nutrients bioavailable?

There is a concern of how bioavailable these nutrients are, and through research and development initiatives of academia, research institutes and government, the nutrient salts recommended are chosen on the basis of their bioavailability.

One of the key points to remember is that fortification is the process of deliberately increasing the nutrient profile of a food item. Fortification of staples, processed foods and confectionaries, increases the nutrient values in these foods, making them healthier variants or line extensions. However, fact remains that these foods still need to be consumed in moderation and as a part of a healthy balanced diet. The fortified foods labelled as +F logo on these packaged foods do not indicate that they can be consumed in large quantities or should be consumed in place of regular healthy food. The importance of consuming diverse food groups, seasonal fruits and vegetables, nuts and oilseeds, remains ascertained.

Food Fortification is a scientifically proven, cost-effective, scalable and sustainable global intervention that addresses the issue of micronutrient deficiencies. In addition to prevention of vitamin and mineral deficiencies, and its adverse effect on growth and development, fortification plays a role in improving the national IQ, mental capacity, and reduce the burden of non-communicable diseases resulting from nutrient deficiency.

Reference:

1. Food Safety and Standards (Fortification of Foods) Regulations, 2018. Website: https://fssai.gov.in/
2. Compendium_Food_Fortification_Regulations_04_03_2021, FSSAI.
3. Food Fortification Resource Centre- https://ffrc.fssai.gov.in/standards

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MILLETS: THE NEW SUPERFOOD

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INTRODUCTION

The focus on healthy eating and good nutrition cannot be understated, especially in the post-pandemic era. Eating whole grains such as wheat, rice, lentils and pulses is a common practice that has been recommended by experts. Millet is also one such ancient superfood that has been garnering interest in the recent past. Popular in Africa and Southeast Asia, the humble millet has been grown in the Indian subcontinent for 5,000 years.

Every Indian dish is a story. Every family has a recipe of its own, which is passed on to the younger generation through oral culture. It is indeed intriguing how the same dish in different homes in India has a unique taste. Until the late nineteenth century, however, only the wealthy ate rice, and most Indians consumed millet and sorghum which are rich sources of high protein, fibre, vitamins and minerals like iron content. Unfortunately, now, however, a study: India's-Protein-Paradox-Study concluded that 85 percent of Indians believe that protein leads to weight gain and agreed that they would prioritize the consumption of vitamins & carbohydrates rather than protein. This underlying 'protein paradox,' which is how the study refers to high importance vis-a-vis low understanding, could become a major factor in the gradually declining rate of quality protein consumption.

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The recommended dietary allowance of protein for an average Indian adult is 0.8 to 1 gm per kg body weight, however, India has the lowest average protein consumption (at 47 gm per person per day) as compared to other Asian countries as well as developed nations. The 'Protein Consumption in Diet of Adult Indians: A General Consumer Survey (PRODIGY)' indicates that nine out of ten people consume inadequate amounts of protein in India.

India's proposal to observe an International Year of Millets in 2023 was approved by the Food and Agriculture Organisation (FAO) in 2018 and the United Nations General Assembly has declared the year 2023 as the International Year of Millets. This was adopted by a United Nations Resolution for which India took the lead and was supported by over 70 nations.

Now, what are superfoods, and can millet be called a superfood? Superfood is a marketing term for foods claimed to confer health benefits resulting from an exceptional nutrient density. There are several benefits of millet.It is known to be high in protein, high in dietary fibre, and the powerhouse of nutrients and phytochemicals including iron, folate, calcium, zinc, magnesium, phosphorous, copper, vitamins and antioxidants which are important for our day-to-day consumption. These multidimensional benefits associated with millets make it a potential superfood and hence it is rightly said that millets are a superfood.

TYPES OF MILLETS POPULAR IN INDIA

The millets commonly grown in India include Jowar (sorghum), Bajra (pearl millet), ragi (finger millet), Jhangora (barnyard millet), Barri (Proso or common millet), Kangni (foxtail/ Italian millet), Kodra (Kodo millet) etc. Following are their details:

1. Barnyard Millet is a high source of iron and fibre. It is known as Kuthiravali in Tamil, Oodhalu in Kannada, Odalu in Telugu, Kavadapullu in Malayalam and Sanwa in Hindi.
2. Finger Millet is a staple that is a very good substitute for oats and cereals. It is known as Ragi in Kannada, Ragulu in Telugu, Kelvaragu in Tamil, Koovarugu in Malayalam and Mundua in Hindi.
3. Foxtail Millet is rich in minerals and vitamins. It is known as Thinai in Tamil, Kirra in Telugu, Thinna in Malayalam, Navane in Kannada and Kangni in Hindi.
4. Little Millet is also loaded with iron and fibre, the regional names are Chama in Malayalam, Same in Kannada, Samai in Tamil, Sama in Telugu and Kutki in Hindi.
5. Proso Millet is known as Barri in Hindi, Panivaragu in Tamil & Malayalam, in Kannada it is called Baragu and Varigalu in Telugu
6. Pearl Millet is a high source of proteins, it is known as Bajra in Hindi, Sajje in Kannada, Sajjalu in Telugu, Kambu in Tamil and Kambam in Malayalam

Figure 1: Nutritional composition of staple cereals (per 100 g)

Staple cereal	Protein (g)	Carbohy-drades (g)	Fat (g)	Crude fibre (g)	Mineral matter (g)	Calcium (mg)	Phosp-horus (mg)
Sorghum (*Jowar*)	10.4	72.6	1.9	1.6	1.6	25	222
Pearl millet (Bajra)	11.6	67.5	5.0	1.2	2.3	42	296
Finger millet (Ragi)	7.3	72.0	1.3	3.6	2.7	344	283
Foxtail millet	12.3	60.9	4.3	8.0	3.3	31	290
Barley	11.5	696	1.3	3.9	1.2	26	215
Maize	11.5	66.2	3.6	2.7	1.5	20	348
Wheat	11.8	71.2	1.5	1.2	1.5	41	306
Rice	6.8	78.2	0.5	0.2	0.6	10	160

Source: National Institute of Nutrition (NIN), Hyderabad.

INITIATIVES TAKEN BY GOVERNMENT TO PROMOTE MILLETS

1. Government of India's millet mission comes under the National Food Security Mission (NFSM), launched in October 2007. Security of food has been taken including millet promotion. NFSM coarse cereals are divided into two parts and one of them is the sub mission on nutri cereals to be implemented in 202 districts of 14 states. Before this, millets were being promoted under INSIMP (Nutritional Security through Intensive Millets Promotion) during 2011-2012 to 2013-2014. Currently, millets are being promoted through technology dissemination, quality seeds through millet seed hubs, awareness generation, minimum support price and inclusion in PDS.
2. Increase in Minimum Support Price (MSP): The government has hiked the Minimum Support Price of Millets, which came as a big price incentive for farmers.Further, to provide a steady market for the produce, the government has included millets in the public distribution system.
3. Input Support: The government has introduced the provision of seed kits and inputs to farmers, building value chains through Farmer Producer Organisations and supporting the marketability of millets.

NUTRITIONAL SUPERIORITY OF MILLETS

a. Millets are less expensive and nutritionally superior to wheat & rice owing to their high protein, fibre, vitamins and minerals like iron content.
b. Millets are also rich in calcium and magnesium. For example, Ragi is known to have the highest calcium content among all the food grains.
c. Millets can provide nutritional security and act as a shield against nutritional deficiency, especially among children and women. Its high iron content can fight the high prevalence of anemia in India women of reproductive age and infants.

4. Gluten-free a low glycemic index:
a. Millets can help tackle lifestyle problems and health challenges such as obesity and diabetes as they are gluten-free and have a low glycemic index (a relative ranking of carbohydrates in foods according to how they affect blood glucose levels).

5. Super Crop at Growing:
a. Millets are Photo-insensitive (do not require a specific photoperiod for flowering) & resilient to climate change. Millets can grow on poor soils with little or no external inputs.
b. Millets are less water-consuming and are capable of growing under drought conditions, under non-irrigated conditions even in very low rainfall regimes.
c. Millets have low carbon and water footprint (rice plants need at least 3 times more water to grow in comparison to millets).

INDUSTRY-ACADEMIA INTERACTION

Covid has taught is very important thing, collaboration working. The Pandemic was a great teacher, and it was lifetime experience for all of us. We did many things first time during this period and now those became part of our life.

If India wants to grow and do innovation in area of Millets, we have to work together for its development. Academia and Industry needs to come closer on working. Each sector has its own strength but working for bigger picture is a need of an hours. Both have to travel some distance towards each other and find out the ways of working for common objective. Government is supporting many institutions for research, so selection of topic and areas should be based on commercial application and partnering with Industry so it will give some benefits either to Industry/society or Farmer. Ultimate aim of any research should not be limited to publications but value addition through technology transfers.

There is huge scope for Millet research in newer product development specially working on consumer acceptable formats and products.

WHAT KIND OF RESEARCH ONE SHOULD CHOOSE?

As described above, our student should choose good topics in area of millets and protein which has commercial value. We should choose research for benefit of society or industry or farmer, simple 'copy paste .com' type research of no value. Also research should not be done for shake of degree or certificate. It should add some value back.

CONCLUSION

There are multi-ministry programs, recently everybody is talking about millets and unless we switch to mission mode, things won't happen. When we talk about millets as a superfood, brand and popularisation of millets, then the question arises that how many dishes can we prepare from millets.

So here comes the involvement of the R&D, and the way R&D work. R&D works on 2 principles- Consumer backward and Technology Forward. Consumer backward means that the consumer will give you a signa that he wants something, and the second signal is given by the technology to take you ahead which will highlight various technologies to fulfill the demand of the consumer. For example, under consumer backward consumers demanded to have snacks for their 5-7 pm hunger and they wanted something which was ready to eat, does not involve cooking,

just a quick snack to munch, these are the unspoken needs. Later many products were launched to address these need-like noodles, makhana, and packet snacks, all these were consumer needs as consumers had asked for all these. Sometimes it is an open demand, sometimes it is unspoken demand, and the one who taps the unspoken needs becomes successful.

In today's time, consumers are demanding millets products, they are talking about millet products, but the question is, are we catering to the products the way consumers are demanding? Unless you talk to the consumers, find out their needs, their requirements,etc it won't help. So it is suggested to the companies and all the other start-ups to talk to the consumers and understand their demands. We can see various innovations in millets today like millet ice creams, mixed millet bhelpuri, millet rabdi, millet burgers etc. So, consumers are looking for such innovations in millet, but without compromising the taste of the product.Challenges related to the quality and supply chain of the millets, and also the consumer acceptance, are the main challenges that millets have.

If there is no innovation there is evaporation, there is always a way through which you can do better. We can see how a variety of different innovative products are available in the market. It is very important for us to explore and try those products which are good for our health. Companies will make sure to give you the best product but as a consumer, it is our duty to give positive feedback to the manufacturer about the product which will motivate them to produce a better product.

Now time has come to come together for Industry and Research Institutes. More collaboration is required and also research topic should be towards commercial angle or social angle.

Year 2023 is International Millet years, and we see huge potential for India for farmers, consumer and Industry at large.

Lets hope India to emerge as strong nation in area of Food Processing specially for Millets and their products.

COMING EVENTS

54th Annual National Conference of Nutrition Society of India
Dec 22 - 23, 2022
At ICMR National Institute of Nutrition, Tarnaka, Hyderabad
Email : nsihyderabad@yahoo.com
Tel: 91-40-27197276/334

27th International Conference on Nutritional Science & Dietetics
Nov 29 - 30, 2022
Venue: Ranchi
Website : http://wrfase.org/Conference2022/11/Ranchi/ICSNS/

29th International Conference on Clinical Nutrition
Feb 13 - 14, 2023
London, UK
Contact: clinicalnutrition@europemeets.com

30th European Nutrition & Dietetic Conference
Feb 22 - 23, 2023
Madrid, Spain
Contact: nutrition@expertsagenda.com

2nd International Conference on Clinical Nutrition & Dietetics
Mar 20-21, 2023
Vancouver, Canada
Contact: Contact.Chris@theannualmeet.com

5th International Conference on Food Nutrition Health & Lifestyle 2023
July 27 - 27, 2023
Kuala Lumpur, Malaysia
W: https://nutritionconference.co/

ANTI-DIABETIC FOODS AND FOOD INGREDIENTS-1 CEREALS, LEGUMES, FRUITS AND VEGETABLES

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Diabetes Mellitus (DM) is defined as a state in which homeostasis of carbohydrate and lipid metabolism is improperly regulated by insulin, a hormone produced by pancreas (endocrine gland) in our body. Insulin is required for maintaining normal blood glucose levels, uptake of fatty acids and amino acids by the cells and their utilisation in the body. Thus, insulin influences the metabolism of carbohydrates, lipids and proteins. Deficiency or absence of insulin adversely affects every cell in the body resulting in several complications such as cardiovascular diseases, kidney diseases, glaucoma etc. patients suffering from DM for a long period also experience a condition called Insulin resistance (IR) i.e. slow action of insulin mainly due to reduced sensitivity of body cells to Insulin. Insulin resistance also leads to low grade inflammation that may impair insulin production by the pancreas besides aggravating the insulin resistance.

The global prevalence of diabetes was estimated to be 2.8% in 2000 and 4.4% in 2030 for all age groups, which translates into an increase in the total number of people with diabetes from 171 million in 2000 to 366 million in 2030. Prevalence of DM is higher in men than in women (Wild S et al, 2000). Currently, India has the world's largest diabetic population (around 35 million people out of an overall population of 1 billion). Another 79 million people have impaired glucose tolerance (IGT). By 2025 the country will have almost 200 million people (approximately 15% of the population) affected by diabetes or its precursor (ADA, 2004).

Diabetes is of three types- Type1DM (Insulin Dependent DM), Type2DM (Non Insulin Dependent DM) and Gestational DM (GDM). In Type1DM, insulin production by pancreas is totally impaired mostly due to auto immunity. Type2DM is characterised by production of insufficient amount of insulin by pancreas. Incidence of diabetes in pregnancy is called gestational diabetes. In addition to the above types, sometimes severe chronic malnutrition especially undernutrition might lead to DM which is called Malnutrition Related DM (MRDM).

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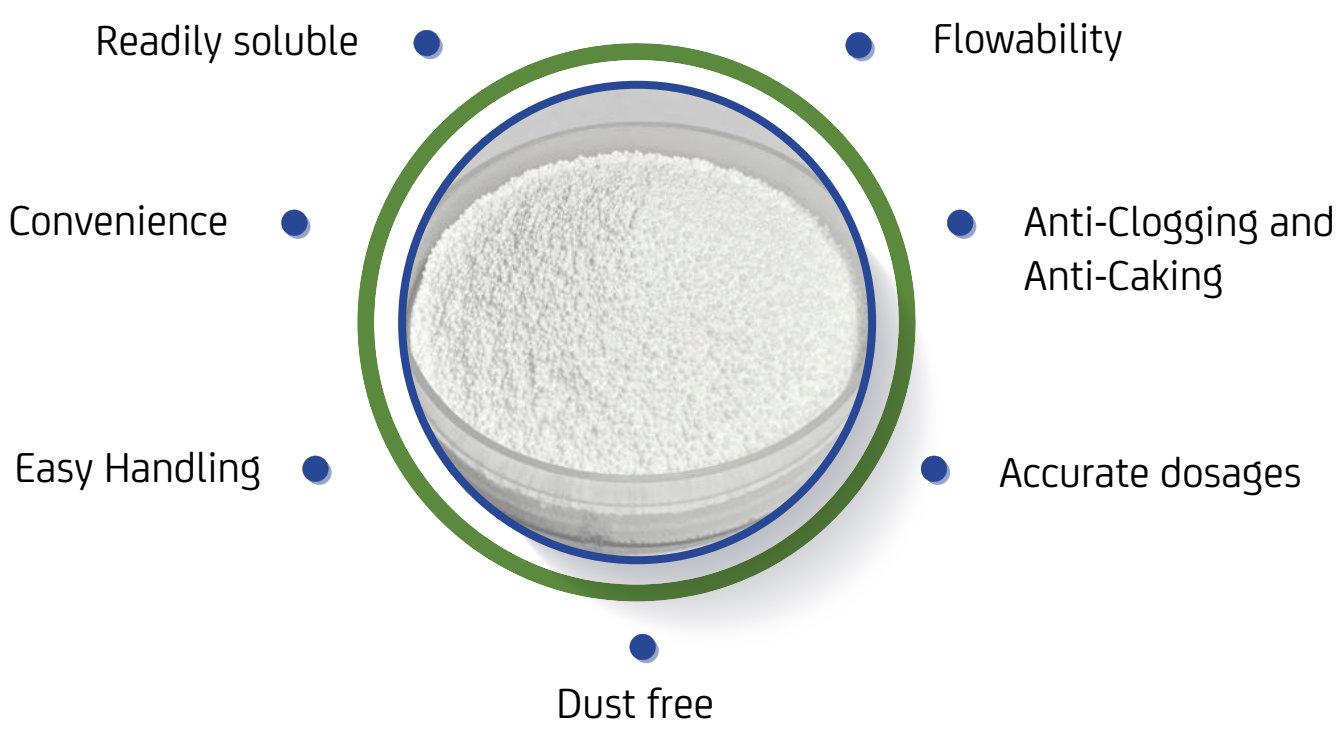
Advantages of CP Granular



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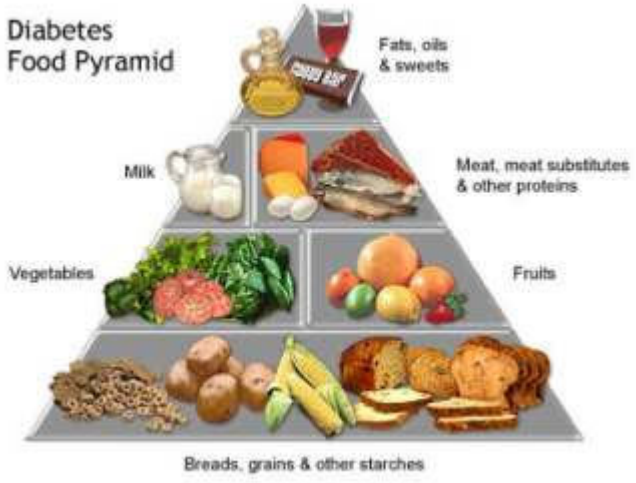


Figure-1: Food guide pyramid for Type 2 DM patients (ADA, 2004)

Diabetes is treated by means of hypoglycaemic drugs and insulin along with lifestyle modification that includes exercise and dietary modification. An appropriately planned diet supports medical therapy in controlling hyperglycaemia. Since ancient times, food based approach has been used in India and several other countries where, certain foods have been proved to be effective hypoglycaemic agents. The American Dietetic Association recommends diabetes-food-guide pyramid for Type 2 DM patients (Figure-1).

According to this pyramid, T2DM patients are advised to consume higher amounts of whole grains, legumes and fibre rich vegetables followed by fruits, other vegetables and meat and meat products. Limited amounts of fats/oils, and sweets are allowed (Kaushik, et al., 2010). Several foods and plants have been identified with anti-diabetic properties. Ayurvedic treatment of DM involves use of various herbs along with foods with medicinal properties. The anti diabetic role of foods, food ingredients/constituents and herbs has been extensively explored and documented. Details on some popular anti-diabetic foods and food ingredients are reviewed and presented below.

Anti-diabetic foods:

Interest in therapeutic/functional foods has been increasing worldwide. Whole grains are identified with huge therapeutic potential in various non-communicable diseases such as obesity, cardiovascular diseases and diabetes (Lee et al., 2018). Whole grains include unpolished cereals, whole legumes and millets. The outer most layers of these grains contain dietary fibre, lignans, phytosterols, oil, and certain fat-soluble and water-soluble vitamins along with minerals. Each of these offers valuable health benefits. Unfortunately, all these nutrients and phytochemicals are lost during processing (polishing). But recently, whole grains are regaining importance and are recommended to be included in the regular diet. Some of the whole grains with evidence of their anti-diabetic potential are discussed below.

Whole grains (cereals and millets)

Whole cereal grains including wheat, brown rice, maize, rye, barley, sorghum and millets are rich sources of dietary fibre, which is largely responsible for their anti-diabetic action. A product can be called whole grain product only if it contains the three major components -bran, germ, and endosperm in the same amount as present in their original grain form. Minimum three servings or one-half of grains consumed daily should be whole grains. Dietary fibre reduces the ability of a food to increase blood glucose levels and the time taken for the same (Glycemic Index). Improved insulin sensitivity, delayed/sustained glucose absorption from the gut are responsible for the hypoglycaemic effect of whole grains which are exhibited by the grains as well as grain products (bran, gums, B-glucan etc.,).

Brown rice especially germinated brown rice is proved as an effective hypoglycaemic food which also helps control the neurological complications of T2DM patients due to its high B vitamin content.

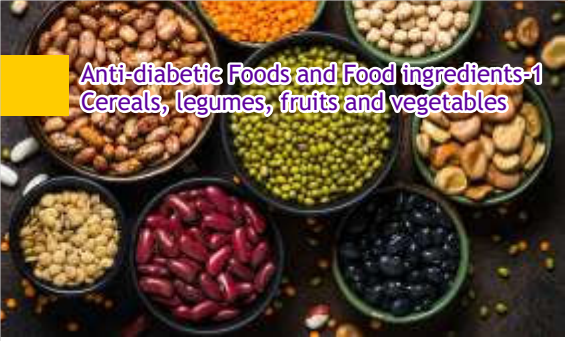
The form in which whole grains are consumed could influence its health benefit for diabetics. For example, rolled oats and oat flour are more effective in reducing serum glucose levels than boiled oat kernels (Granfeldt et al, 1995). Barley, if consumed as whole grain or grain flour was reported to increase insulin production and its sensitivity both by itself or when added to other food products (Bourdon et al, 1999). Due to its high soluble fibre content, corn helps in controlling glucose intolerance. The resistant starch content in Maize improves insulin sensitivity and control hyperglycemia (Kaushik et al., 2010).

Millets: Millets include pearl millet, proso millet, finger millet, foxtail millet, barnyard millet, little millet, and kodo millet. These are considered as less glucogenic but more nutritious grains and also rich sources of polyphenols (phytochemicals possessing antioxidant and anti-inflammatory properties). Several millets were found to be beneficial for diabetes patients due to their high dietary fibre, polyphenol and antioxidant content. Millets can reduce fasting- as well as postprandial blood glucose levels and improve insulin production and sensitivity. Long-term consumption of millets also reduces HbA1C level (indicator of blood glucose levels over a period of three months). Millets reduce glycemic index of foods hence adding millets to commonly consuming recipes is an ideal option. Due to the high fibre and resistant starch content in millets like finger millet, these can impair the activity of carbohydrate digesting enzymes in the gut and delay the absorption of digestible carbohydrate. Method of cooking would influence the digestibility of millets. For example, boiling and pressure cooking increase the digestibility and thereby glycemic index of millets compared to roasting. Hence, khichadi (a mix of pulse, millet, spices) has high GI (increases blood glucose faster) compared to cheela (savoury pancake), thalipeeth (savoury multi-grain flat bread), sorghum bhakri (round flat unleavened bread), and wheat roti. Similarly, large particle size of millet product (Rava) has low glycemic index compared to the flour.

Millets are also subjected to germination and fermentation, which would increase the availability of polyphenols to the body, thereby help in controlling oxidative stress and inflammation observed in diabetes patients. The polyphenols in foxtail millet, finger millet and kodo millet were found to improve both insulin sensitivity and insulin production besides reducing the production of advanced glycation end products (AGEs) found in chronic diabetics which are responsible for various complications of diabetes. Hence, it is important to select an appropriate product and recipe to enjoy the hypoglycemic and other health benefits of millets (Anita et al, 2021; and Wang et al, 2022).

Recently, chia seeds are gaining attention of healthcare experts. These are rich in protein, dietary fibre and omega 3 fatty acids. These seeds are proved to activate the AMP-activated protein kinase (AMPK) in the peripheral tissues and muscle cells of consumers thereby increase glucose and fat uptake and their utilisation in the body. This mechanism does not depend on insulin. Thus, regular consumption of chia seeds would be beneficial to T2DM patients (Saskia Revinka Maharani et al, 2021).

Legumes: The most commonly consumed legumes are Bengal gram (chana), red gram/pigeon pea (tuvar), green gram (moong), black gram (urad), rajma etc. Most of the research trials on hypoglycemic effect of legumes was conducted in animals and the results could be extrapolated to humans.



Anti-diabetic Foods and Food ingredients-1
Cereals, legumes, fruits and vegetables

Legumes with high soluble fibre (gums) such as bengal gram, black gram and rajma have been reported to exhibit hypoglycemic effect by increasing the time taken for digestion and absorption of carbohydrate. Whereas, the insoluble fibre in whole legumes hasten the movement of food in the gut allowing less time for carbohydrate digestion thereby impairing the absorption of carbohydrate and it's release into the blood. Both soluble and insoluble fibre can also increase satiety and reduce subsequent food intake.

Besides being hypoglycemic, legumes are also hypolipidaemic i.e. they lower serum total cholesterol and LDL cholesterol levels due to the presence of various phytochemicals such as isoflavones. This ability of legumes would protect the diabetes patients from cardiovascular problems, one of the complications of serious concern in DM patients. The Grains and Legumes Nutrition Council recommends 100 g of legume intake at least three times per week to enjoy their health benefits (Figueira et al. 2019). However, some people may experience abdominal pain, flatulence, bloating, or altered bowel habits on higher intake of legume consumption. Hence, the quantity of legumes in the diet need to be increased slowly as per the individual tolerance.

Red gram (*Cajanus cajan L.*)

Red gram/tuvar dal is widely cultivated legume in India. Tuvar dal has been proved to be an effective hypoglycemic food (Panlasigui et al. 1995). However, this benefit of reducing blood glucose levels in DM is exhibited by raw tuvar dal. It is a common practice to dry roast red gram dal to improve its flavour and/or it's shelf life. It is interesting to note that roasting of red gram dal has been found to increase the blood sugar. This could be due to the increased digestibility and thereby the glycemic index of red gram dal upon roasting. It is very important to remember that roasting tuvar dal at high temperature for 30 minutes totally destroys its hypoglycemic property (Grover, et al. 2002). Raffinose, a type of carbohydrate (oligosaccharide) present in red gram has been reported to be effective prebiotic, hypoglycemic and hypolipidaemic (Shakappa, 2017).

Soya bean (*Glycine max L. Merr.*)

Soya bean is a highly nutritious legume possessing the highest quantity of good quality protein than any other legume. Besides protein, soya bean is also well known for the phytochemicals (Isoflavones, phytates and saponins) present in it. All these components exhibit anti-diabetic as well as hypolipidaemic property (Jin et al, 2018).

Fruits and vegetables:

India is blessed with wide variety of Fruits and vegetables, which are rich sources of several nutrients (B-Carotene, Vitamin C, certain B vitamins, minerals and phytochemicals). They can stimulate insulin production by pancreas and also the phenolic constituents (flavanols, flavones and anthocyanins) function as insulin like molecules (Jayaprakasam et al., 2005). The anti diabetic activity of selected fruits and vegetables has been presented below. WHO has recommended a daily consumption of more than 400 g or five portions of combined fruit and vegetables to prevent T2DM (World Health Organization, 2003).

Fruits

Amla (*Emblica officinalis Gaertn or Phyllanthus emblica Linn*)

Indian gooseberry or amla is beneficial in preventing and/or managing T2DM. The constituents of Amla responsible for this anti-diabetic action include gallic acid, gallotanin, ellagic acid and corilagin, which are powerful antioxidants. They not only help in controlling blood glucose levels but also prevent the complications of DM (D'souza et al., 2014). A combination of turmeric and amla was found to be effective as an adjunct in the treatment of T2DM (Rao et al., 2013).

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Banana (*Musa sapientum*)

Diabetes patients often are restricted from eating banana fruit due to its high carbohydrate content. This restriction is limited only to the fruit. But, raw banana, banana flower, Stem and leaf- all were proved to possess anti diabetic properties. The resistant starch, dietary fibre, various minerals (Potassium, Magnesium etc.,) present are responsible for the health benefits of raw banana (Ramu R, et al, 2016). Banana flower juice as well as banana stem juice were proved to control hyperglycemia (Dong Nguyen et al, 2017).

Black Plum/Black Berry/Jamun/ Jambul (*Eugenia jambolana*):

Jamun is a type of black berry and a very popular anti-diabetic fruit. Fruits, seeds and leaves of jamun plant were proved to improve insulin sensitivity, stimulate insulin production by pancreas thereby help in the management of diabetes. The chemical constituents of Eugenia jambolana seed powder include ellagic acid, essential oil, gallic acid and tannic acid which are responsible its hypoglycemic effect. Jamun seed powder has been found to be more beneficial in newly diagnosed diabetes patients (Acharya, et al, 2010). In addition, Jamun seed powder and/or their extract can influence carbohydrate metabolism by increasing the utilisation and decreasing storage of glucose (Sharma et al, 2011). Feeding of 10g/day of Jamun seed powder for 90 days significantly reduced fasting and postprandial blood glucose levels in T2DM patients (Sidana et al., 2017).

Guava (*Psidium guajava*)

Guava is a nutritious fruit rich in vitamin C. In addition, the soluble fibre and polyphenols (phytochemicals- quercetin, guaijaverin, isoflavonoids, gallic acid, catechin, epicathechin, rutin, naringenin, etc. are also present). The guava leaf extract has been used in the treatment of DM in East Asia. In fact, guava leaf tea has been approved under Foods for Specified Health Use in Japan (Deguchi & Miyazaki 2010). The anti diabetic potential of guava has been reported to be in this pulp > leaves > seeds (Shabbir 2020) and dose dependant.

Pomegranate (*Punica granatum*):

Pomegranate has been used since long as a medicinal fruit in the Middle East. The juice, peels, flowers and seeds of pomegranate-all have been proved beneficial in T2DM. Various phytochemicals present in pomegranate including punicalagin and ellagic, gallic, oleanolic, ursolic, and uallic acids, have shown anti-diabetic properties. The tannins and anthocyanins are effective antioxidants and offer protection against several complications of DM including cardiovascular diseases (Banihani et al., 2013). Pomegranate juice has been proved to protect pancreatic tissue from oxidative damage and facilitate insulin production and release. Juice prepared from whole fruit is more beneficial than preparing it only from the edible portion (Arils) (Virgen-Carrillo et al, 2020). However, recommendation of pomegranate juice for diabetes patients needs more research.

Vegetables:

India is blessed with wide variety vegetables. Often vegetables are consumed along with a cereal preparation such as rice, wheat (roti/chapati etc.,). In some regions of India, vegetables are consumed as salads, soups, juices etc.Vegetables are sources of several micronutrients including vitamins (carotenoids, vitamin C, folic acid etc.,), and minerals (Zinc, Selenium, Magnesium, Chromium etc.,), dietary fibre, resistant starch and phytochemicals (Flavonoids, Thiosulfides etc.,)

- all of which are responsible for their anti-diabetic activity. Eating vegetables before a meal containing carbohydrate rich sources such as cereals was found to control postprandial blood glucose levels (Imai and Dias, 2020). Hence, the habit of eating vegetable salad (Leafy vegetables, onion, tomato etc.,) before a major meal should be encouraged. Since the number of nutrients and phytochemicals present in vegetables vary with the source, it is advisable to include a variety of vegetables in the daily menu.

Bitter gourd (*Momordica charantia*):

Bitter gourd/karela has been used as a natural remedy for various health problems since long. it is also a very popular anti diabetic vegetable. There is strong research evidence for the anti diabetic potential of karela. Bitter gourd juice was found to increases insulin production by pancreas and insulin sensitivity in the body. No side/toxic effects have been reported upon bitter gourd juice consumption. Fried bitter gourd pieces are a delicacy for many. Even this snack preparation was found to improved glucose tolerance in T2DM patients (Mahwish, et al., 2017). The form in which bitter gourd is consumed does not alter its health benefits.

The constituents in bitter gourd, which are responsible for its anti diabetic effect are oleanolic acid 3-*O*-glucuronide and momordin (Grover 2002).

Onion (*Allium cepa*):

Onions are rich sources of sulphur containing amino acids and several phytochemicals. Juice prepared from various fractions of onion was proved to control hyperglycemia by regulating glucose metabolism at various levels in the body-Gastrointestinal tract, liver and muscle. Interestingly, administration of raw onion to T2DM patients not only reduced the blood glucose levels but also reduced the dosage of hypoglycaemic medication. Onion extract can even regenerate pancreatic cells. Freeze-dried onion powder too helped in controlling high blood sugar and lipid levels. Surprisingly, raw onion intake increases the blood glucose level due to the sulphur containing amino acid cysteine. This effect could be beneficial when blood glucose levels fall below normal (hypoglycaemia) due to diabetes medications both in Type 1 and Type 2 DM (Taj Eldin IM et al, 2010).

Green leafy vegetables:

Leafy vegetables are rich sources of magnesium, potassium, iron, calcium, vitamin C and vitamin E along with dietary fibre. Moreover, leafy vegetables are very low in glycemic index and hence very beneficial in diabetes. Daily consumption of one serving of leafy vegetables reduces the risk of diabetes by 9% (Bazzano et al, 2008). Leafy vegetables such as broccoli, lettuce, spinach, cauliflower greens, kale, and mustard greens have high Aggregate Nutrient Density Index (ANDI). This scoring system is based on nutrient content, rated on a 1-1,000 scale) due to their high fibre, glucosinolates and other phytonutrients, calcium, selenium, β-carotene, lutein and selenium, and hence proved to be very effective in controlling blood glucose levels (Carlos et al, 2017).

Food ingredients:

Okara

Okara is a fibrous residue that remains after extracting milk from soya bean or after bean curd or tofu processing. Okara is a rich source of dietary fibre, protein, minerals and isoflavones.

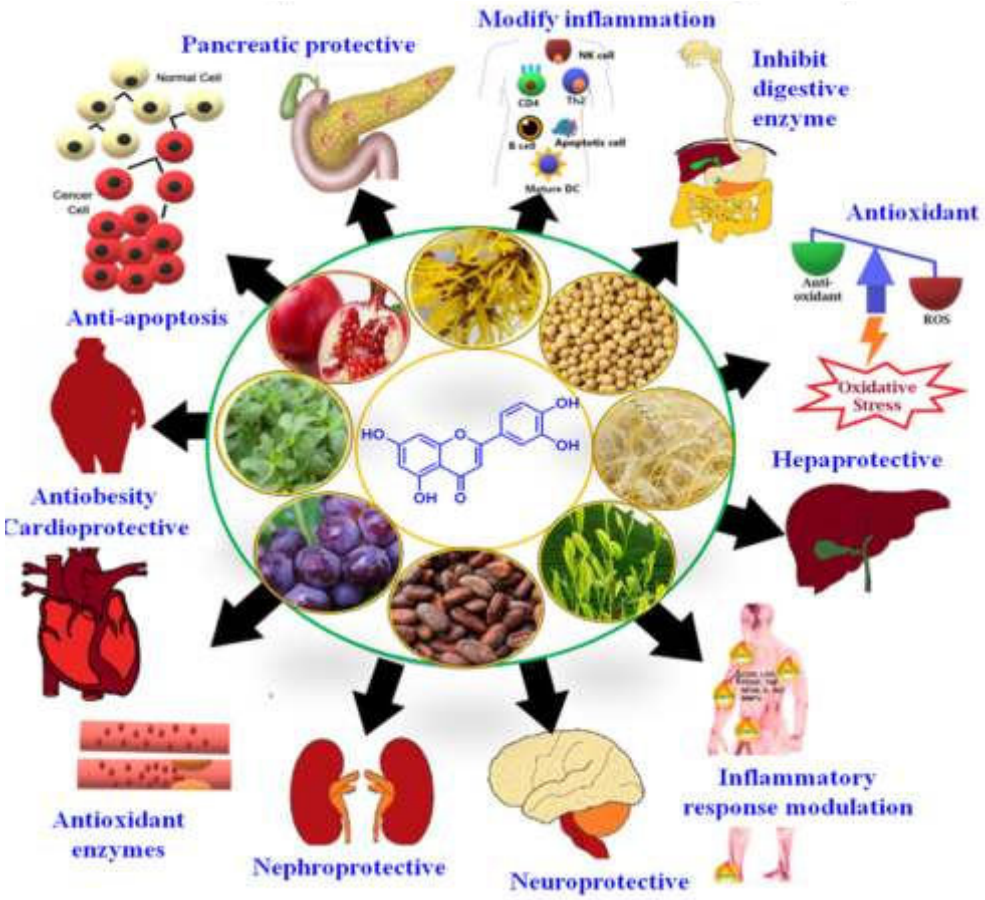

Figure-2: Anti-diabetic effect of polyphenols (Sun, et al., 2020)

However, it is often used as animal feed. The flavour and taste could be improved on fermentation and the anti-nutritional factors could be inactivated too. Besides being a prebiotic and improving gut health, Europium cristatum fermented okara (ECO) can also be used as an effective anti-diabetic food ingredient (Chan LY et al, 2018).

Food derived peptides:

Bioactive peptides are prepared by hydrolysing food proteins, which exhibit several health benefits including antioxidant, anti hypertensive and anti diabetic activity thereby prevent occurrence of non-communicable diseases such as heart diseases, hypertension and diabetes. The food derived peptides exhibit anti-diabetic property at various levels. They can inhibit/delay digestion and absorption of dietary carbohydrate by inhibiting the activity of carbohydrate digesting enzymes-Amylases and glucosidases in the gut, stimulate release of two hormones (Glucagon like peptide-1 and gastric inhibitory polypeptide) which are called incretins. The incretins stimulate insulin production from pancreas, and inhibit release of glucagon (a hormone produced by the alpha cells of pancreas that facilitates release of glucose into blood). The role of food-derived peptides in improving insulin sensitivity, insulin production, incretin secretion and their use as anti-diabetic agents need further research (Rivero-Pino et al, 2020).

Dietary polyphenols

Fruits, vegetables, wine, chocolate, cocoa, and tea are sources of polyphenols, which are isomers of isomers of flavones, isoflavones, flavonols, catechins, and phenolic acids. Polyphenols benefit diabetes patients in several ways-antioxidants, improving gut health, stimulating insulin production, inhibiting carbohydrate digestion and glucose absorption, preventing inflammation and complications of diabetes etc (Figure-2).

Conclusion:

Most of the commonly consumed foods [(whole grains (cereals and legumes); fruits and vegetables) possess anti-diabetic potential which is attributed to various nutrients and phytochemicals present in them. Several food constituents, such as bioactive peptides, and polyphenols, are receiving attention as therapeutic functional ingredients. In the light of available scientific evidence, it is recommended to include variety of these foods in the daily diet for prevention or management of diabetes. Research evidence on the hypoglycaemic effect of foods and food ingredients has been generated more from animal trials than human trials, thus emphasizing a strong need for clinical research on patients suffering from diabetes and its complications.

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LESSONS FROM THE PANDEMIC: WORKING WITH MODERN SCIENCE-BASED ECOSYSTEMS

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Never has anything – war, pestilence, acts of God – awakened our consciousness more than the ongoing pandemic, hopefully now receding. For one, it showcased on the world stage how science and governments work together to balance life and livelihood. The science (risk assessment) led by experts in virology, epidemiology and medicine, in an ascendant role, made it clear to executive functionaries (risk managers) faced with a looming economic shut down that "the virus will decide when the country will open up". In retrospect, this is what happened.

Risk assessment – scientific evidence - is a predominant arm of risk analysis the other two being risk management and risk communication. Public health issues are risk events arising from either airborne transmissions or food borne infections. Only the spread and severity differ. Both impact the economic activity and growth of the country. But this article is not about the pandemic or disease, or even food; it is about ecosystems required to effectively address and safeguard public health. These systems are generic to be applied in its specific context. Those familiar with the Food Safety and Standards Act, 2006 (1) will instantly recall the terms risk assessment, risk management and risk communication. There is no better way to understand how these systems should be worked than lessons learned from the pandemic.

Follow the science

During the pandemic, a constant message was "follow the science", except that it was not just a quote, but a call for 'disciplined' action by those involved. For science to precede executive actions, it must be embedded in legal procedures (Acts) to legitimize decision making. Such modern science-based food safety systems are available: the Food Safety and Standards Act (FSSA, 2006),(1)the European Food Safety Act (EFSA, 2002),(2)and Codex Alimentarius (3) operate by such models. Other country regulatory agencies (US, Australia, New Zealand)usesimilar frameworks. Risk-based systems that "follow the science" require decisions on any safety related issue to be taken only after examining the science and its available evidence.

Risk assessors begin by identifying the hazard, in this case the virus, Covid 19, responsible for the respiratory and gastrointestinal infections, actively transmitting across India. Hazard identification simply, but precisely, seeks out the agent (virus) with the potential to cause harm.

Following identification its recognizable – or hidden - symptoms (hazard characteristics) were described to be, high fever, cough, breathlessness, including death. Transmissibility routes and spread (exposure assessment) is the third step and finally characterizing it a high-risk health issue. A high-level risk characterization takes priority for immediate mitigation measures by executive functionaries. All four steps fall under the composite term risk assessment: this is well defined in the Act. Only risk assessment (science based) engages the scientific expertise in a precise and focused manner. In case of the pandemic, virologists, immunologists, epidemiologist etc., with specialized knowledge in different but complimenting fields delivered the science (scientific opinion), to be acted upon by risk managers. Both role and function between the scientific experts and civil authorities was clear: no overlap, no overstepping (interference) no confusion. The scientific evidence – conveyed through the scientific opinion - was open, transparent and shared with all.

Life and livelihood: mitigation measures are appropriate and proportionate

While the scary scenario of mounting fatalities mesmerized public attention, mitigation measures were being taken following the principles of risk management. The way they were deployed is another lesson to be learned. For one, expertise lies in the ability to balance both lives and livelihood; it's not a simple choice of one over the other. Risk managers during the pandemic, took a bundle of measures appropriately and proportionately. These ranged from stay-at-home advisories, local area quarantines and lockdowns, including interstate travel restrictions. All these were non-pharmaceutical interventions until the vaccine arrived. Even when there is uncertainty, measures may be taken provided they are no more restrictive of trade. The key point is reliance on data and scientific evidence for measures to be appropriate and proportionate. An incredibly efficient surveillance, monitoring and evaluation system (SME) set up for the pandemic, provided daily transmission rates and mitigation trends, nationwide, regional and in local areas. The FSSA, u/s [FSSA, 18.2(c)(d)]too requires the Food Authority (risk managers)to note "when scientific uncertainty persists, provisional risk management measures necessary to ensure appropriate level of health protection may be adopted. However, "the measures adopted shall be proportionate and no more restrictive of trade that is required to achieve appropriate level of health protection ....". Essential procedures of a risk-based ecosystem are embedded in the Food Safety and Standards Act, 2006. These should be adopted and implemented upon as it was during the pandemic.

Active databases are critical for identifying risk and its mitigation effect....

Risk assessment relies on active databases capturing relevant data. The necessity of a national surveillance, monitoring and evaluation system (SME) is required under the Act [sec. 16.3(b)]. The Authority is required to "search, collect, collate, analyse and summarise relevant scientific and technical data particularly relating to food consumption and the exposure of individuals to risks related to the consumption of food" and the "... incidence and prevalence of biological risk, contaminants in food, residues of various contaminant and identification of emerging risks..." Apart from this, there are other complementing databases monitoring food borne disease. The Integrated Disease Surveillance Program (IDSP) under National Centre Disease Control (NCDC) captures nationally outbreaks of food borne disease.

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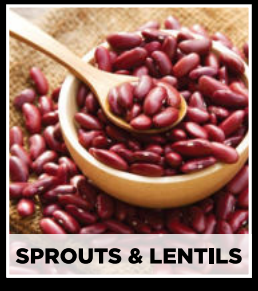
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A National Sample Survey, 2019(4) collated data of seven broad diseases: infections (including diarrhea, dysentery), endocrine, cardiovascular (including hypertension and heart disease), respiratory and other ailments. Infections are the highest classified ailment category at 35.7% (rural) and 25.4% (urban), cardiovascular at 13.8% (rural) and 21.9% (urban). Of all ailments hospitalization cases 31.3% (rural) and 31.6% (urban) are for infections; gastrointestinal (10.4% rural; 9.6% urban).

Data collected under the Integrated Disease Surveillance Programme (IDSP), (5) shows outbreaks together with acute diarrheal diseases constitute nearly half of all reported outbreaks, identifying salmonella as most common.

While dietary practices of hot pre-cooked food may eliminate or reduce bacterial infections, mycotoxins such as aflatoxins, ochratoxin A, etc are of public health importance. In India, mouldy maize, sorghum and wheat flour are associated with outbreaks of mycotoxicosis.

Coordinated analysis between these databases should be able to identify public health risks and their mitigation trends. Captured outbreak events of infections along with a functioning SME required under the Act, would provide disease-food attributions. Interestingly all these databases fall under the ambit of the Ministry of Health and Family Welfare (MoHFW). Integrated databases provide comprehensive information for policy planning and achievement of public health goals.

Conclusions

The pandemic hopefully raised consciousness on the ecosystems concerned with public health. Scientific evidence is a predominant factor succinctly referred to as 'follow the science'. Predictive systems of identifying emerging risks depend on a functioning SME database of failing events. The FSSA 2006, is a risk-based Act that seeks to ensure only safe food gets to market. India has a modern science-based Act though its principles and practice are yet to be fully deployed. The pandemic, which so eminently showcased its practice raises the stake for government and civil society to recognize these principles for building a reliable safe food ecosystem.

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HURDLE TECHNOLOGY:

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India is a large country with a population next only to China. Feeding this large population is an equally humongous task. Consumers have been spending on food annually between $ 300 to 800 billion by different estimates. Mostly fruit & vegetables, dairy and meat & poultry products are big sectors with bakery & snacks and others following with important contributions to the markets of food industry. Industry was largely unorganised with over three fourths in unorganised sector a few decades ago. This has been changing.

Consumers have been looking earlier mostly the taste and quality along with the price of the products. However, situation is slowly changing with increasing awareness of nutrition, health and safety becoming more important especially after the pandemic when people have realised the importance of food, especially the nutrients, with respect to immunity. Nutritionists and medical doctors have been advising intakes of micronutrients which may be lost if care is not taken in processing and storage of products to retain the vitamins and minerals. Thus, people are now looking for better quality products with higher nutrients contents.

Losses of Nutrients with Processing

When food is heated, the nutrients that are heat sensitive will be degraded and there will be losses of these nutrients. Higher temperature for longer times causes greater losses. Man discovered use of fire to cook food. Although fruits and some vegetables are consumed without cooking, most other foods are commonly cooked before eating. Foods after cooking become edible and more digestible and acceptable. Some become safer by destroying pathogens and certain anti-nutritional factors. Thus, in most cases, heating of foods and ingredients is inevitable.

Grains contain outer covering with inedible quality so the husk, bran etc needs to be removed by milling. Along with these many nutrients including protein, dietary fibre, iron, B-vitamins etc are lost. Parboiling to some extent can restore micronutrients.

Milk is pasteurised by heating to destroy the pathogens, which could cause diseases. The heat applied not only kills pathogens but also destroys some vitamins. The pasteurised milk not only becomes safe but it also lasts for a longer time without spoilage.

There have been some attempts to modify the processes to minimise the extent of damage to nutrients. For example, pasteurisation could be done at higher temperature, which though may cause greater damage if carried out for the same time, needs much less time to kill the pathogens compared to lower temperature. So net effect of using higher temperature for shorter time actually causes less damage to nutrients compared to lower temperature for longer time. Some of the ultra-high temperature processes use higher than 100°C for just a couple of seconds to do the job of destroying pathogens which required over 15 seconds at 72°C or 30 min at 63°C.

Problems with Established Methods

Canning, freezing, dehydration etc. are used successfully for many products but for some these are too drastic. Soft and delicate fruits disintegrate and become mushy in canning or freezing. Canning also causes loss of colour and flavour in many fruits and vegetables. Dehydration of potatoes disfigures the shape.

Rasgolla becomes dry and hard when canned. Frozen paneer disintegrates upon cooking losing its flexibility. Dried paneer or khoa does not rehydrate properly.

Some of these problems could be overcome by combining different methods.

Principle of Hurdle Technology

Pasteurisation destroys pathogens but does not kill all the microbes. So, although pasteurised milk may last without spoilage longer than unpasteurised raw milk, it has shelf life of less than a day under ordinary temperature conditions. The same can last for longer time of a few days when pasteurised milk is refrigerated. So, the low temperature helps in preserving. Thus, both heating and storing at low temperature prolong shelf life.

Typical Maximum Nutrient Losses (as compared to raw food)

Vitamins	Freeze	Dry	Cook	Cook+Drain	Reheat
Vitamin A	5%	50%	25%	35%	10%
Retinol Activity Equivalent	5%	50%	25%	35%	10%
Alpha Carotene	5%	50%	25%	35%	10%
Beta Carotene	5%	50%	25%	35%	10%
Beta Cryptoxanthin	5%	50%	25%	35%	10%
Lycopene	5%	50%	25%	35%	10%
Lutein+Zeaxanthin	5%	50%	25%	35%	10%
Vitamin C	30%	80%	50%	75%	50%
Thiamin	5%	30%	55%	70%	40%
Riboflavin	0%	10%	25%	45%	5%
Niacin	0%	10%	40%	55%	5%
Vitamin B6	0%	10%	50%	65%	45%
Folate	5%	50%	70%	75%	30%
Food Folate	5%	50%	70%	75%	30%
Folic Acid	5%	50%	70%	75%	30%
Vitamin B12	0%	0%	45%	50%	45%
Minerals	**Freeze**	**Dry**	**Cook**	**Cook+Drain**	**Reheat**
Calcium	5%	0%	20%	25%	0%
Iron	0%	0%	35%	40%	0%
Magnesium	0%	0%	25%	40%	0%
Phosphorus	0%	0%	25%	35%	0%
Potassium	10%	0%	30%	70%	0%
Sodium	0%	0%	25%	55%	0%
Zinc	0%	0%	25%	25%	0%
Copper	10%	0%	40%	45%	0%

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It is known that if the pH of the medium in which microbes are present is lowered, the heat becomes even more lethal for destroying the microbes. Thus, acidic environment makes heating more efficient for destroying microbes. Fruit juices need much milder processes for pasteurisation because they have lower pH.

Thus, each of the factors including heat, pH, and lower temperature storage is a hurdle in way of microbes growing in food and causing spoilage. If only one of the factors were to be used, it would have to be extremely severe to stop the growth. For example, if only heat were used for stopping all microbes from growing, it would be a very severe thermal process, which would involve very high temperature for a long time. Such a process would not only destroy spoilage microbes but also cause extensive destruction of nutrients as well as undesirable flavour and colour to be developed making the food unacceptable.

Considering the example of milk, if we try to sterilise the milk to preserve it for a long time, then the amount of heat needed is quite high and may cause many changes some of which may reduce acceptability. However, pasteurisation is a milder heat treatment, which causes minimal changes in milk. Pasteurisation may prolong the shelf life by a few hours. If it could be combined by chilling or refrigeration, then we can extend the shelf life by a few days. Thus, two processes could effectively preserve milk and each one not severe enough to cause much changes in nutritional and sensory quality of milk. This is the principle of hurdle technology.

Each of the processes would be too severe, but combining two or more processes could effectively preserve foods without affecting adversely the properties of food. It is similar to a runner who can run very fast without any obstacles. But putting hurdles in the way would slow down the runner. However, if the hurdles are put simultaneously at the same spot, it would be too high to overcome.

Traditional Technology

Our grandmothers used various means of hurdle technology without realising to preserve many foods. Pickles were prepared using salt, oil, acid and spices, each of which had adverse effect on microbes. Using salt alone can stop spoilage but the product would be inedible. Similarly, too high acidity would make it difficult to consume. But a combination in which bacteria were allowed to produce acid to which salt is added along with spices. Adding oil would make it difficult to get oxygen.

In murabba (preserve) sugar would bind the water to a large extent and acid would help preserve. Small amounts of antimicrobials help in preservation. In products like aam papad and petha, good amount of water is removed by drying so there is very little remaining which could be easily bound by sugar and with the help of acid spoilage is prevented. Dry salted fish and chikki also use hurdle technology.

Principle Hurdles Used for Food Preservation

Parameter	Symbol	Application
High temperature	F	Heating
Low temperature	T	Chilling, freezing
Reduced water activity	a_w	Drying, curing, conserving
Increased acidity	pH	Acid addition or formation
Reduced redox potential	Eh	Removal of oxygen or addition of ascorbate
Bio preservatives	—	Competitive flora such as microbial fermentation
Other preservatives	—	Sorbates, sulphites, nitrites

Since there is less damage to original colour and flavour of foods, there is no need to add colours and flavours. Consumers prefer the natural colour, flavour and taste of the food. When combination of methods is used, each one of lesser intensity is needed so there is less change in food occurs. Effectiveness of heat is improved due to lower pH, and presence of antimicrobials. Combined with lower free water, chilling, and irradiation etc. would adequately preserve the food product.

There are many methods of preservation using above principles for making foods stable and safe e.g., heating, chilling, freezing, freeze drying, drying, curing, salting, sugar addition, acidification, fermentation, smoking and oxygen removal. Radiation with ultra-violet rays has been used for decontamination and sanitisation of liquids. Ionising or gamma rays have also been used to in fruits and vegetables for delay in ripening, decontamination of spices and many other products very successfully.

More recently some newer processes have given wider choice of hurdles. High pressure processing of foods with use of pressures 100-800 MPa, temperature of up to 100° C for a few seconds to a few minutes provides better retention of colour, flavour, texture and nutrients in products from fruits, vegetables, seafoods etc. High pressure makes pathogens and spoilage organisms susceptible to destruction by much lower temperature of up to 90 to 110° C.

Ohmic heat uses electric current passing through food generating heat in food. Heating is rapid and uniform unlike traditional heating from outside in. Viscosity and conductivity of food to electricity affects heating rate. Amount of heating needed to destroy microbes is minimal saving cost as well as improving nutrient and sensory quality.

Edible coatings or films give food products a protective layer. Waxing of fruits was done for long. Currently these protect food against microbial spoilage as well as loss of quality. They may contain protein, starch, wax, lipids etc. and may contain antimicrobial or antioxidant substance. This enables minimal use of additives. Selective use of material provides active properties as they can control vapours of aromas and solvents, water vapours and gases such as oxygen, CO2 and nitrogen.

Modified and controlled atmosphere has been used for fruits and vegetables storage. Newer packaging materials are available with desirable vapour and gas transmission rates that help in making packaging material to work along with other hurdles.

Osmotic dehydration removes water without phase change. Fruits are dipped in concentrated osmotic solutions that may contain sugar or salt etc. Water moves from fruit to solution without much exchange of solutes, thus allowing dehydration with final products with better nutritional and sensory properties like colour and flavour similar to fresh fruits.

Advantages and the Future

One of the main advantages of this technique is overcoming the ability of microbes developing resistance to conventional techniques. This technique uses combination of different preservation methods that act synergistically by attacking different targets within the cell of spoilage organism. Hurdles are also used at lower concentrations, thus preventing undesirable changes in sensory and nutritive values. This also takes place at lower cost saving energy. Since this technique also uses natural preservatives in combination with synthetic, risks of higher concentrations of synthetics are lower. There is also possibility of having shelf-stable foods, easier to store, sometimes even without refrigeration.

Consumers are looking for cleaner labels for food products and would prefer to have lesser additives. When harsher processes are used, there may be need to add colours and flavours and other substances to correct some undesirable defects caused. When milder or gentler processes are used in combination, the natural sensory and nutritive values are better preserved. There is also less need for synthetic preservatives. This would certainly be appreciated by all.

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FREEZING AND FOOD PRESERVATION

AUTHOR
Ms Prerana Patil,
Food Technologist,
PFNDAI

One of the best ways for shelf-life extension and preservation of foods is freezing. Freezing has been one of the oldest and most widely used methods of food preservation. To put it simple freezing can preserve the food because of the low temperature at which microorganisms cannot grow (-18°C.), chemical reactions are stopped and metabolic activities are delayed resulting in extended shelf life of a product.

Water is everything in freezing process. Freezing converts water to solid at a particular temperature, that temperature is called as the freezing point. If we consider pure water then its freezing point is 0°C. So pure water freezes at this temperature but that is not the case with food. Water and food freeze differently. The water present in food is not pure water it contains solutes.

In any food system, water exists in two forms bound (non-freezable) and unbound (freezable) or free water. Free water is the water that freezes while the unbound water remains unfrozen even at lower temperature. So, as the freezing proceeds the concentration of solutes increases resulting in decreased freezing point. Hence the freezing point of complex food systems is lower than that of pure water.

Freezing has been used for preserving fruits, vegetables, meat, and fish from ages. But many modifications have been made in this process for commercial adaptation. Whenever a product has to be frozen, the freezing cycle has to be designed in order to achieve maximum shelf life with minimal damage and loss of nutrients.

Freezing starts with lowering the temperature of food below freezing point. At this point, the water is in liquid state. Upon further cooling, the first ice crystal is formed called as nucleation. Then this nuclei or ice crystal grows when different water molecules attach to it with reducing temperature resulting in freezing of the free water.

Along with the freezing point the rate of freezing also acts as an important parameter in freezing of any food system. Maximum portion of a food product is water. When a food product is frozen, the water is converted to ice with a 6 to 8% increase in volume. Usually, rapid freezing is preferred to slow freezing. If the food is frozen more rapidly, then small crystals are formed. Small crystals are numerous in number giving fine texture to the food product and also minimal losses during thawing as there will be minimal water that migrates from cell to intercellular space with little damage to cell.

But, slow freezing results in large crystal formation increases the concentration solutes in intercellular fluids causing increase in osmotic pressure. Slow freezing is also responsible for cell shrinkage and membrane damage. This results in larger drip loss (Tavman& Yilmaz, 2017). So, for the freezing to be effective in nutrient retention quick freezing is ideal. Industrially individual quick freezing is used widely.

Freezing time and temperature are the key factors. The time required to lower the temperature from its initial temperature to given temperature at the centre of food is called as the freezing time. Once the centre of product has reached desired temperature then it can be considered that product has reached the storage temperature.

Freezing affects the physical properties of food product due to the phase change that occurs upon crystallization. Also, freezing delays biochemical reactions and microbial growth but does not remove them completely. So, like any other food product frozen products can undergo changes during storage affecting the textural properties, nutritional profiles of the product. Here are some of the changes that may occur upon freezing-

Freeze cracking-

Some food products may crack if freezing rates are too high or due to very low temperature freezing medium. These cracks can be on surface only or may originate from inside especially in case of products with non-smooth surface like patties or cakes. Freeze cracking can affect the quality of food product and may get rejected by consumers (Hung, 1997).

Moisture migration-

Frozen foods can lose moisture upon prolonged storage. It is very important to keep the water bound in food matrices in order to avoid moisture loss when the food product goes through freeze- thaw cycles. Moisture loss can also lead to freeze burn. When food products like meat, poultry, fruits and vegetables are frozen for a longer time, some moisture is lost by sublimation of ice leaving behind cavities, which affects the texture and colour of food products. Meat products show greyish discoloration. Ice-creams lose their creamy texture and have ice crystals throughout giving a sandy texture (Webmed, 2021).

When a frozen product faces temperature changes the watermolecules try to escape from food matrices and recrystallize. Upon recrystallization the small crystals may grow into big ones. These large crystals affect the texture of food product and can damage the cell walls leading to drip loss. Drip loss is the loss of nutrients that occurs while thawing the food caused by the irreversible tissue damage due to freezing, recrystallization and thawing (Pham & Mawson, 1997).

Rancidity-

When frozen foods like fish, meat high in fats are exposed to oxygen they undergo oxidative rancidity, loose colour and develop off flavours. Freezing results in concentration of solutes, which may initiate oxidation disrupting the cells and exposing membrane phospholipids, which are high in unsaturated fats to oxidation (Rahman & Velez-Ruiz, 2007).

Loss of colour, flavour and texture-

The bound water which remains unfrozen can support enzymatic reactions. In fruits and vegetables colour change may occur due to changes in natural pigment (chlorophyll, carotenoids, anthocyanins) or enzymatic browning. Green coloured vegetables lose their colour upon freezing and storage due to conversion of chlorophyll. Meat products can develop dark brown colour upon storage due to oxidation of heme iron, which may be putting off for consumers (Henriott et al., 2020).

Effect of freezing on nutritional profile of frozen food products-

Many studies have shown that freezing can retain better nutrients than the non-frozen counterparts. The freezing process as such does not degrade the nutritional quality of foods. Most of the nutrition losses occur in pre-freezing stage. Animal products like meat, poultry, fish are particularly great sources of proteins and fats and minerals like iron, zinc, magnesium, selenium, vitamins A, B, and D etc. After slaughtering these products under go chemical and physical changes. So, the objective of freezing here is to delay these changes.
Prolonged storage can result in irreversible aggregation of the actin and myosin protein myofibrils, leading to tough meat texture and reduced water-holding capacity. Also, as mentioned above if these products come in contact with air, then off flavours may develop due to rancidity (Evans, 2008).

Some fruits and vegetables are also frozen. Fruits and vegetables have a high metabolic rate even after harvesting due to which nutrients may get degraded. So, in order to avoid this freezing is used to lock these nutrients. When compared to fresh fruits and vegetables, frozen counterparts retain more nutrients over a longer period of storage.

Most of the fruits and vegetables are blanched prior to freezing in order to prevent enzyme-mediated oxidation and also to reduce pathogens to some extent. Blanching may lead to loss of water-soluble vitamin like vitamin C by leaching.

A study on effects of freezing and frozen storage on the vitamin content (Ascorbic acid, riboflavin, α-tocopherol, and β -carotene) of peas, green beans, broccoli, spinach, corn, carrots, strawberries, and blueberries showed overall vitamin content of the frozen commodities was comparable and occasionally higher than their fresh counterparts. Beta carotene, however, was found to decrease drastically in some commodities (Bouzari et al., 2015).

In non-blanched fruits and vegetables flavour change may occur due to enzymes like lipoxygenase (Fu & La Buza, 1997). But not all fruits and vegetables are frozen because they contain higher amount of water which transforms into ice upon freezing that disrupts their cell structure resulting in mushy and unpleasant end products. Instead their pulp can be frozen because of the addition of the solutes which decreases the freezing point.

Bakery products like bread are also frozen. The freezing rate and storage time can affect the gluten solubility and rheological properties of dough. So, when the bread is frozen at slow freezing rate for a short storage period, the bread quality is better (Silvas-García et al., 2014). Bread can become stale due to retrogradation. But it can be reversed to some extent by thawing bread in oven for short time. Also, flours fortified with folic acid can be stored for a long time with freezing without much loss.

Effects on microorganisms-

As mentioned above one of the main functions of freezing is to reduce the microbial load by inactivation or by keeping them in dormant state. The maximum storage temperature at which all the microbial growth ceases is -18°C. Although the microbial growth is stopped enzymes will still be active and can cause deterioration. Freezing causes death of 10%-60% of the viable microbe population, which increases upon storage.

But different microorganisms have different sensitivity to freezing. So, some of them may survive freezing and grow upon thawing. Gram-negatives are more sensitive to frozen death than Gram-positives. Non-sporulating rods and spherical are resistant, while Clostridium and Bacillus remain stable by freezing. Stationary-phase bacteria are more stable than growing phase of bacterial growth. On the contrary, in products like yogurt with active culture the cell viability of beneficial culture should increase (Tavman & Tuncay, 2017). So, the varying effect of freezing on the microorganisms has to be considered while designing a frozen product.

So, to conclude freezing is one such preservation technique that can provide a longer shelf life to many food products while preserving the nutrient content with no or low added preservatives.

Nowadays due to busy schedules, people do not have time to prepare foods. So, freezing can come to the rescue here. There are many frozen products available in the market like yogurts, ready to eat meals, fruits and vegetables. Nutritious and healthy meals can be frozen and consumed as per convenience without compromising on quality.

REPORT ON NUTRITION AWARENESS ACTIVITY WITH THEME PROTEINS - THE POWER RANGERS OF OUR LIFE

ORGANIZED BY PFNDAI WITH SVT COLLEGE OF HOME SCIENCE

AUTHOR

Ms Anuja Padte,

Food Scientist, PFNDAI

PFNDAI organized a Nutrition Awareness Activity at Sir Vithaldas Thackersey (SVT) College of Home Science, SNDT Women's University Mumbai in collaboration with the Department of Food Nutrition & Dietetics. The total participation of students was about 250. The students showed excitement and were very enthusiastic about the competitions. More than 7 Colleges from Mumbai participated in the activity. The seminar was also live broadcasted via Zoom where more than 100 participants joined.

The theme of the Activity was "Proteins-The Power Rangers of Our life". The Sponsors of the event were Samyog Health Foods, Marico, Kellogg's, and Zydus Wellness. The recipe competition was sponsored by Marico & the theme for the competition was Incorporating Plant-Based Protein in our Daily Foods/ Meals to Make it Protein Rich.

The morning session started with intercollegiate competitions among students. Students from different colleges participated in competitions. Two competitions were organized: Quiz Competition & Recipe Competition.

There was huge participation in both competitions. For the recipe competition, the theme was Incorporating Plant-Based Protein in our Daily Foods/ Meals to Make it Protein Rich for which Soya Chunks samples were sponsored by Marico. The quiz competition was based on the Food & Nutrition theme.

Judges of Recipe Competition

Winning Recipes

The judges for both competitions were highly appreciative of the efforts made by the students and the organizing team. The judge for the Recipe competition was Ms. Purvi Varma, Associate Director Marketing – CVM & Dr. Alka Walavalkar Founder, Resonance L Nutrition Director (Fuel & Programs), Satya Health Sciences, Novoliver. The judge for Quiz Competition was Ms. Naaznin Husein Founder Director- Freedom Wellness Management Chairperson – Nutrify India Dietetics.

The winners from each competition were awarded by PFNDAI.

Winners of the Recipe Competition

1. First Prize Winner - Ms. Bushra Qureshi & Ms. Mitali Raval from SVT College of Home Science SNDTWU, Recipe - Soya Burger

2. Second Prize Winner - Ms. Vidhi Tukaram Prabhu &Ms. Nisha Ramlal Pal from Premlila Vithaldas Polytechnic, SNDTWU, Recipe - Soya Aluwadi

3. Third Prize Winners

I. Ms. Palak Mistry & Ms. Ishita Shah from Premlila Vithaldas Polytechnic, SNDTWU, Recipe - Soya Muffin

II. Ms. Sara Nazim Sakarkute& Ms Aayat Shakir Batliwala from SVT College of Home Science SNDTWU, Recipe - Soya Falafel Pocket

WINNERS OF RECIPES COMPETITION

Winners of the Quiz Competition

- First Prize Winner - Ms. Nisha Ramlal Pal, Ms. Vidhi Tukaram Prabhu &Ms. Riddhi Ramchandra Kamblefrom Premlila Vithaldas Polytechnic, SNDTWU

- Second Prize Winner - Ms. Zoya Shaikh, Ms. Nandini Zanwar & Ms. Stuti Rathi from SVT College of Home Science SNDTWU

- Third Prize Winner – Ms Tanishka Shah, Ms. Unaiza Shaikh & Ms Jaiba from SVT College of Home Science SNDTWU


Lighting Of Lamp

TECHNICAL SESSION

The event started with the lighting of the lamp followed by the Welcome Address by Dr J S Pai, Executive Director, PFNDAI. The inaugural speech was given by Dr Jagmeet Madan, National President, IDA, Principal & Professor- Dept. of Food, Nutrition & Dietetics SVT College of Home science SNDTWU. Ms. Dolly Soni, Manager of Marketing & Projects, Seminar Convenor, PFNDAI then introduced Protein Foods & Nutrition Development Association of India and its activities to the participants as well as the audience and introduced all the speakers.


Dr Pai gives Welcome Address

Dr Jagmeet Madan, presented a talk on Protein and Sarcopenia, wherein she briefed on why is metabolic health important. Dr Madan spoke about Sarcopenia and its types and elaborated more on the etiology of sarcopenia and various other aspects such as complications faced due to sarcopenia & progression of sarcopenic obesity. She further added about the study of cross-sectional study in Indian adolescents and young adults (2020 – 2021) which was done to explore snacking patterns and its association with body composition in adolescents and young adults, aged 16-25 years in Mumbai, India. She ended her talk with take away message where she mentioned, "No single food is super food & no single nutrient is magic nutrient"


Dr Jagmeet Madan

Dr Pratipanna Dash, Product Development Manager, Marico presented on Increasing Protein Consump-tion in Daily Diet, where she spoke on Protein & What is quantity vs quality of proteins in which she mentioned about nutritional classifi-cation of proteins like complete proteins, partially complete proteins & incomplete proteins. She further spoke on Protein Digestibility Corrected Amino Acid Score (PDCAAS) & also highlighted protein consumption in India & showed a study of intake and reference distribution of protein (g/kg/d) in rural and urban populations. She ended her talk by mentioning on what are the certain ways to consume protein & the various choices of products available in the market.


Dr Pratipanna Dash

The third speaker for the day was Ms Nadiya Merchant, Associate Director- Nutrition, Kellogg India Pvt Ltd she presented on the topic of Plant Protein Insights and Trends. Ms Nadiya talked about which factors are considered by people when choosing their proteins. She also focused on the study of the Plant-based market, which she mentioned that in 2020, the India plant-based protein market attained a volume of nearly 11,250 tons & the market is projected to grow at a CAGR of 12.4% between 2021 and 2023. She ended her talk by briefing the audience about the rising trend of healthier and premium food options. These fortified with natural plant protein are available in meat substitutes based on plant protein for the health-conscious consumer.


Ms Nadiya Merchant


Dr Madhuri Nigudkar felicitating Ms Arohi Bapna

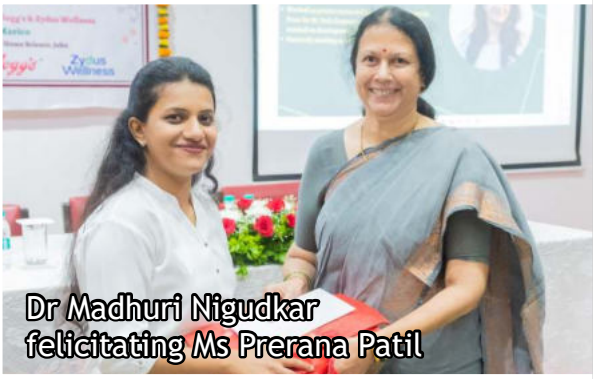
Ms Arohi Bapna, Senior Manager (Sci. Affairs & Research, R&D), Zydus Wellness Ltd presented on the topic Advantages of Milk protein for Growing Children. Ms Arohi briefed the audience about the growth spurt among children where she mentioned that growth spurts happen at different stages in children, depending on their age & a major growth spurt happens in adolescence. Further, she mentioned that the consumption of an adequate, well-balanced diet is important for proper growth and development. She also displayed a Recommended Daily Allowance of nutrients table for the adolescence. She explained to the audience the types of protein & their roles. She ended her talk by explaining about Role of milk and its nutrients in the growth and development of school children& what are the Dairy consumption guidelines from the National Institute of Nutrition (NIN).

The final speakers for the day were Ms Dolly Soni, and Ms Prerana Patil, Food Technologist, PFNDAI presented on the topic of Soy Protein.

Ms Prerana covered the scientific aspect of soy protein & explained how Soy is a complete protein more than other plant proteins and briefed the audience about the composition of soybeans. She further spoke about the form of protein & mentioned that soy protein products are utilized in food systems such as whole beans, flours, and grits, soy protein concentrates and isolates, and textured products. She also spoke about soy based meat analogues where has been reported that when soy protein is used, the final product could mimic the texture, appearance, taste, smell, and functionality of red meat.


Ms Dolly Soni

Ms Dolly in her talk covered all the marketing aspects of soy protein. She briefed the audience about how Soy can be beneficial for people who consume a vegetarian diet, and what types of various protein options are available in the market. She spoke on several myths which are heard about soy and how can we debunk such myths. She explained to the audience how we can make awareness of soy protein and its benefit to the common people as the problem of protein deficiency is going around for a long time nowand what are the marketing ways to create such awareness. She also spoke on the industry perspective and how the industries can create a buzz about their products.


Dr Madhuri Nigudkar felicitating Ms Prerana Patil

The seminar was followed by prize distribution to the winners of the competitions. The program ended with a vote of thanks by Dr Madhuri Nigudkar, Associate Professor & Head (I/C) Dept. of Food, Nutrition & Dietetics.

Please click the link for the Speakers Presentation: https://www.pfndai.org/association-news.html

Prolicious - Sponsors stall

Audience during Quiz Competition

Organizing Team

REGULATORY ROUND UP

By
Dr. N. Ramasubramanian,
Director, VR FoodTech,
n.ram@vrfoodtech.com

Dear Readers

Please find below the new notifications, orders, etc since the last round up.

Requirement of health certificate in certain high risk imported products like milk and milk products, meat products, etc is deferred to consignments reaching on or after 01 January 2023.

FSSAI has designated 61 points of entry for the import of certain high-risk foods like milk and milk products, meat and meat products, egg powder, health supplements and infant foods for better control and Coordination, The entry points are listed in the letter dated 17 October 2022 and is made effective from 01 February 2023.

Deadline for the registration of foreign manufacturers (exporting to India) of high-risk foods has been extended to 01 February 2023.

Here is the good news for food business operators who submit their annual return in Form D late. The late fees is Rs 100 per day but the upper limit for the fine has been restricted to 5 times the annual licensing fees.

Latest list of FSSAI approved food testing laboratories

A draft notification setting standards for traditional Indian sweets and savouries along with other products like sausages has been published and comments and suggestions can be sent in the prescribed format by 31 December 2022. Sweets have been categorized as milk, grain, legume, nut based and similarly namkeens on pulse, millet, grain, nut based etc.

Standards are described in terms of essential and optional ingredients and important quality parameters in terms of fat content, acid value, peroxide value, etc. In case of milk sweets, RM value of the extract has been specified to ensure milk has been used. Special labelling requirements are specified with examples.

The standards are generic in nature giving a free hand for innovation. The standard does not stipulate minimum percentage of ingoing essential ingredient – No minimum content of Kaju in Kaju Katli. Very enabling regulation. As most of the manufacturing of traditional Indian sweets and savouries is in the unorganized sector, FSSAI must follow it up by creating awareness among the manufacturers.

Final notification introducing Table 11 A under Appendix C of FSS (Food Products Standards and Food Additives) Regulation, 2011. The table lists 45 enzymes derived from genetically modified organisms as processing aids with names of production organism, donor organism, technological function or purpose, end use application and permitted residual threshold level.

A final amendment has been introduced to FSS (Labelling and Display) Regulation 2020 describing the requirements for different types special bread like whole wheat bread, multigrain bread, protein enriched bread, etc. in terms of minimum percentage of the ingredient, which is highlighted. For example – Whole wheat bread is required to have minimum 75% atta or whole wheat flour. The amendment setting standards of identity for different breads could have been more appropriately placed under bread in FSS (Food Products Standards and Food Additives) Regulation, 2011.

FSS (Non-Specified Food) Regulation, 2017 is amended. Changes are made in the application format for different categories of novel foods/ingredients. FSSAI through a separate notification has made online application mandatory. I did a couple of differences between the online and the physical format. In the online format, certain requirements like agreement between the manufacturer and importer is not mandatory. However, such an option is not there in the physical format.

FSSAI advisory dated 01 November 2022 categorically states that fees of Rs 50,000 paid while applying under FSS (Non-Specified Food) will not be refunded under any circumstances.

FSSAI has published a consolidated list of approvals and rejections of novel foods and ingredients under FSS (Non-Specified) Regulation, 2017.

Upper limit for copper, as a heavy metal, in case of imported dried hops has been pegged at 1000 ppm.

FSSAI vide it letter dated 27 October 2022 has directed referral laboratories, in case of imported consignments to analyse only those parameters which have been found non-conforming by the primary laboratory. This is to avoid delay on the part of the referral laboratory.

FSSAI in a letter dated 20 October 2022 has clarified that alcoholic beverages imported in bulk and which are processed further are exempted from the upper limit of the alcohol content. Such consignments shall carry a declaration “For the Manufacture of Alcoholic Beverages only”.

RESEARCH IN HEALTH & NUTRITION

Taking Vitamin D during pregnancy could lower the risk of eczema in babies

Science Daily July 5, 2022

Taking Vitamin D supplements during pregnancy could substantially reduce the chances of babies up to a year old suffering from atopic eczema, according to a new study by University of Southampton researchers.

The research, published in the British Journal of Dermatology, revealed that babies had a lower risk of developing atopic eczema in their first year if their mothers took 1000 international units (IU) of Vitamin D a day from when they were 14 weeks pregnant until they delivered. The effect was particularly seen in babies who were later breastfed for more than a month.

Atopic eczema is a chronic inflammatory condition that can have a large impact on sufferers, their families, and healthcare. It is estimated that one in six children aged one to five has atopic eczema, and there has been a global rise over recent decades.

The study at the University of Southampton Medical Research Council Lifecourse Epidemiology Centre and the NIHR Southampton Biomedical Research Centre is the first randomised, controlled trial to show evidence of reduced risk of atopic eczema in infants of mothers who took Vitamin D supplements during pregnancy. More than 700 pregnant women took part in the research -- with 352 taking the supplements from 14 weeks until they gave birth and 351 taking a placebo.

Dr El-Heissaid: "Our aim was to see whether taking 1000IU of Vitamin D (cholecalciferol) as a supplement during pregnancy would decrease the risk of atopic eczema in babies. We also wanted to establish whether breastfeeding had any effect on this.

"Our results showed that babies of mothers who received supplements had a lower chance of having atopic eczema at 12 months, which supports recommendations for Vitamin D supplements to be routine during pregnancy.

"We found no effect at 24 and 48 months suggesting that other postnatal influences might become more important beyond infancy or that the babies themselves might also need to be supplemented during the postnatal period for a sustained effect."

Molecule boosts fat burning

Study identifies a new signalling molecule that increases the energy consumption of brown fat cells

Science Daily July 5, 2022

Normally, fat cells store energy. In brown fat cells, however, energy is dissipated as heat -- brown fat thus serves as a biological heater. Most mammals therefore have this mechanism. In humans it keeps newborns warm, in human adults, brown fat activation positively correlates with cardio-metabolic health.

"Nowadays, however, we're toasty warm even in winter," explains Prof. Dr. Alexander Pfeifer from the Institute of Pharmacology and Toxicology at the University of Bonn. "So our body's own furnaces are hardly needed anymore." At the same time, we are eating an increasingly energy-dense diet and are also moving far less than our ancestors. These three factors are poison for brown fat cells: They gradually cease to function and eventually even die. On the other hand, the number of severely overweight people worldwide continues to increase. "Research groups around the world are therefore looking for substances that stimulate brown fat and thus increase fat burning," says Pfeifer.

Dying fat cells boost energy combustion of their neighbours Together with a group of colleagues, the team at the University of Bonn has now identified a key molecule named inosine that is capable of burning fat. "It is known that dying cells release a mix of messenger molecules that influence the function of their neighbours," explains Dr BirteNiemann from Pfeifer's research group. Together with her colleague Dr SaskiaHaufs-Brusberg, she planned and conducted the central experiments of the study. "We wanted to know if this mechanism also exists in brown fat." The researchers therefore studied brown fat cells subjected to severe stress, so that the cells were virtually dying. "We found that they secrete the purineinosine in large quantities," Niemann says. More interesting, however, was how intact brown fat cells responded to the molecular call for help: They were activated by inosine (or simply by dying cells in their vicinity). Inosine thus fanned the furnace inside them. White fat cells also converted to their brown siblings. Mice fed a high-energy diet and treated with inosine at the same time remained leaner compared to control animals and were protected from diabetes.

The inosine transporter seems to play an important role in this context: This protein in the cell membrane transports inosine into the cell, thus lowering the extracellular concentration. Therefore, inosine can no longer exert its combustion-promoting effect.

Drug inhibits the inosine transporter

"There is a drug that was actually developed for coagulation disorders, but also inhibits the inosine transporter," says Pfeifer, who is also a member of the Transdisciplinary Research Areas "Life and Health" and "Sustainable Futures" at the University of Bonn. "We gave this drug to mice, and as a result they burned more energy." Humans also have an inosine transporter. In two to four percent of all people, it is less active due to a genetic variation. "Our colleagues at the University of Leipzig have genetically analyzed 900 individuals," Pfeifer explains. "Those subjects with the less active transporter were significantly leaner on average."

These results suggest that inosine also regulates thermogenesis in human brown fat cells. Substances that interfere with the activity of the transporter could therefore potentially be suitable for the treatment of obesity. The drug already approved for coagulation disorders could serve as a starting point. "However, further studies in humans are needed to clarify the pharmacological potential of this mechanism," Pfeifer says. Neither does he believe that a pill alone will be the solution to the world's rampant obesity pandemic. "But the available therapies are not effective enough at the moment," he stresses. "We therefore desperately need medications to normalize energy balance in obese patients."

Long term high-fat diet expands waistline and shrinks brain

Science Daily July 7, 2022

New research shows that fatty foods may not only be adding to your waistline but also playing havoc with your brain.

An international study led by UniSA neuro-scientists Professor Xin-Fu Zhou and Associate Professor Larisa

Bobrovskaya has established a clear link between mice fed a high-fat diet for 30 weeks, resulting in diabetes, and a subsequent deterioration in their cognitive abilities, including developing anxiety, depression and worsening Alzheimer's disease. Mice with impaired cognitive function were also more likely to gain excessive weight due to poor metabolism caused by brain changes.

UniSA neuroscientist and biochemist Associate Professor Larisa Bobrovskaya says the research adds to the growing body of evidence linking chronic obesity and diabetes with Alzheimer's disease, predicted to reach 100 million cases by 2050. "Obesity and diabetes impair the central nervous system, exacerbating psychiatric disorders and cognitive decline. We demonstrated this in our study with mice," Assoc Prof Bobrovskaya says.

In the study, mice were randomly allocated to a standard diet or a high-fat diet for 30 weeks, starting at eight weeks of age. Food intake, body weight and glucose levels were monitored at different intervals, along with glucose and insulin tolerance tests and cognitive dysfunction. The mice on the high-fat diet gained a lot of weight, developed insulin resistance and started behaving abnormally compared to those fed a standard diet.

Genetically modified Alzheimer's disease mice showed a significant deterioration of cognition and pathological changes in the brain while fed the high fat diet. "Obese individuals have about a 55 per cent increased risk of developing depression, and diabetes will double that risk," Assoc Prof Bobrovskaya says. "Our findings underline the importance of addressing the global obesity epidemic. A combination of obesity, age and diabetes is very likely to lead to a decline in cognitive abilities, Alzheimer's disease and other mental health disorders."

Women already live longer. They can live better with an improved diet

Eating more bright-coloured fruits and vegetables can help prevent women's health issues

Science Daily July 14, 2022

Women tend to live longer than men but typically have higher rates of illness. Now, new research from University of Georgia suggests these higher rates of illness can be improved by a better diet, one that is high in pigmented carotenoids such as yams, kale, spinach, watermelon, bell peppers, tomatoes, oranges and carrots. These bright-coloured fruits and vegetables are particularly important in preventing visual and cognitive loss.

"The idea is that men get a lot of the diseases that tend to kill you, but women get those diseases less often or later so they perseverate but with illnesses that are debilitating," said Billy R. Hammond, a professor in UGA's Franklin College of Arts and Sciences department of psychology behavioural and brains sciences program and co-author of the study. "For example, of all of the existing cases of macular degeneration and dementia in the world, two-thirds are women … these diseases that women suffer for years are the very ones most amenable to prevention through lifestyle."

The study, which reviewed and analyzed data from previous studies, detailed several degenerative conditions, from autoimmune diseases to dementia that, even controlling for lifespan differences, women experience at much higher rates than men. "If you take all the autoimmune diseases collectively, women account for nearly 80%. So, because of this vulnerability, linked directly to biology, women need extra preventive care," Hammond said.

How does gender affect health?

One of the reasons for this vulnerability has to do with the way women store vitamins and minerals in their bodies. Hammond points out that women have, on average, more body fat than men. Body fat serves as a significant sink for many dietary vitamins and minerals, which creates a useful reservoir for women during pregnancy. This availability, however, means less is available for the retina and the brain, putting women at more risk for degenerative problems.

Dietary intake of pigmented carotenoids acts as antioxidants for humans. Two specific carotenoids, lutein and zeaxanthin, are found in specific tissues of the eye and brain and have been shown to directly improve central nervous system degeneration.

"Men and women eat about the same amount of these carotenoids, but the requirements for women are much higher," said Hammond."The recommendations should be different, but there are, generally, not any recommendations for men or women for dietary components that are not directly linked to deficiency disease (like vitamin C and scurvy)," Hammond said. "Part of the idea for the article is that recommendations need to be changed so that women are aware that they have these vulnerabilities that they have to proactively address, so they don't have these problems later in life."

Carotenoids are also available via supplements, and the National Institutes of Health has focused resources on specific carotenoids through the National Eye Institute program. And though supplements of lutein and zeaxanthin are a way of increasing intake, Hammond said getting them through food is a much better strategy.

"Components of diet influence the brain, from things like personality to even our concept of self. I don't think people quite realize what a profound effect diet has on basically who they are, their mood, even their propensity to anger," Hammond said. "And now of course this is extended to the microbiome and the bacteria that make up your gut -- all of these components work together to create the building blocks that compose our brain and the neurotransmitters that mediate its use."

Vitamin B6 supplements could reduce anxiety and depression

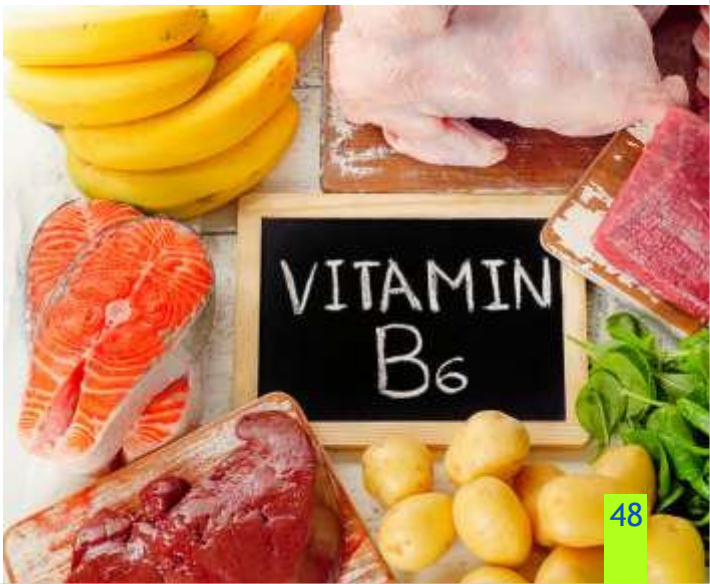
Science Daily July 19, 2022

Taking high-dose Vitamin B6 tablets has been shown to reduce feelings of anxiety and depression by new

research.

Scientists at the University of Reading measured the impact of high doses of Vitamin B6 on young adults and found that they reported feeling less anxious and depressed after taking the supplements every day for a month. The study, published in the journal Human Psychopharmacology: Clinical and Experimental, provides valuable evidence to support the use of supplements thought to modify levels of activity in the brain for preventing or treating mood disorders.

Dr David Field, lead author from the School of Psychology and Clinical Language Sciences at the University of Reading, said: "The functioning of the brain relies on a delicate balance between the excitatory neurons that carry information around and inhibitory ones, which prevent runaway activity.



"Recent theories have connected mood disorders and some other neuropsychiatric conditions with a disturbance of this balance, often in the direction of raised levels of brain activity. "Vitamin B6 helps the body produce a specific chemical messenger that inhibits impulses in the brain, and our study links this calming effect with reduced anxiety among the participants."

While previous studies have produced evidence that multivitamins or marmite can reduce stress levels, few studies have been carried out into which particular vitamins contained within them drive this effect. The new study focused on the potential role of Vitamins B6, which is known to increase the body's production of GABA (Gamma-Aminobutyric Acid), a chemical that blocks impulses between nerve cells in the brain. In the current trial, more than 300 participants were randomly assigned either Vitamin B6 or B12 supplements far above the recommended daily intake (approximately 50 times the recommended daily allowance) or a placebo, and took one a day with food for a month.

The study showed that Vitamin B12 had little effect compared to placebo over the trial period, but Vitamin B6 made a statistically reliable difference. Raised levels of GABA among participants who had taken Vitamin B6 supplements were confirmed by visual tests carried out at the end of the trial, supporting the hypothesis that B6 was responsible for the reduction in anxiety. Subtle but harmless changes in visual performance were detected, consistent with controlled levels of brain activity.

Dr Field said: "Many foods, including tuna, chickpeas and many fruits and vegetables, contain Vitamin B6. However, the high doses used in this trial suggest that supplements would be necessary to have a positive effect on mood.It is important to acknowledge that this research is at an early stage and the effect of Vitamin B6 on anxiety in our study was quite small compared to what you would expect from medication. However, nutrition-based interventions produce far fewer unpleasant side effects than drugs, and so in the future people might prefer them as an intervention.

"To make this a realistic choice, further research is needed to identify other nutrition-based interventions that benefit mental wellbeing, allowing different dietary interventions to be combined in future to provide greater results.One potential option would be to combine Vitamin B6 supplements with talking therapies such as Cognitive Behavioural Therapy to boost their effect."

Women urged to eat potassium-rich foods to improve their heart health

Science Daily July 21, 2022

Women who eat bananas, avocados and salmon could reduce the negative effects of salt in the diet, according to a study published today in European Heart Journal, a journal of the European Society of Cardiology (ESC). The study found that potassium-rich diets were associated with lower blood pressure, particularly in women with high salt intake.

"It is well known that high salt consumption is associated with elevated blood pressure and a raised risk of heart attacks and strokes," said study author Professor Liffert Vogt of Amsterdam University Medical Centers, the Netherlands. "Health advice has focused on limiting salt intake but this is difficult to achieve when our diets include processed foods. Potassium helps the body excrete more sodium in the urine. In our study, dietary potassium was linked with the greatest health gains in women."

The study included 24,963 participants (11,267 men and 13,696 women) of the EPIC-Norfolk study, which recruited 40 to 79 year olds from general practices in Norfolk, UK, between 1993 and 1997. The average age was 59 years for men and 58 years for women. Participants completed a questionnaire on lifestyle habits, blood pressure was measured, and a urine sample was collected. Urinary sodium and potassium were used to estimate dietary intake. Participants were divided into tertiles according to sodium intake (low/medium/high) and potassium intake (low/medium/high).

The researchers analysed the association between potassium intake and blood pressure after adjusting for age, sex and sodium intake. Potassium consumption (in grams per day) was associated with blood pressure in women -- as intake went up, blood pressure went down. When the association was analysed according to sodium intake (low/medium/high), the relationship between potassium and blood pressure was only observed in women with high sodium intake, where every 1-gram increase in daily potassium was associated with a 2.4 mmHg lower systolic blood pressure. In men, there was no association between potassium and blood pressure.

During a median follow-up of 19.5 years, 13,596 (55%) participants were hospitalised or died due to cardiovascular disease. The researchers analysed the association between potassium intake and cardiovascular events after adjusting for age, sex, body mass index, sodium intake, use of lipid lowering drugs, smoking, alcohol intake, diabetes and prior heart attack or stroke. In the overall cohort, people in the highest tertile of potassium intake had a 13% lower risk of cardiovascular events compared to those in the lowest tertile. When men and women were analysed separately, the corresponding risk reductions were 7% and 11%, respectively. The amount of salt in the diet did not influence the relationship between potassium and cardiovascular events in men or women.

Professor Vogt said: "The results suggest that potassium helps preserve heart health, but that women benefit more than men. The relationship between potassium and cardiovascular events was the same regardless of salt intake, suggesting that potassium has other ways of protecting the heart on top of increasing sodium excretion."

The World Health Organization recommends that adults consume at least 3.5 grams of potassium and less than 2 grams of sodium (5 grams of salt) per day. High potassium foods include vegetables, fruit, nuts, beans, dairy products and fish. For example, a 115-gram banana has 375 mg of potassium, 154 grams of cooked salmon has 780 mg, a 136-gram potato has 500 mg, and 1 cup of milk has 375 mg.

Most high blood pressure in children and teenagers is linked with unhealthy lifestyle

Science Daily July 27, 2022

Inactivity, diets high in sugar and salt, and excess weight account for nine in ten cases of high blood pressure in children and adolescents, according to a consensus paper by heart health experts published today in European Heart Journal, a journal of the European Society of Cardiology (ESC). The document, which focuses on hypertension in 6 to 16 year-olds, recommends that families get healthy together.

"Parents are significant agents of change in the promotion of children's health behaviours," said first author Professor Giovanni de Simone of the University of Naples Federico II, Italy. "Very often, high blood pressure and/or obesity coexist in the same family. But even when this is not the case, it is desirable that lifestyle modifications involve all family members."

Dietary recommendations for treating high blood pressure in children include emphasising fresh vegetables, fruits, and other high fibre foods, limiting salt intake, and avoiding sugar-sweetened drinks and saturated fat. Children and adolescents should do at least one hour of moderate-to-vigorous physical activity every day, such as jogging, cycling or swimming, and spend no more than two hours a day on sedentary activities. "Parents should monitor the amount of time their children spend watching TV or using smartphones and suggest active alternatives," said Professor de Simone.

Realistic goals should be set for weight, diet, and physical activity that focus on the aspects needing the most improvement. "Recording weight, eating habits and exercise over time -- but without becoming obsessive -- can help young people and their families to track progress towards their goals," said Professor de Simone.

A "health-promoting reward system" is recommended. Professor de Simone said: "Ideal incentives are those that increase social support and reinforce the value of targeted behaviours, such as a family bike ride or a walk with friends."

The document refers to childhood obesity and hypertension as "insidious siblings" which gradually become a serious health hazard. Studies have shown that childhood hypertension is becoming more common and that part of the increase can be explained by obesity, particularly abdominal obesity. It is estimated that less than 2% of normal weight children are hypertensive, compared to 5% of overweight and 15% of obese children. Professor de Simone said: "The rise in childhood hypertension is of great concern as it is associated with persistence of hypertension and other cardiovascular problems during adulthood."

Early diagnosis of elevated blood pressure is crucial so that it can be managed with lifestyle and, if needed, medications. Even one blood pressure measurement by a doctor or nurse can identify children with high blood pressure, but a second visit is recommended for confirmation. Professor de Simone said: "Screening should be performed in the primary care setting at least yearly, regardless of symptoms. This is because hypertension in children, as in adults, is usually asymptomatic."

When blood pressure measurements point to hypertension, a medical history and physical examination are needed to determine potential causes and identify behaviours that can be modified. Information includes family history of hypertension and cardiovascular disease, birth weight and gestational age; details on lifestyle such as smoking, salt intake, alcohol consumption, physical exercise and leisure time activities; and possible symptoms including headache, nosebleeds, vertigo, visual impairment, low school performance, attention difficulties, shortness of breath, chest pain, palpitations and fainting.

In the early stages, treatment of childhood hypertension should focus on education and behaviour change. If blood pressure goals are not achieved, a single low-dose drug should be introduced. If one drug is ineffective, small doses of two drugs may be needed.

FOOD SCIENCE & INDUSTRY NEWS

Researchers call for critical consensus on processed foods definition

01 Jul 2022 Nutrition Insight

Disagreements on how to interpret "processed foods" mean there is no consensus on the nutrition and healthfulness of food, a new study has revealed.

"Sometimes food processing can result in nutrient losses, for example, when grains are milled to refined flour, and recipe formulations can include high amounts of fat, sugar, and/or salt," Christina Sadler, postgraduate researcher at the University of Surrey and senior manager at the European Food Information Council, tells NutritionInsight.

"However, sometimes processing methods can make some nutrients more bioavailable and thus could have a positive impact." The research carried out by the University of Surrey highlighted the ambiguity and confusion surrounding terms such as "processing," "ultra-processed," and even "healthy" foods.

A cornucopia of confusion

The study concentrated on four main points of contention. First, they looked at broad concepts that require differentiation, such as "processed" and "ultra-processed." Second, they honed in disagreements surrounding the extent and amount of processing. Next, they looked at the role of processing within the food system and its risks and benefits. Finally, the researchers focused on the challenges of different perspectives and invested interests in these terms.

The study found that the conceptions of these terms were so vast and different, even among professionals, that it may cause considerable trouble when trying to communicate their meanings to consumers. "The research aimed to understand professionals' perspectives on the concept of processed food and identify the agreements and disagreements that exist and the challenges for communicating to the public," Sadler underscores.

The findings confirmed a lack of consensus on the degree or level of food processing and how this relates to nutrition and the healthfulness of a food, she notes. "Even among professionals, there was confusion about whether or not the term ultra-processed means 'unhealthy,' and confusion about the distinction between processing and nutrients."

A necessary consensus?

Another difficulty highlighted by the study revolves around whether there should be consensus on the meanings of these terms. One participant explained that the moment universal definitions for what is "processed," what is "ultra-processed" and what undergoes processing are introduced, their mischievous side would go out looking for the one thing that violated the definition.

They also stated that creating standard definitions may cause consumers and the industry to fixate on the definition rather than the real issue; whether or not the product is healthy. Still, others stated that all food is "processed" in one way or another, whether that process includes packaging or freezing foods onsite or cooking the food at home. "Definitions give meaning to words, avoid multiple interpretations, and enable a common understanding," Sadler continues. "Terms surrounding processed foods are not consistently defined and can mean different things to different people, limiting how these terms can be used effectively in policies or advice."

Putting the "ultra" in "ultra-processed"

One final area of deep contention in the study was the term "ultra-processed." A recent issue of Great Debates in Nutrition looked at two studies related to this term. One claimed to find evidence linking increased morbidity rates to ultra-processed foods, while another contended that there are too many factors in health outcomes to blame just one. The Surrey study notes that some countries, such as Brazil, India and parts of Belgium, have already started to use the term "ultra-processed" in their dietary guidelines. The US is also slated to adopt the term in 2025, and the UK has stated that consumption of ultra-processed foods must be slashed in order to stem the rising tide of childhood obesity.

Finding common ground

The study concludes that there must be some agreement among food professionals on the definition of these terms if only to help consumers stay informed and make healthy choices. As it stands now, a recent study by the British Nutrition Foundation found that most adults in the UK have no idea how to differentiate between processed and ultra-processed foods. "It is agreed that food processing is part of a complex food system, with benefits and risks for achieving healthy, sustainable and affordable diets," states Sadler. "Food processing serves important purposes such as lengthening preservation, ensuring food is safe, boosting digestibility, increasing shelf-life, reducing food waste, and improving taste, texture, or colour."

However, Sadler notes that both home and industrial processing can have "undesirable consequences" such as loss of nutrients, the formation of toxic compounds, or the addition of high amounts of fat, sugar, and/or salt. "Describing foods as good or bad is already a contentious issue. But there needs to be some differentiation between the processing of food products to help inform consumers." "This study did not test people's ability to understand how 'processed food categories' influence perceptions of nutritiousness," comments Sadler.

"It does show that further collaboration is needed to agree on the scope and degree of food processing and how this relates to health impacts and existing nutritional labelling and dietary advice. Emerging research may allow for other aspects, such as processing methods, to be accounted for in the future," she concludes.

By William Bradford Nichols

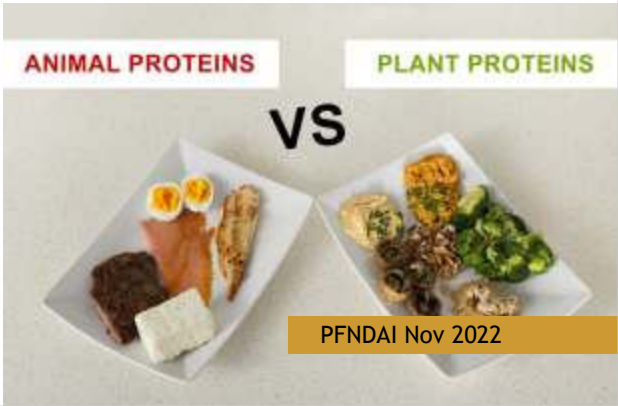
MycoTechnology fermentation platform may see plant protein rival that of animals

07 Jul 2022 Nutrition Insight

A new study by the University of Illinois and Cornell University published in Food Science and Technology reveals that MycoTechnology's patented mycelial fermentation process may make plant-based proteins comparable to their animal-based counterparts.

The Colorado-based company used the technique with a pea and rice protein blend to create its FermentIQ protein powder, which the study found to have a 99% absorption rate. The announcement comes on the heels of the company raising US$85 million in a series of E funding campaigns. "MycoTechnology's proprietary mushroom fermentation platform harnesses the natural ability of mushroom mycelia to break down or digest material it grows on," Lisa Wetstone, senior director, growth, strategy and marketing, MycoTechnology, tells NutritionInsight.

"Looking forward, our second-generation products will leverage the mushroom mycelia itself as a valuable and sustainable source of nutrition." continues Wetstone. "Creating this mushroom-based protein requires just the right formula, conditions and choice of mushroom strain to create the optimal taste, texture and nutrition profile."



Harnessing the power of the mushroom

Mycelia are the mushrooms' underground root systems. According to MycoTechnology, the mycelial fermentation process modifies the complex configuration of the proteins in the rice and peas and decreases the quantity of "anti-nutrients" like phytic acid, a molecule that makes proteins harder to absorb. "Mycelial fermentation helps break down or 'pre-digest' plant proteins for the body to absorb," explains Wetstone. "This allows for faster absorption of amino acids from FermentIQ protein compared to unfermented pea or rice protein."

She continues: "A separate, unpublished study conducted in collaboration with the University of Illinois found that initial total amino acid uptake with FermentIQ PTP plant protein was 30% higher than for standard pea protein and 500% more than for rice protein. This greater protein absorption increases bioavailability, which means the body can access the benefits of amino acids more readily." Addressing this problem may provide increased benefits in areas where efficient protein is most popular such as the senior, sports and fortified nutrition markets. MycoTechnology adds that as an unforeseen outcome of the process, FermentIQ may even extend the shelf life of some products due to its ability to regulate moisture activity.

Surpassing animal protein?

MycoTechnology holds that the amino acid absorption rate, as published in the study, reveals that the fermentation process may make the FermentIQ protein power "as complete and nutritious as animal proteins – or even more so." Furthermore, Wetstone notes that the changes the plant-based proteins undergo during the fermentation process "improve its taste and digestibility – two of the major barriers to adoption for plant proteins." MycoTechnology states that the bitter taste of many plant-based proteins means that product developers must often use masking agents, adding to the ingredients list and compromising clean label programs.

"Early interest in and adoption of plant-based protein was often associated with a shift away from animal agriculture to reduce the environmental impact of our food system," notes Wetstone. "Yet today, it has become clear that health and nutrition are the primary drivers of market growth." "The next generation of animal-free products must deliver comparable or superior nutrition to animal-based products to motivate adoption of a broader audience, without sacrificing taste and texture."

Making mushrooms more appealing

The health benefits of mushrooms have not gone unnoticed. They have been hailed for their ability to tackle nutrient deficiencies, like riboflavin and potassium, without adding a ton of calories. They have also been praised for their capacity to strengthen immunity, increase brain power and even aid digestion, creating what industry leaders call the "shroom boom." Innova Market Insights has also reported on the growing popularity of mushroom-enriched supplements.

"While the incredible potential of mushrooms is beginning to enter the spotlight, there is a long way to go to educate consumers on all the ways that mushrooms and mushroom mycelia can contribute to human and planetary health," Wetstone stresses. "In the world of animal-free protein, consumers have less familiarity with the role mushrooms play and the associated benefits."

"In our case, educating customers and consumers on these nutritional benefits imparted by our fermentation process is critical to drive adoption. As we look to the future, introducing new mushroom-based proteins to the market requires – above all – that those products can win over consumers with the first bite."

By William Bradford Nichols

families. They don't want to overload their bodies and their children's bodies with sugar, and they don't want to feel guilty about enjoying a cookie either."

Vitamin-packed, "guilt-free" cookie targets sugar-heavy snack industry

11 Jul 2022 Nutrition Insight

Boston-based start-up FYXX Health has launched a high fibre, low carb, low sugar cookie fortified with vitamins D, B12, zinc, magnesium and calcium it says will "shake up" both the snack and supplement industries. In a market dominated by low fibre, high carb, fat, salt and sugar products, Sung Park, CEO and founder at FYXX Health, tells NutritionInsight, "This is an industry first. We are showing what can be done when you put a consumer's health at the front of mind."

"We want to make healthy eating fun. For us, it's not about eliminating the foods we have always enjoyed, like cookies and candies, but about making them good for our bodies, as well as our taste buds." The launch targets health-conscious consumers, according to Park. "These are people who really take the time to read the labels of the food they are buying, both for themselves and for their

Putting the guilt-free in cookies

The Vitamin Cookie is FYXX Health's most recent foray into the realm of healthy snacks. Previously, the health and heart-conscious company released a calcium-enriched cookie to help support strong bones and a phytosterol-fortified cookie to promote heart health. Moreover, they recently released a range of products, from drinks that support immunity to candy made from carrots. Innova

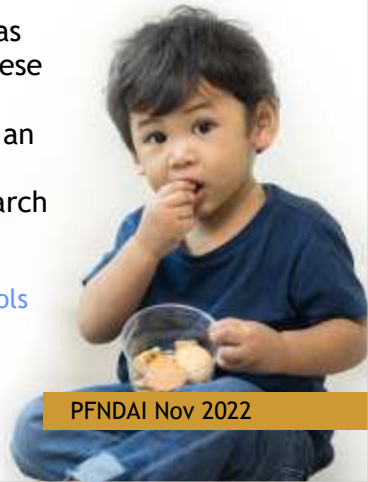
Market Insights recently reported that the nutrient-packed sweets market grew by 4% from 2017 to 2021. They have also reported that consumers are increasingly focused on items with less sweeteners in their sweet products and have revealed that four out of ten consumers claim to have reduced their sugar intake within the last 12 months.

Impact on public healthcare

The company emphasizes its small size enables them to quickly react to consumer demands in a market "ripe for innovation." Industry has previously pegged start-ups may hold the key in overcoming inflationary strangleholds as smaller companies have greater flexibility to adjust and innovate. FYXX Health holds that parents care deeply about their children's health and the company's products can help parents replace their children's favourite snacks with healthy and equivalent treats. "Our healthy eating habits and the choices we make about our food not only impact our own health, but the healthcare system as a whole."

The impact of nutrition on public healthcare has long been a point of contention between campaigners and industry. In the UK, childhood obesity is "worsening," costing the National Health Scheme billions every year, as more than 21 million adults across will be categorized as medically obese by 2040, according to an analysis by Cancer Research UK.

By William Bradford Nichols



Ashwagandha extract eyed for sports nutrition market after study reveals endurance benefits

20 Jul 2022 Nutrition Insight

A clinical study unveils daily Ashwagandha extract consumption may benefit energy and endurance levels in males. Conducted by India-based Manipal Natural, the study focuses on the company's Asvaman product, drawn from Ashwagandha – also known as Withaniasomnifera – extracts.

"Ashwagandha is increasingly becoming one of the most popular herbal supplements worldwide, and it is no surprise given its remarkable health benefits. The study positions Ashwagandha as strongly recommended for chronic fatigue syndrome or energy supplements," Dr. HebbaniNagarajappa Shivaprasad, managing director at Manipal Natural, tells NutritionInsight.

"Especially post COVID-19, many people complain that fatigue is a normal part of the body's response to fighting a viral infection," he adds.

Energy boosting effects

The participants consisted of healthy males between 18 to 50 years old. They were given either a daily dose of 300 mg of Asvaman or a placebo for 42 days. A six-minute walking test, standing on one leg, stairs climbing, and chair standing tests were conducted throughout the testing period to measure endurance and energy levels. "Overall, the results of this study have demonstrated statistically and clinically significant efficacy for the treatment group subjects supplemented with Asvaman – Ashwagandha extract – when compared to placebo," says Shivaprasad. "Taken together, the primary and secondary efficacy parameters from this study make a strong argument that Asvaman could provide comparable improvement in energy level and endurance over placebo," he concludes.

Herbs as medicine

According to Shivaprasad, Ashwagandha is not well known among the general population yet, although

interest is spiking among health nutrition enthusiasts. Social media activity on ashwagandha increased last year compared to the year before, mainly in Europe, Germany and the UK. "We look forward to expanding ashwagandha extract to the market segment of F&B and sports nutrition," says Shivaprasad.

Ashwagandha is usually used in alternative medicine and has shown many health benefits in ayurvedic practices. One of those is immune-boosting effects when consumed in a low dose. Being one of the oldest medical systems in the world, ayurvedic focuses on gut health as "the basis of health" with treatments involving herbs. Although "dietary directives play a role as well," an industry player previously mentioned.

By Beatrice Wihlander

REGULATORY NEWS

EU-wide nutrition labelling consensus proving to be a headache, Griffith Foods reveals

04 Jul 2022 Nutrition Insight

Inconsistencies in front of package (FoP) food labelling systems throughout the EU and the UK are a source of confusion for consumers and headaches for corporations, according to a whitepaper on nutrition labelling published by Griffith Foods.

Until now, FoPlabelling has been voluntary, but that may all change soon. The EU intends to adopt a standardized system by the end of 2022, and the UK's High Fat Salt and Sugar scheme is slated to become law in 2023. The problem is, between the UK and the EU, and even solely within the EU, there is no universal agreement on which system should be used or how they should be applied.

"The greatest obstacle to the introduction of a standardized system firstly lies with the member states agreeing on the system under development," MiekeBloeman, market manager, Snack Europe and Simon Hewlett, research and development manager, Griffith Foods, tells NutritionInsight. The Nutri-Score system is the likely candidate for universal adoption by the EU at the end of the year. "To date in Europe, FoP nutrition labelling remains voluntary. However, The European Commission will submit a proposal for a harmonized mandatory scheme," they say.

Mounting confusion

There are at least five FoP systems currently in use in the EU and the UK, and some countries, similar to the UK, have adopted their own systems. Bloeman and Hewlett explain: "There are several schemes operating in accordance with the Food Information to Consumers Regulations in the EU. These include Nutri-Score, the Traffic Light scheme used in the UK and Ireland, the Keyhole logo used in Sweden and Denmark, and the Choices Logo used in Poland and the Czech Republic."

"Many argue that the co-existence of a range of FoP schemes in the EU market will lead to more market fragmentation and consumer confusion," state the two. "The major issue for (Pan-European) food companies, especially those that operate across the UK and EU, is the checkerboard of systems being used in the European Economic Area."

Too complex and yet, too simple

The authors state that the popular Nutri-Score system is the likely candidate for adoption in the EU. Many will recognize the A through E nutritional grade that moves from green to red depending on the nutritional value of the food. It seems simple enough, but not all countries agree on its usefulness. "Some countries are opposed to this scheme, arguing that it oversimplifies the nutritious value of products," says Bloeman and Hewlett.

"The greatest benefit is to improve the overall health of consumers by providing the information to allow everyone to make informed purchases. "This means they have the ability to reduce calorie intake, fat, salt, and sugar, which in turn can help reduce the risk of chronic disease."

Even though 269 European scientists have called for the European Commission to adopt the Nutri-score system quickly, Italy, for one, has rejected the system outright. Italy claims that the system unjustly penalizes the Mediterranean diet and downplays the nutritional value of many products. Spain also recently flagged problems and called for the Nutri-Score system to remove its FoPlabelling from jamónibérico pork and olive oil, stating it does not take all of the nutrients into account for these types of products.

Corporations feel the heat

The white paper notes that food corporations, especially snack companies, will have to jump through some hoops if they intend to score on a universal system. "One challenge is that they will have to redesign most food packaging, for all concerned food categories, and reformulate food products to improve the nutritional score without compromising taste and texture alongside the development of regulatory and technical knowledge," say Bloeman and Hewlett.

"Some experts think that food manufacturers should anticipate a Nutri-score B as standard, making that an unofficial, even an official, industry target that would create some conformity across the EU and the UK," they stress.Others are even recommending that it's best practice to reconfigure portfolios from this point on and, in doing so, enjoy some first-mover advantage when the new legislation locks in."

Trouble in the UK?

The UK's Department of Health and Social Care (DHSC) has already published its food promotion guidelines and placement regulations in accordance with the HFSS scheme. Some of that guidance, such as the regulation dictating where HFSS products can be displayed in stores, is due to start this October. "HFSS guidance will impact predominantly on the promotion of products – the greater challenge is, following the departure from the European Community, exports and imports may become more challenging as the nutritional labelling systems may well differ from one another," adds Bloeman and Hewlett.

The UK's HFSS scheme is also not without its detractors. In April of this year, Kellogg's announced a lawsuit against the UK government for not including milk in their cereals' nutrition facts. Conversely, the organization Action on Salt claims that the HFSS guidelines do not go far enough and still put citizens at risk.

Something is still better than nothing

Despite all the potential conflicts, the white paper notes that some form of harmonization is still a critical point if consumers are to be adequately informed about the nutritional value of the foods they eat. Bloeman and Hewlett admit that, at first, there will be some growing pains: "While there is wide acceptance that a standardized system is right, its practical implementation is another matter."

"The immediate impact could be confusion if the system is not communicated effectively. The consumer may take little or no notice of the advice, and the opportunity to improve their overall health might be lost." However, the two conclude that the lasting benefits to the consumer may outweigh the initial risk. "Governments and consumers have long been in need of improvements. Even simplification, in so fragmented a system, is welcomed change," they conclude.

By William Bradford Nichols

Singapore begins sugar crackdown, set to adopt Nutri-Grade labelling by 2023

15 Aug 2022 Nutrition Insight

Singapore is set to adopt the Nutri-Grade labelling system by the end of 2022 for pre-packaged beverages with high sugar and saturated fat, according to the nation's health minister Ong Ye Kung.

Outlets selling these drinks will be required to label their menus with the Nutri-Grade score by December 30, 2022, when the measure comes into force. Products with the highest level of sugar and saturated fat will also be prohibited from advertising by the end of 2030.

"These measures aim to help consumers make more informed, healthier choices, reduce the influence of advertising on consumer preferences and spur industry reformulation," Kung explains. "While we cannot avoid the sugar in juices and sugar cane drinks, we can enjoy coffee, tea, milo and bubble tea with less sugar content. I hope more Singaporeans will realize that less sugar will bring out the natural flavours of the drinks and may find them more enjoyable. More importantly, it keeps us healthy and staves off diabetes." Singapore announced the idea in 2020, which was criticized by Food Industry Asia for being disproportionate.

Eyeing UK efforts

Ahead of the implementation date, producers have "significantly reformulated their beverages," Kung underscores. Preliminary data shows that the median sugar level of prepacked beverages have been reduced from 7.1% in 2017 to 4.7% in 2021, he adds. As for demand, sales of pre-packaged beverages with higher sugar content (Grade C and D) have fallen from 63% in 2017 to 40% in 2021. Conversely, sales of beverages with less than 5% sugar content have gone up from 37% to 60% over the same period. "These shifts are as significant as those recorded in the UK, which has implemented a sugar tax and much more stringent regulation of the market. It shows that by providing the right information in the right way, our industry and consumers are sophisticated and health-conscious enough to respond positively," Kung notes.

The UK's sugar tax on soft drinks resulted in less sugar consumption, according to a study published last year. Nonetheless, campaigners have long slammed the UK government for siding with industry by introducing voluntary measures aiming to slash sugar rather than making them mandatory. Britain's diabetes figures have led to the country to be described as a "tipping point of public health emergency," as Diabetes UK flagged one in ten people in the UK will be living with diabetes by 2030.

Tackling labelling hurdles

According to Kung, more than half of Singaporeans' daily sugar intake comes from beverages, of which prepacked beverages such as can and packet drinks contribute nearly two-thirds. "From December 30 this year, prepacked beverages with higher sugar and saturated fat must be labelled with a Nutri-Grade mark. It is a neutral or even nice name, but the message to consumers is to avoid those with Nutri-Grade mark that indicates a high level of sugar. Those with the highest level of sugar and saturated fat are also prohibited from advertising."

Across the EU and UK, inconsistencies in front of package food labelling systems are proving to be a headache. The EU intends to adopt a standardized system by the end of this year, while the UK's HFSS scheme is slated to become law in 2023. A study previously flagged the impact of where nutritional labelling is presented. Moving labels from the back to the front of food packaging may incentivize food producers to competitively improve the quality of their ingredients, research revealed.

By Andria Kades

Slashing spoilage: Indian bioactive sachet innovation could boost fresh produce shelf life

By Nurul Ain Razali 27-Jun-2022- Food Navigator Asia

Chennai-based start-up Greenpod Labs has invented bioactive sachets that claim to reduce the spoilage of fresh fruits and vegetables.

The bioactive ingredients contained in the sachets could uniform ripening and minimise microbial growth, thereby extending the shelf life of produce, explained Greenpod Labs CEO Deepak Rajmohan.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"The economic loss of food waste costs India USD$12b. Despite India being the second-largest producer of fruits and vegetables, 40% of it is lost before it even reaches the consumer. We have to solve this. If you can solve it for India, you'll solve it for all developing countries," he said.

The spoils of science

The sachets are manufactured in two OEM manufacturing plants – one in the state of Tamil Nadu itself, while another is in Andhra Pradesh. The firm's current sachet output can protect 200 to 500 tonnes of produce per week.

Each 5cm by 5cm sachet is made of non-woven, gas-permeable membranes and contains proprietary formulations of eight to 12 bioactive ingredients in powder form. According to Deepak, the ingredients could be considered "generally recognised as safe" (GRAS) by the US FDA.

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Derived from plant parts, such as barks and leaves, skins of vegetables and fruit extracts from India, Asia and Europe, the bioactive ingredients are then encapsulated in different polymers and released as volatile compounds.

These compounds activate the in-built defence mechanisms upon landing on the surfaces of the produce. He claims that one sachet can protect 2kg to 5kg of produce in temperatures ranging from 12 degrees to 45 degrees Celsius (53.6 degrees to 113 degrees Fahrenheit) and increase shelf life by 40% to 60%.

Each sachet type is tailored to the crop and could contain multiple compounds. They must be placed on top of the produce to ensure even distribution of the bioactive ingredients. The firm's first commercialised product is the sachet for mangoes. Mangoes tend to overripe or underripe and soften during transport and storage. Deepak also said that rotting occurs on the top layers, rendering it undesirable to distributors and consumers.

"Hence, the compounds for the mango sachet can slow down the softening of the mango skin and subsequently prevent microbes from entering. One mango sachet can protect 2kg of mangoes at ambient temperatures, ranging from 35 to 45 degrees Celsius. It leaves no residue due to the volatility of the compounds," he explained.

Besides impacting the skin thickness, the sachets could trigger other reactions in other crops. For instance, sachets for tomatoes activate the process of ethylene biosynthesis, while sachets for leafy greens could slow down transpiration.


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Watering the seeds of growth

Currently, the firm is working on over 20 pathways to prevent spoilage for different types of produce. Testing is also being conducted in other developing countries; for instance, tests in Indonesia will commence end-June to early July 2022, while Kenya's will be around July to August 2022. The team is in discussions to explore the Filipino market as well.

The start-up is also targeting to commercialise sachets for another three to four types of crops this year, such as capsicum, leafy greens, grapes and tomatoes. Also in the pipelines are sachets for strawberries and pineapples. B2B firms can also expect more diversification, such as sachets for grains, seeds, meat, milk, juices and confectionary, in the long run. By year-end, the firm aims to protect 7,000 tonnes of produce, which involves approximately 7msachets. According to Deepak, 15 sachets costing US$1.20 can protect around 20kg of mangoes. Normally, cold storage for 20kg of mangoes could cost up to US$12.

After India, Greenpod Labs targets Africa and fellow Asian countries like Thailand, Vietnam and Bangladesh and hopes to protect 100,000 tonnes by 2025. By 2027, it aims to protect 10m tonnes of produce in developing countries globally. "It also provides an economic benefit for consumers. A US$1 investment reaps you an ROI of US$12 to US$14 in sales because of lesser spoilage. You get better prices for the same volume because the quality is better.

"Food waste is a preventable problem. We need to have more systems and processes in place, and we hope that we can play a significant role in making the food waste preventable," said Deepak. Greenpod Labs, established in October 2019, were one of the 10 finalists in the sixth edition of the Future Food Asia Awards (FFAA) 2022 held in Singapore recently. This was the firm's maiden attempt with FFAA.

Before this, the 14-man firm participated in a Danish accelerator and received €100,000 (US$104,000) at the end of 2020. Then, it conducted a second fundraiser involving C-suite investors that garnered€500,000 (US$520,600) in February 2022. Some notable investors include Rockstart Agrifood, the Indian Angel Network and Singapore's she1K.