PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN OCT 2021

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PFNDAI Bulletin OCT 2021
FOOD, NUTRITION & SAFETY MAGAZINE

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HEXAGON NUTRITION

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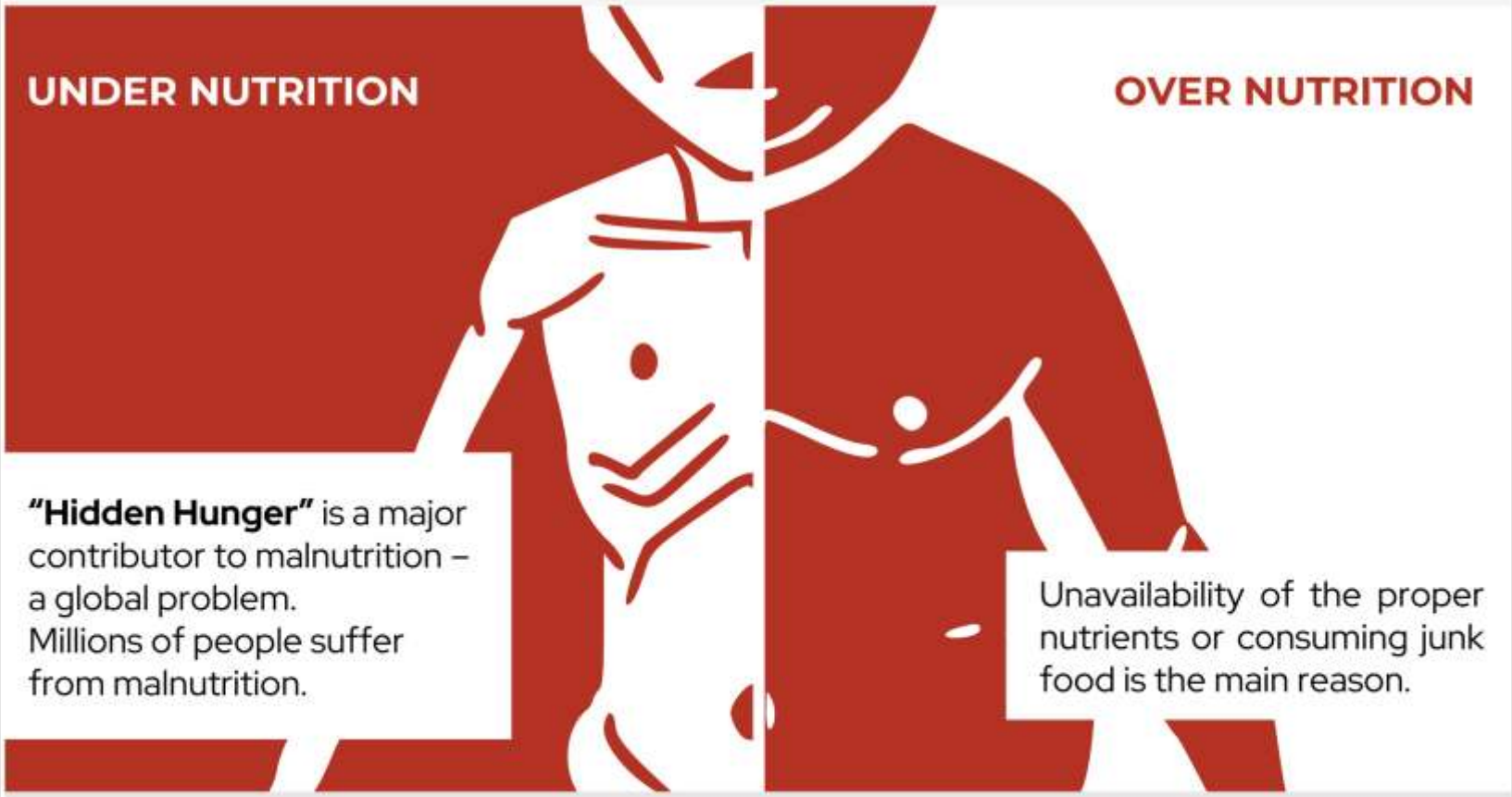

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EDITORIAL

Pandemic has created many problems and one of the most important effects has been on food in every form. Restaurants and malls have been very badly affected. Even today they are not fully functional. May delivery companies have also been affected adversely; some are trying to bounce back. There has been a great change in the food people eat at home.

People found it difficult in the initial part to get groceries as shops were closed due to lockdown. People would try to get whatever and wherever possible including local bania shops, street vendors of vegetables and fruits, etc. Online shopping picked up with online stores like Amazon ensuring that groceries were promptly delivered. People started having faith in packaged food products and ingredients.

People were trying to prepared food at home and eat mostly home-cooked food as it was safer under these conditions. This was fine with people having family and a person who could prepare food from the ingredients. However, many did not have the skills not infrastructure to prepare foods at home and largely depended on restaurant food or food service delivering meals. Out of these difficulties rose a concept which was known earlier but became successful because of pandemic namely meal kits.

The concept here is simple and is made into a large variety of different products. Much of the efforts in making a meal go into preparation of food ingredients and measuring to proportion for certain number of individual to eat. Rice needs to be measured and then washed and then cooked. Vegetables need to be washed, peeled and sometimes inedible portions to be removed and then cut as per the requirement.

Pulses need to be soaked before cooking. For making curry several different spices need to be proportionately measured and mixed and sometimes ground.

Some of the preparations like non-veg curry need fish or chicken to be marinated. The meat is often deboned to make boneless if necessary. Some preparations like dosa or idli needs the batter to be prepared and fermented. Some multigrain roti or similar products e.g. thalipeeth needs proper proportion of cereals mixed in the ground form and sometimes even spices added.

If many of these steps are carried out and then the ingredients are delivered it will save a large amount of time but the inexperienced person can also get a lot of confidence for preparing the food. They all get the satisfaction that they cooked for themselves and their families. This is the concept of meal kits. You don't buy ready-to-eat meal or frozen dinner which only need to be heated in microwave for a few minutes and it is ready. You get the satisfaction of cooking or preparing the food yourself although got a little help from the meal kit person.

This sector is growing world wide as it is not only providing satisfaction and confidence but also gives you to some extent the assurance of safety as you have prepared it. Global meal kit delivery is expected to reach around 9 billion dollars by 2025. Even big stores have started keeping these meal kits on their shelves so people can buy them and bring home and prepare meals. So when difficulty closes one door, it open another door of new opportunity.

Prof Jagadish Pai,
Executive Director,
PFNDAI

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FROZEN FOOD: NEW DIMENSION IN THE INDIAN FOOD INDUSTRY

AUTHOR
Mr Ashu Phakey,
Vice President,
Business Head
ITC Frozen Foods

Let us start by asking you this. What comes to your mind when you hear the word 'Frozen Food'. Close your eyes and think! would some of those words be – ''not as good as fresh food', 'loaded with preservatives', 'not so healthy food', 'not as tasty', etc. Would most of your thoughts sound as if you are making a compromise.

Now, what if we told you, that Frozen Foods and much of the Frozen Snacks you see in your super market has "no added preservative, is as good as fresh food – maybe even better, is great tasting and does not compromise on your health"! Yes, that's right. And No, this is no marketing pitch. Read on to learn why.

We will take you through an exciting journey about Frozen Food, its accidental invention, why it stays fresh without added preservatives, the techniques of freezing, how our grandmothers and dadi's always knew the secrets of Freezing (without the need for Google), the size of the industry, and the challenges and the opportunities in India!

History of Frozen Food

The Frozen Snack Food business in India is still in its teens, less than 20 years old. But did you know, that Frozen Food as a concept is more than 3000 years old…it was discovered in 1000 BC, when the Chinese people would store food in their Ice cellars made of snow (Like they say, While God created the world, the rest was all invented by the Chinese !!).

Thereafter, freezing food emerged in countries with cold climates, using the natural conditions of snow and ice to preserve food. During the 18th century, people like Enoch Piper, William Davis began to develop innovative food-freezing techniques. However, in 1924, Clarence Birdseye is credited with inventing the quick freezing method, which produces the type of frozen foods that we know today.

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Birdseye while working as a fur trader in Labrador, Canada, discovered that the fish he would catch would freeze almost immediately due to the extreme cold weather. And when a month later, he cooked the same fish, he was surprised to discover that it still tasted delicious. From this experience, he theorized that food must be frozen very quickly in order for it to retain its taste and texture.

Birdseye was right. Before quick-freezing came along, foods were frozen at a fairly slow rate. This caused large ice crystals to form, which ruptured the cell membranes of the food. When the food was defrosted before cooking, the ice crystals melted and water would leak out, taking with it the food's flavour and texture.

Birdseye developed two methods for quick freezing foods, both of which employed the innovation of packaging the food beforehand. In the first technique, the package was held between two metal belts that were chilled to -40°C to -45°C.

In the second and more popular technique, the packaged food was held under pressure between two hollow metal plates that were chilled to -30°C. Using this method, a two-inch-thick package of meat could be frozen to-18°C in about 90 minutes, while fruits and vegetables took about 30 minutes. This led to the birth of quick freezing method – that is used in most Frozen Food today.

Birdseye's quick-freezing process actually ended up creating 168 patents! These covered not only the freezing technique but also the packaging, type of paper used, and related innovations.

Long story short, Birdseye is the father for frozen food techniques and we should thank him for adding so much versatility to our food choices.

Some Common Myths associated with Frozen Foods:

So, while we all purchase and consume frozen foods in some form, sometimes lack of complete & correct information makes us believe anything we hear. This is especially true for a product category like Frozen, where we still harbour several misconceptions. Hence it is important to discuss a few of them.

Myth 1: How does Frozen Food remain as tasty and nutritious as fresh food, even months after freezing?
The answer lies in Quick Freezing or now IQF (individual Quick Freezing), where each piece –like peas, nugget or fries is quickly frozen to lock in the nutrients. In fact, the fresh Green peas you buy from your vendor is not really fresh but 3-5 days old (that's the time it takes to get to you from the farms). But Frozen Peas is fresher than Fresh, as it generally takes just 24 hours between harvesting and freezing, locking in all the nutrients. The quick freezing helps to retain the texture and bite as micro ice crystals are formed in cells during quick freezing, whereas in slow freezing, macro ice crystals destroy

the cell structure and hence loss in bite and texture. Similarly, for Frozen snacks, once they are manufactured, they go through IQF (individually quick freezing technique) that locks in the nutrients, flavour and texture that makes them deliciously tasty. 'Frozen, Fresher than Fresh'

Myth 2: How is it possible that frozen food has no added preservatives? 18 months of shelf life and still no preservatives!

Sound impossible right! Well if that's what you think, it is time you took lessons from your grandma or mom. Remember all the tasty home food (gharka khana) your grand ma would freeze to be eaten days or months later. Or all the fresh green peas she would make you peel in winters to freeze them for the off season. Or all the masalas and dry fruits, she would keep in the freezer!! Because she knew, without having to go to a fancy college, that at -18°C(our freezer temperature), food can be stored literally forever without spoiling and therefore needs no preservatives. None absolutely…. Because at -18°C, microbial growth is completely arrested which makes the product absolutely safe to consume. Instead many of the shelf stable processed products are loaded with preservatives to achieve shelf life at room temperature.

Now armed with this knowledge, the next time you are on gharka kbc, you can impress your friends and family! And this is one more reason to stock up your Freezers with the delicious range of ITC Master Chef Frozen Snacks. So enjoy without any concern!

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PATENTS

WO 2009/063485 • WO/2010/103545 • WO/2012/059942

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Global & Indian Perspective on the Frozen Food Industry

Globally, The Frozen food market is huge. It is estimated to be $224 billion. That's about Rs.16 lakh crores and is projected to grow to $ 321 billion by 2025, a CAGR of 5%. By contrast, while the Indian Frozen Snacks market is still niche and young, it is poised for an exciting growth phase.

The Frozen retail market in India is expected to see exponential growth as consumer behaviourevolves and supply chain improves. The consumer at home is rapidly evolving, seeking variety beyond home food,food that is tasty and also convenient to cook and also hygienically made. Enter Frozen Food, that fits this narrative so well. 'Freezer is the new Pantry at homes'. The pandemic has further accelerated this change in behaviour. Aiding this, is the improvement in supply chain and last mile delivery. The availability of Frozen Foods in multiple e-commerce channels and growth of Modern Trade outlets has improved availability and category discoverability. This has helped add first time users to the category while significantly increasing household penetration.

The Food Service customer in India on the other hand is also rapidly evolving and growing. international and Indian QSR chains, including local burger joints, bars, pubs and other eateries have significantly increased the B2B demand for frozen food. Frozen food is a natural choice for chains to ensure that the food served at different locations has the same taste and quality. This becomes very difficult with fresh produce, where year-round availability is a problem and the taste can change depending on the season, location or the chef at each outlet. This is why all large international QSR chains have standardised their products based on frozen or centrally prepared ingredients, making it quick and easy to present the final product to

consumers at their outlets. A good example is burger patties. Almost all burger patties are prepared at a high-quality plant based on a standardised recipe and then frozen. This ensures that the consumer experiences the same taste whether he eats the burger in Kashmir or Kanyakumari.

At ITC, we have launched a wide range of Frozen Food. This includes a range of over 50veg and non veg snacks under the ITC Master Chef brand, a range of Frozen Raw prawns under ITC Master Chef brand and a range of frozen vegetables – Green Peas, Corn and Mixed veg under the ITC Farmland brand. The products are versatile, nutritious and high on convenience – one can air fry, tawa fry, bake or microwave and are made from lentils, veggies, meat and potatoes. At ITC, we are also working towards growing accessibility and availability through innovative channels like Home Carts (similar to ice cream carts) and Vending machines.

Future Ahead:

The future of the Frozen Foods space is exciting. Frozen foods is truly a versatile product – great tasting, long shelf life, convenient to cook, safe and hygienic and offers consistency. On top of it, it's eaten as a hot snack, the best of being both home food and an exotic meal.

This has helped the market to grow at a healthy CAGR of 12-15% over last 5 years. With the HORECA channel now opening up and changing consumer behaviour, the opportunity of growth is immense.

Over the next couple of years, the key to accelerated growth will be - a) increasing consumer awareness of the category, b) expanding category stocking outlets by 10x and c) adding variety beyond potatoes -

like the range of ITC Master Chef (Veg and Non Veg Kebabs, Burger patties, Pockets, Pops, Fries, etc). With many emerging trends like Plant protein based snacks, vegan, keto, high protein based or local cuisine & spice based food, ancient grain based snacks and/or meals being in demand, this space has a lot more to offer. Even the regulatory framework is constantly evolving and thereby supports the growth of this category.

The journey has just begun!

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GUILT-FREE INDULGENCE WITH SUGAR REDUCTION

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Roquette India

What are those tiny translucent sweet crystals that often tempt us? Yes, it's sugar! A seemingly not-so-friendly ingredient anymore. But before we raise this red flag and set complete restriction on its use, it is important to understand how we got here, how much of it we actually need and how we can actually manage our indulgence while enjoying the food we love.

Role of sugar in human diet and on functioning of the body

"Sugar" includes all monosaccharides (glucose, fructose, etc.) and disaccharides (maltose, sucrose,
lactose, etc.) as per Food Safety and Standards (Advertising and Claims) Regulations, 2018.1

Glucose, a monosaccharide, in the right quantity is extremely important for the functioning of our brain and the nervous system. It helps to metabolize fats and spare proteins for their bodybuilding key function. Glucose even functions as backup energy stored in the muscles as glycogen and is released in the body while the body is active performing sports or exercising. Fructose acts as an alternative metabolite in providing energy especially when glucose is not sufficient, and the metabolic energy demand is high. Similarly, lactose is an important source of energy for babies and adults alike. There are enough scientific validations that sugar is important for the flawless operations of the metabolic industry within our body.

How do we consume sugar (quantity and forms)?

According to the World Health Organization recommendation, adults and children should reduce daily intake of free sugar to less than 10% of total energy intake. For an adult with normal body weight, this is about 12 teaspoons, with a single teaspoon containing approximately 5 grams of sugar. A further reduction of sugar intake to below 5%, or 25 grams (6 teaspoons) per day would add health benefits.2 According to OECD-FAO agricultural output report, over the outlook period 2020-2029, the average world level of per capita consumption is expected to increase from 22.5 kg/cap to 23.5 kg/cap, although considerable variations between regions and countries will occur.

Certain categories of processed foods, not usually seen as sweet goods, contain a much higher content of sugar than we would expect. For several decades, we have got used to consuming a lot of sugars in the processed foods, as it is a flavour enhancer! We need to get disaccustomed to this sweet taste. Consumers are increasingly aware of the direct impact of their food choices on their health. Because of regulatory pressure and governmental taxes and strategies around warning icons, traffic lights, and advertising limitations, the food industry is working on products reformulation, to improve nutritional value while keeping product quality and enjoyment all in the interest of the loyal consumers.

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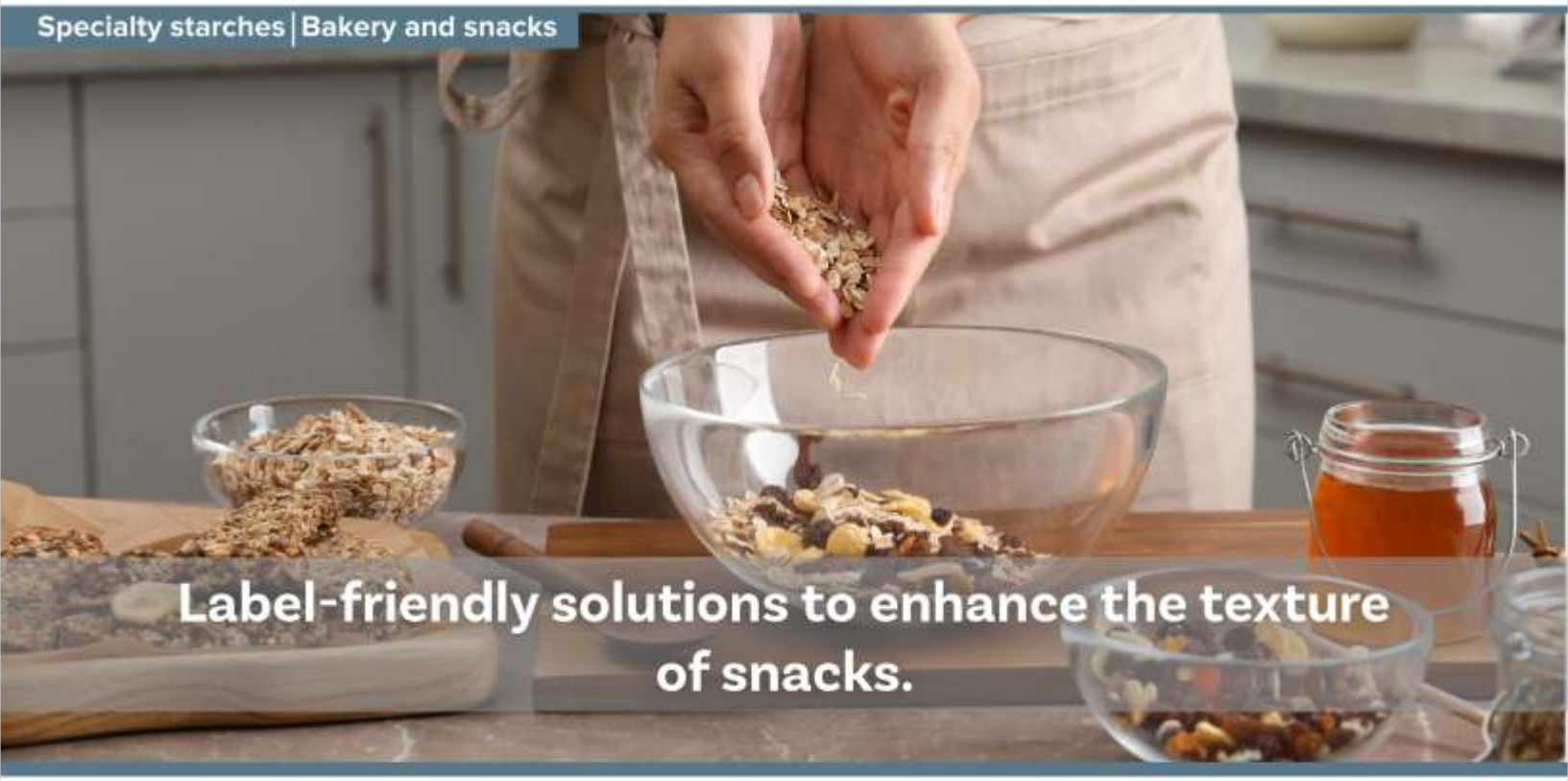


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Brain and mood	The feel-good chemical dopamine gets a huge surge in the presence of sugar. The more sugar available, the higher the dependency. Withdrawal symptoms observed in people with diabetes or on weight management programs.
Oral cavity, teeth	Fermentation of sugar in the oral cavity led to lowering of the pH. A pH drop to 4.5 causes the bacteria to proliferate and feast on the tooth enamel, which is the protective covering on each tooth.
Bones and joints	Causes inflammation and delays recovery. A possible risk for onset of rheumatoid arthritis. Indirect effect due to increased body weight.
Skin	Wrinkles and early ageing due to the additional metabolites of glycation. Sugar damages the collagen in the skin.
Liver	Fatty changes in the liver are common whenever there is a high proportion of fat in the metabolic mixtures, as in uncontrolled diabetes or obesity. Indirect effect due to increase in body weight.
Heart	Patients with diabetes mellitus have a three-fold greater risk of congenital heart disease. It leads to metabolic alterations like insulin resistance, blood lipid abnormalities, hypertension, and central obesity.
Kidney	Nephropathy is damage to the kidneys. It is a possible long-term complication of diabetes. Hyperketonemia leading to diabetic ketoacidosis. Presence of glycosuria and ketonuria are sure tests for diabetic conditions.
Body weight management	Unused sugar converted to fats, leading to its deposition as fatty layer and eventually the body gains excess weight.

Source[3]: WebMD https://www.webmd.com/

What does excess sugar do to our body?

Excess sugar negatively affects the body and in that too in multiple ways. Here's a closer look at how sugar can impact your health, from head to toe and thus our overall well-being.

References of worldwide trends towards sugar reduction programs

Excess of anything is unhealthy, and the same applies to sugar. WHO recommends a reduced intake of free sugar throughout our life. In both adults and children, WHO recommends reducing the intake of free sugar to less than 10% of total energy intake[4].Many countries have taken initiatives to control excessive sugar consumption. The UK's sugar reduction program launched in 2015 was a pioneer in this where they challenged the food industry to reduce sugar levels in the food and drink commonly consumed by children, with an overall 20% reduction between 2016 and 2020[5]. In June 2018, the Australian Beverages Council announced a pledge that it will see that the non-alcoholic beverage industry commits to a 20 percent reduction in sugar across the industry portfolio by 2025[6]. The Singapore Ministry of Health in 2019 decided to introduce mandatory front-of-pack nutrition labels for less healthy pre-packaged sugar sweetened beverages (SSBs) and advertising prohibitions for the least healthy SSBs on local mass media channels[7].

The governments around the world are taking all the possible measures to protect and prevent their young consumers from consuming too much sugar.

Begin the change: choose the right alternative

There are multiple scientifically proven ways to reduce sugar. It could be through using intense sweeteners like stevia, sucralose paired with polyols for bulking or a combination of polyols to get the right functionality. The creative possibilities are endless.

So, what could it be?

Sugar-like ingredients that could be used to easily substitute sugar are the sugar alcohols or polyols. Polyols are naturally occurring sugar alcohols found in a range of fruits and vegetables including stone fruits and mushrooms. Regarding their functional properties, polyols are best used as bulk sweeteners with attractive nutritional properties. Polyols have an intrinsic sweet taste, available in both powder and liquid forms. Some polyols have equivalent sweetness and offer a wide range of possibilities, from slightly sweet taste to high sweetness. A common example is to find sorbitol in toothpaste or in mints and chewing gums. Another example is maltitol to make no-added-sugar ice cream or lozenges or chocolates and biscuits. Xylitol and sorbitol have been consumed for several years in mouth-freshening mints and tablets that are popped after meals and on the go.

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Polydextrose	Baolingbao

Taste Enhancer

PRODUCT	SUPPLIER
Yeast Extract	Biorigin

Other Products

PRODUCT	SUPPLIER
Dairy Starter Culture	Proquiga
Rennet, Nisin	Proquiga
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Each type of polyol differs in their glycemic index. Maltitol, for example with glycemic index 29, suits the reformulations best where sugars need to be substituted. Maltitol imparts only 2.4 Kcal vs. 4 Kcal from sucrose and is closest to sugars in the relative sweetness, i.e., 0.9 as compared to 1 of sucrose. The flavour release from the food upon consumption can be considered at par to sucrose and even better than sucrose in some applications of confectionery. It replicates sucrose in its dissolution speed, mouthfeel, viscosity and even in the melting and recrystallising behaviour that is important in baking applications. Out of the wide range of polyols, maltitol has good digestive tolerance and that even increases with regular consumption[8].
Available in different particle sizes, the applications can be wide-ranging in bakery and confectionery use such as no-added-sugar fondants, sandwich creams, whipped creams or sprinkles on biscuits and cookies.

Apart from the above-mentioned new applications and functionalities of maltitol, polyols are very versatile in their functionalities. They are used for the following technical benefits[9] to the food:

Functionality	Application Segment	Polyol
Cryoprotection	Meat and fish-cryoprotection	Sorbitol powder
Sugar balance-alternative	Dressings, soups, jams, jellies, dietetic foods	Maltitol
Humectancy	Nutribars	Sorbitol liquid
Sugar Free syrups	Indian sweets, ice creams, sorbet, ice lollies	Maltitol liquid and powder
Freezing point depression	Ice creams	Maltitol
Compression, cooling effect	Mints	Sorbitol, Xylitol
Plasticizer	Bakery	Sorbitol

The way forward for sugar reduction

Thoda aur chalega?! Has been a standard way of expressing love for the family members at the dinner table in India. Meethe mein kya? the reverse question! A glass of milk at breakfast has never been the culprit. The real culprit is the extra tablespoon of sucrose (as different forms) derived from extra helpings or the sugar-frosted cereals or crunchy granolas and our traditional mithais. Even our habit of serving all things sweet to kids in infancy eventually leads to the big sweet tooth preference psychology, and we can be caught unaware in a vicious circle of temptation. The government and industry should consider a progressive and sustainable sugar reduction program. A radical decision of reducing added sugar in processed food or imposing sugar tax may not be an optimal solution. Sugar consumption varies across geography. It is largely influenced by biological, social, behavioural and cultural factors.

We have three main options that require simultaneous attention:

1. Consumer awareness: It is important to raise awareness about the role of sugar in our body and how much an individual need it. Most people are not aware about how to interpret nutrition label information and how much sugar they are silently consuming. Awareness on the subject will be a starting point for consumers to make decisions in how to select healthier products.
2. Access and affordability: Sugar imparts sweetness and has a functional role in food products. Access and affordability will play a key role in sugar reduction. Currently, low sugar food products are more expensive than their conventional counterparts. There is a strong need of public–private partnership to promote reformulation of healthier food options which will help people choose healthier food preferences.

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3. Reformulation with low sugar alternatives: There are many ways in which total sugar content could be reduced or replaced with healthier low sugar alternatives. Reformulation with sweeteners, polyols and fibres can help to reduce the overall added sugar in the final formulations. This will enable changes in the diets of consumers without making major changes in their dietary preferences.

The challenge is to achieve true reduction (even total substitution) of simple sugars while preserving taste and texture given that sugar a bulking agent – has an important texture-generating role. The true acceptance of any sugar substitute is its functionality equivalent to sugar and the taste by default. That's where the success lies to bring about breakthroughs with new innovations. Responsibly meeting the consumers' demands and delivering healthier alternatives has a larger gain in today's time. Imagine all the happiness while consuming no-added sugar- yogurts, shrikhand, gulab jamuns, rasgulla, ice creams and thick shakes, kulfi or even frosties, biscuits and sugar-free granolas!

It would be worth to have a pack of sugar alternates on our kitchen shelves as well, and you are permitted to indulge!

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DIETARY REFERENCE VALUES FOR INDIANS – AN EVOLUTIONARY PERSPECTIVE: PART 1

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1. Introduction

Dietary Guidelines help policymakers and other stakeholders to empower individuals and populations on consumption of a healthy, nutritionally adequate diet. They are not intended to treat existing malnutrition or chronic diseases but to prevent deficiencies and over nutrition in normal individuals and population. Reference intake values keep evolving basis the emerging science and population studies on eating patterns.

Dietary allowances include dietary reference values (DRVs), reference nutrient intakes (RNI), dietary reference intakes (DRIs). These are used for planning diets, assessing their adequacy in healthy individuals and populations, prevention of chronic diseases, providing nutrition education, nutrition labelling and fortification (NIH, 2020). A significant development in scientific knowledge regarding the association of diet, health, and chronic disease has impacted nutrition research greatly.

The requirement is not the same for all people in a population and differ depending on individual variability (age, gender, physiological condition and bodyweight) and bioavailability from a diet.Children need nutrients for growth, development and maintenance. Adults need nutrientsto maintain normal healthy bodyweight and body functions. Physiological conditions like pregnancy and lactation, increasethe requirements of certain nutrients to meet the demands of fetal growth, maintaining maternal reserves and secretion of milk (RDA, 2010).Dietary references are expressed as:

- Estimated Average Requirements (EAR) or Average Nutrients Requirements (ANR): it is used for public health to calculate the requirements of the population. It is the median of a population distribution to meet the requirements of 50% of the population. It is the recommended standard for population assessments.
- Recommended Dietary Allowance (RDA): It is the average daily level of intake enough to meet the nutrient requirements of nearly all (97.5th percentile) healthy people.It is for a specific age and gender and may not be applicable for all the individuals in a specific age group. It is ideal for individual assessments and is represented as EAR +2SD.
- Adequate Intake (AI): It is suggested in the absence of RDA and is set to ensure nutritional adequacy of a population.
- Lower threshold intakes: It is represented as EAR – 2SD and is enough to meet the bottom 2% of the population.
- Tolerable Upper Intake Level (TUL): Regular high doses of nutrients may lead to toxicity and TULs are maximum daily intake unlikely to cause adverse health effects.
- Acceptable Macronutrient Distribution Ranges (AMDR): it is the range of macronutrient intakes associated with a lower limit of minimum requirements for maintenance of healthy function and upper limit for reduced risk of chronic diseases. They are represented as percentage of energy (%E).

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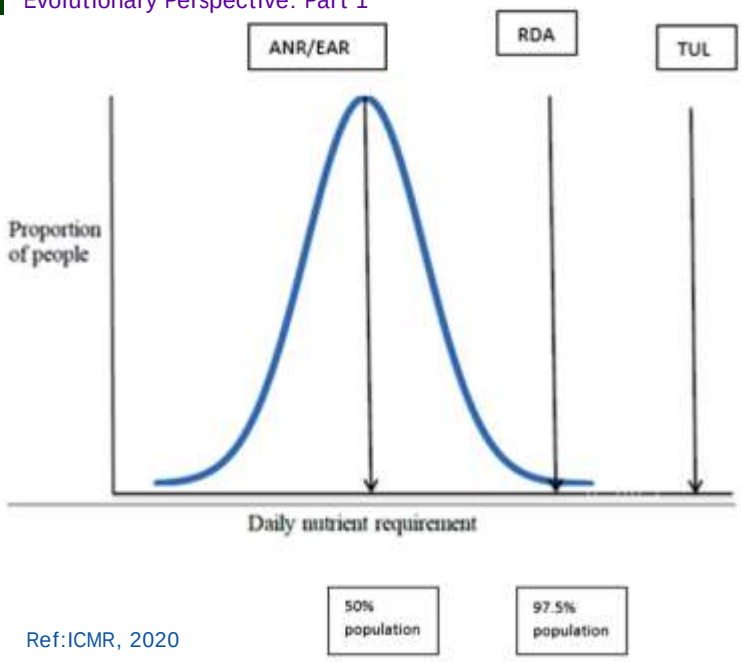


Ref:ICMR, 2020

Figure 1. Evolution in the Dietary Reference intakes

• Additionally, upper limits of certain nutrients of public health concern are also set by WHO to limit the excess consumption of these nutrients which might lead to the development of NCDs. These are mostly used for labelling purposes and are presented as values per day. (IOM, 1998; IOM, 2011; NIH, 2020)

2. Evolution in the recommended dietary intake values for Indians

The first set of dietary intakes for Indians in terms of safe values were revealed by The Nutrition Advisory Committee of Indian Research Fund Association (IRFA, now ICMR) in 1944. These included requirements of essential nutrients like protein, iron, calcium, vitamin A, thiamine, riboflavin, ascorbic acid and vitamin D. The diets Indians were found to be deficient in many of these nutrients and balanced diets were formulated based on these recommendations to improve the intakes. The second set of nutrients requirements were published in 1960 and later, were regularly revised in 1968, 1978 and 1988. These recommendations were largely based on the updated knowledge and information provided by FAO/WHO/UNU. A major overhauling of the recommendations was done in 1989due to newer developments at the international level (FAO/WHO/UNU, 1985), emerging national studies on body weights, consumption, and bioavailability of various nutrients. Requirements were provided for newer nutrients like vitamin E, vitamin K, phosphorus, electrolytes, dietary fibre and as visible and invisible fats.

In 2010, following the FAO/WHO/UNU Expert Consultations (2004, 2007), changing dietary patterns, evolving techniques of measurements, the prevalence of malnutrition, the Recommended Dietary Allowances for Indians were updated. The requirements for selenium, Vitamin B6 were introduced.

Following the trend, the latest set of dietary references were released by ICMR (2020) and for the first time, nutrients requirements are represented as EARs with RDAs as RDAs are considered as individual specific references (97.5% percentile) and may lead to excess nutrient intakes in some persons. EARs are more appropriate for assessing the nutritional status of a population. While the reference intakes of certain nutrients like B complex vitamins, Zinc, Vitamin C were increased due to prevailing deficiencies and evolved techniques; references for energy, protein and iron (for certain age groups) are reduced. It is stressed that the overall protein consumption should emphasize on quality of proteins providing adequate amino acids. *Recommendations for carbohydrates including free/added sugars are also provided for the first time.* A set of TULs (Tolerable Upper Limits) are also introduced to monitor over-consumption of certain nutrients.

3. Reference Body Weights

Indians are hypothesized to have a *"thin but fat"* phenotype with low to normal birth weights but an increased accumulation of fat in the visceral areas for a given BMI (body mass index) (kg/m2) making them "metabolically obese" and prone to childhood and adult obesity and the onset of non-communicable diseases (NCDs). Weight and height are important determinants of BMI and Indians have lower references for BMI than the western population. Body weights and height determine the nutrients requirements for people in all age groups. They are 95th centile values for a reference group generated basis the population data and WHO growth standards.

The reference body weights have been revised (RDA, 1989, 2010, 2020) from 45kg to 55kg for adult females and 55 Kgs to 65 kg for adult males. Earlier references (1989) were based on WHO standards (MGRS, 0-60 mo; WHO growth standards, 2006-2007), while the latter ones (2010 and 2020) also used relevant Indian references (Indian Academy of Paediatrics (IAP); NNMB, 2016; NFHS, 2015).

4. Energy requirements for Indians

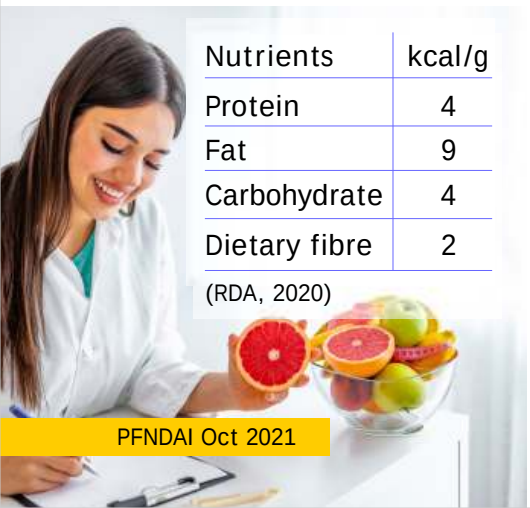
have reduced due to lower BMR and reduced physical activity Age, gender, height, weight, physical activity and physiological conditions determine the energy requirements of the body. Energy input should be equal to energy expenditure to maintain energy balance. The balance in energy input and output should be maintained at a regular interval. Fat in the body adjusts the imbalance in the energy equations by breaking down the adipose tissue during insufficiency and storing the adipose tissue when in excess. Continuous negative and positive energy balance leads to underweight and overweightindividuals, respectively. Asexcess energy can be stored as body fat, its average requirement over a period (and not the daily requirement as) is given as Estimated Energy Requirements (EER).

The energy requirements have reduced for adults due to decreased basal metabolic rate (BMR) and physical activity levels (PAL), while the requirements for children (1-18y) have been increased due to higher PAL. The importance of physical activity among the children is emphasised and regular moderate physical activity is recommended.

A balanced diet should consist about 55% of energy from carbohydrates, preferably complex, from whole grains, legumes, fruits and vegetables and less than 10%E from simple sugars. Recommended metabolizable energy (ME) factors helpful in calculating the calorific values of foods are:

Nutrients	kcal/g
Protein	4
Fat	9
Carbohydrate	4
Dietary fibre	2

(RDA, 2020)



5. Importance of physical activity

Physical activity is an important function of energy expenditure and energy balance to maintain ideal body weight. Regular physical activity of varied intensity for a different time duration is required to obtain health benefits and to reduce the risk of chronic NCDs. WHO has recently recommended for increased physical activity for adults with sedentary behaviour. A balanced energy intake with optimum energy expenditure is vital to maintain energy balance and healthy body weight.

6. Protein consumption are adequate, but the quality of proteins consumed is a concern

As protein is not stored in the body unlike energy, it should be consumed every day to meet the daily requirements. Protein should provide all the 9 essential amino acids which cannot be synthesised in the body. Globally, protein requirements are computed by using short-term and long-term nitrogen balance methods. While adults require protein for maintenance by replacing the worn-out ones, children require it for growth also. Additional protein is necessary during pregnancy for the synthesis of foetal, placental and maternal proteins that increase with the increase in maternal body weight and for the synthesis of breast milk proteins during lactation.

Earlier (RDA, 2010), the protein requirements were based on protein digestibility corrected amino acid score (PDCAAS), which provided a lower digestibility rate of the Indian diets (85%). The current requirements (RDA, 2020) used newer assessment method called digestible indispensable amino acid score (DIAAS), which is based on true ileal digestibility of individual amino acids to calculate the requirements of high-quality proteins.

The current protein requirements are estimated for high quality proteins, which were deficient in Indian diets. The protein requirements are presented as g/kg of body weight ideal for age and are reduced from earlier as 0.66g/kg/day as median and 0.83 g/kg/dayas safe intakes for adults. Requirements for adolescents and adults are gender specific. The requirements increase further for lower quality protein intakes, through usual Indian diet, based on cereals, pulses and milk. Therefore, consumption of high-quality protein foods (such as milk or eggs) is recommended during pregnancy to meet the increased protein requirements. Requirements for indispensable amino acids (IAA) are increased for adults and children as it was discovered that the needs are 2-3 times more than the earlier recommendation.

15%E, especially from fortified products, are warranted according to age, body requirements, and exercise levels.

6.1 Protein quality determines protein requirements, as good quality proteins have a balanced distribution of all EAA which are adequately digested and absorbed in the body. Plant proteins are poorer in quality versus animal protein. A higher-quality protein reduces the amount of protein to meet the IAA requirements. Therefore, an increased consumption of good quality proteins like dairy protein is recommended.

6.2 Protein Energy Ratio

For the optimum utilization of protein for metabolic functions, adequate energy should be consumed as fat and carbohydrates. Ideal protein requirements are represented as percentages of energy (%E) and denoted as Protein Energy Ratio to total energy (PER).

The recommended PER range from 4.8 (pre-school children) to 11.1 (sedentary women). Protein intake without exercise does not increase muscle protein deposition. Judicious intakes, not more than 15%E, especially from fortified products, are warranted according to age, body requirements, and exercise levels.

e from 4.8 (pre-school children) to 11.1 (sedentary women). Protein intake without exercise does not increase muscle protein deposition. Judicious intakes, not more than

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PREBIOTICS SUPPORTING GUT, IMMUNE, METABOLIC, AND BONE HEALTH WITH REFERENCE TO ELDERLY

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Abstract

In elderly, multiple physiological changes occur along with aging such as metabolic and immunological functions. Intestinal health is a primary factor and plays important role in elderly stage. With aging, the physiological functions of intestine start diminishing affecting the nutrient absorption, unbalanced gut microbiome, problems related to leaky gut, and reduced immune functions and much more.

Prebiotics and subsequently probiotics have reported to provide health benefits to elderly, starting from improving gut wall barrier functions, increased mineral absorption and other metabolic regulations. Thus, dietary modifications with inclusion of prebiotics and probiotics in the daily diet may be beneficial for the elderly population. Fermentable carbohydrates such as fructo-oligosaccharide (FOS), galacto-oligosaccharides (GOS), inulin, and xylans are the some of the most well documented prebiotic fibers that support health among the elderly. The current document shares some of the health benefits of prebiotics, with/without probiotics among the elderly populations.

What are Prebiotics and Probiotics?

Prebiotics are substrates that are selectively utilized by host microorganisms conferring a health benefit. These non-digestible carbohydrates are fermented in colon by the colonic bacteria. The selective stimulation of bacteria, in particular Lactobacilli and Bifidobacteria spp. with their ability to produce metabolites such as short chain fatty acids (SCFAs) – acetate, propionate and butyrate, have been reported to confer to health benefits. Ingested prebiotics not only helps in improving satiety, weight management and glycemic management, but also acts a fuel source for the colon probiotics.

Probiotics are the live microorganisms and adequate amounts of its intake leads to the beneficial health effects.

A Healthy Gut Microbiome

Probiotics, usually lactobacilli and bifidobacteria, have been reported to boost immunity in the elderly. Many studies suggest that the gut microbiome plays key role in maintaining the health by supporting the energy supply, facilitating improved nutrients absorption rate (eg. minerals) and production of metabolites like SCFAs. SCFAs may directly or indirectly involves in the maintenance of immune and nervous functions and increases the defence mechanisms to protect the gut from pathogens. Also, the positive changes in the gut microbiome composition and its functions have shown positive health benefits not only in elderly but in all age groups. Therefore, the age-related alterations in intestinal motility, functions and quality of diet will have a major influence on the gut microbial composition.

Does the Gut Microbiome change with Age?

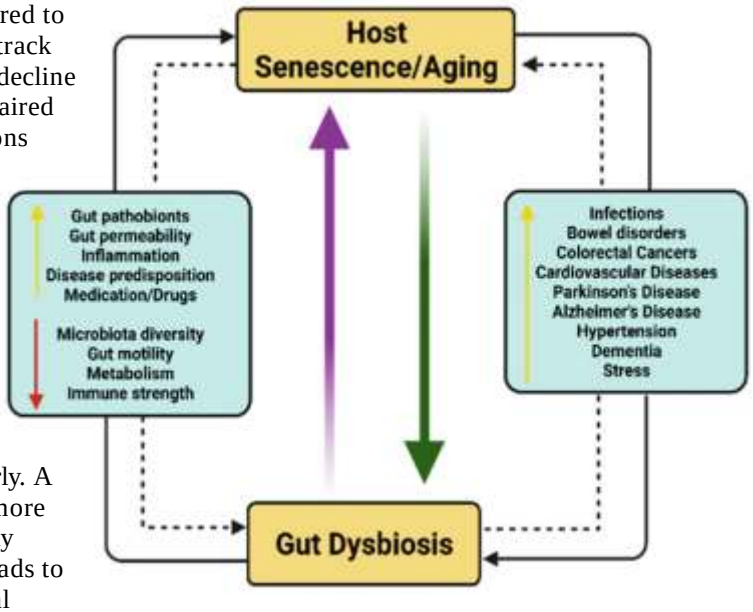
Vital organs and its functions in the body, deteriorates with age, leading to changes in the physiological processes that are dependent on the gastrointestinal (GI) tract. An impaired GI health would primarily cause poor digestion, altered/reduced nutrient absorption rate and thus end up with nutrient inadequacy for a normal and healthy body functioning. Unlike young adults, the gut health is weaker in its physiological functions, lower in gut microbial load and many times the older population is dependent on medications (majorly antibiotics), which may also affect internal organ functions (Table 1).

In elderly, the GI tract and its functions (such as impaired digestion process and transit time) initiate to be weaker than younger adults. Also, the mortality due to GI infections is higher in the elderly compared to young adults. GI track functions start to decline and end with impaired gut barrier functions such as leaky gut wall.

The changes in the gut related process and metabolites may support health maintenance and decrease morbidity in elderly. A leaky gut wall is more prevalent in elderly population and leads to impaired intestinal barrier function hence, reduced nutrient absorption, reduced immune functions, and an increased health risk. Therefore, it is important to provide solutions that may support a good gut health for overall health maintenance (Figure 1).

Modulators for a healthy Gut Microbiome

Gut microbiota undergoes substantial fluctuations over lifetime and these modifications are often linked to undesirable effects on human health. Variations in the microbiota are influenced by factors such as individual's lifestyle, stress, nutritional choices, and usage of antibiotics. Modified dietary intake with prebiotics and probiotics would enhance the total gut health by reflecting on bowel movement,



improvement in transit time, increased SCFA production, reduction in pH and pathogenic bacterial load, increase in beneficial bacterial load and improvement in mineral absorption. This strategy to counterbalance the harmful gut microbial fluxes is shown to be effective in reducing symptoms and sometimes curing some of these pathologies. Hence a positive change in the gut microbial load in elderly is vital and may enhance the health or disease recovery for the older population including those not who are depended on medications.

In a study, FOS consumption increased the relative abundance of healthy bacteria, Bifidobacterium and Lactobacillus. Further, a significant change was also observed

Table 1: Age related multiple difficulties

Sl No	GI tract	Age related multiple difficulties
1	Mouth	Dysphagia (difficulty in initiating a swallow process)
2	Oesophagus	Odynophagia (painful swallowing due to decreased peristalsis, and uncoordinated contractions)
3	Stomach	Peptic ulcer, gastric atrophy, decreased gastric acid secretion, decreased mucus production and mucosal prostaglandin levels, reduced gastric emptying owing to slowing of transit time etc.
4	Small-intestine	Apparently does not change much but it has reduced physiological functions (nutrient malabsorption), however, with aging, it might worsen due to physiological changes in GI tract and other morbidity factors

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in certain butyrate-producing microbes like Faecalibacterium, Ruminococcus and Oscillospira. While consumption of prebiotics increased bacterial diversity, withdrawal led to its reduction. The positive impact of FOS on butyrate-producing bacteria and FOS-mediated increase in the bacterial diversity strengthens the role of prebiotics in conferring beneficial functions to the host.

Evidences supporting health benefits

Prebiotics for Bowel Movements

Prebiotics are hygroscopic in nature, absorbs water in intestine and increases the water retention rate, thereby changing stool consistency, plasticity, adding bulk to stool. Thus, ends with an improved intestinal transit time, improved stool frequency and reduced bowel related diseases such as constipation and diarrhea. Probiotics like bifidobacterium, lactobacillus spp. and yogurt supplementation help increasing colonic transit, defecation frequency, and faeces stiffening process.

Fibre supplements can improve constipation by either Mechanical stimulation/irritation of the colonic mucosa, or Gel-dependent/viscous water holding capacity that resists dehydration, increasing the decal mass. Prebiotic fibres supporting the above mechanisms thus help in alleviating the conditions of constipation. A synbiotic study with constipated women aged between 18 – 75 years, were supplemented FOS with Lactobacillus and Bifidobacterium strains (LACTOFOS) for 30 day and found that there was a significant improvement in stool consistency.

Prebiotics and Probiotics for Immune Function

The immune functions are adversely affected by the aging process leading to decreased diseased resistance and increased mortality rate in elderly. Prebiotics and probiotics influence the microbial productions through the SCFA, which interacts with immune cells and enterocytes and modify their activity. In a study when elderly nursing-home patients were given 8g FOS for 3 weeks (4g*2/day), there was a decreased phagocytic activity of granulocytes and monocytes (white blood cells), and expression of anti-inflammatory response marker, the, Interleukin-6 (IL-6), suggesting a possible decrease in inflammatory process in elderly. Balancing of T-helper cells is critical to ensure an effective immune response to infection and human diseases based on the types of cytokines secreted. Available evidences suggest that the supplementation of probiotics can increase the fecal bifidogenic bacterial load, immune markers and can regulate or support to balance the T-helper cytokine functions.

Prebiotics and Probiotics for Metabolic Health

Prebiotic fibres such as FOS, inulin is well known for its low glycemic effects. In a study the short chain fructo-oligosaccharides (scFOS), when consumed alone, replaced by/added to available carbohydrates did not increase the postprandial glucose and insulin levels. As it is not digested by enzymes in the human small-intestine and it can be classified as an unavailable carbohydrate that does not raise post prandial blood glucose or insulin.

Intestinal microbiota composition is highly associated with the Type2 Diabetes Mellitus (T2DM); specifically, Bifidobacterium and Lactobaccilus spp has shown the improvement on high Density Lipoprotein (HDL), insulin sensitivity, high sensitivity C-reactive protein (hs-CRP) and also showed increase in good bacteria and reduction in Gram-negative bacteria. Further, L.acidophilus La-5 and B.animalis subsp. lactis BB-12 supplementation in T2DM showed significant decrease in the hemoglobin A1c (HbA1c), total cholesterol and low-density lipoprotein-C (LDC/C) levels, LDL-C/ HDL-C ratio and fasting blood glucose level.

Synbiotic (probiotics containing FOS) based supplementation studies have shown the positive improvement in fasting blood glucose insulin resistance and decrease in serum hs-CRP. Therefore, prebiotics and probiotics supplementation could help management of blood glucose levels in T2DM, including the elderly patients.

Prebiotics for Bone health

The Metabolite Production and pH Reduction Theory:

The acceptable theory between prebiotics and mineral absorption is

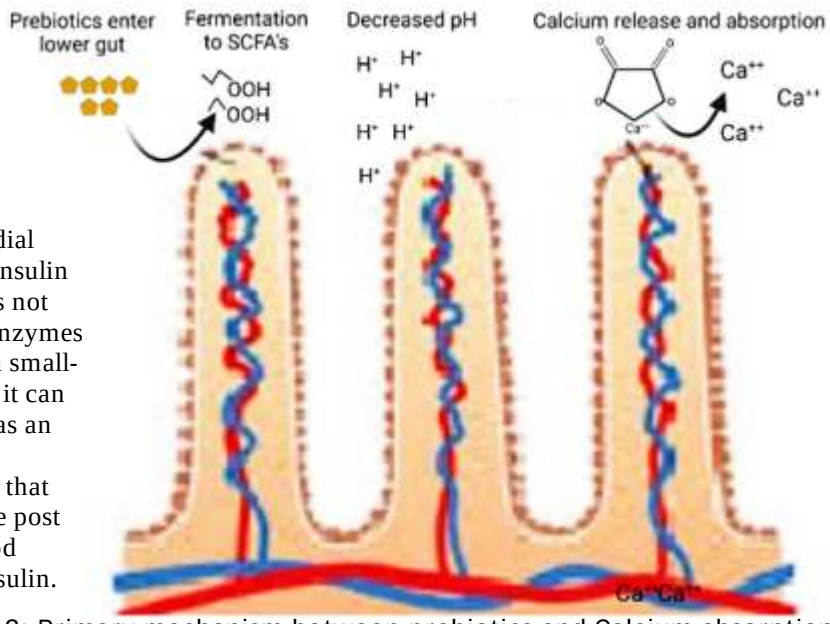

Figure 2: Primary mechanism between prebiotics and Calcium absorption (Adopted from Whisner and Castillo, 2018)

with respect to the production of SCFAs in the lower gut (e.g., Prebiotics and calcium absorption mechanism; (Figure 2). It is known that mineral absorption (e.g., calcium) majorly occurs in the large-intestine in a decreased pH condition (acidic environment).This lowered (acidic) cecal pH leads to greater solubilisation of minerals (e.g. magnesium) so that the biologically available mineral concentration is increased.

The Gut-Bone Axis Theory:

Another theory is the Gut-Bone Axis theory. Dietary consumption of prebiotics (as FOS) stimulates the microbes in the gut and mediates the intestinal environment. These changes promote the production of signalling molecules, immune cells, and metabolites, which in turn are thought to influence bone mineral uptake through the mechanistic action of SCFAs. Microbial signalling molecules may trigger systemic neuro-inflammatory responses that ultimately stimulate the release of hematopoietic and immune system cells from the bone marrow which feed back to the intestinal tissue to influence intestinal microbial communities and tissue inflammation (Figure 3). Fructo-oligosaccharide (FOS) showed beneficial skeletal effects. In a rat study, scFOS increased serum levels of butyrate, which is known to have osteogenic effect. ScFOS at the human equivalent dose, enhanced peak bone mass (PBM) and protected against estrogen deficiency induced bone loss by selective enhancement of new bone formation, and implicated butyrate in this process. Although, it is an animal study, the same principle can be applied for testing the benefits in human through clinical trials.

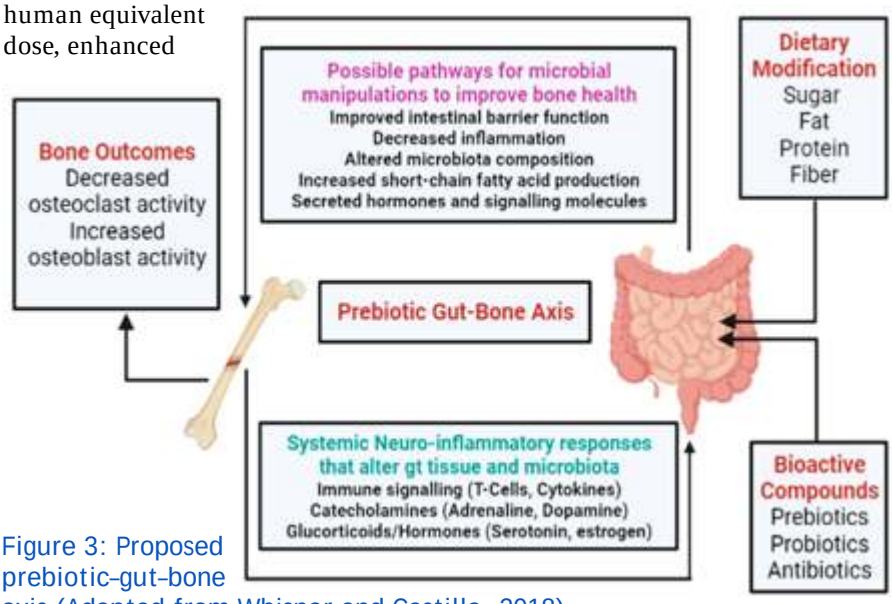

Figure 3: Proposed prebiotic-gut-bone axis (Adopted from Whisner and Castillo, 2018)

Prebiotics and Probiotics for Colon Cancer

As the population ages, cancer also predominantly affect older individuals and advancing age is a high-risk factor for cancer, with persons over 65 accounting for 60% of newly diagnosed malignancies and 70% of all cancer deaths. A pH below 6 or 6.5 in the colon has been reported to inhibit colonic bacterial enzyme 7_{α}-dehydroxylase, responsible for degradation of primary bile acids to secondary bile acids. Thus, potentially also reducing the tumour promoter activity of secondary bile acids. In other words, a reduced colonic pH possibly helps to reduce in colonic cancer cell proliferation. Intake of prebiotics helps in reduction of the colonic pH.

Conclusion

To maintain the normal bodily functions, elderly people need medications, maybe along with a modified dietary intake. Clinical evidences demonstrate association of dietary modifications and improvement of gut health in different age groups. Prebiotics, probiotics and synbiotics are some of the alternate options for medications and their association on the improvement of gut microbiome is well established. FOS is resistant to breakdown and is indigestible in the human small-intestine, and therefore it can be classified as an unavailable carbohydrate that does not raise post prandial blood glucose or insulin. FOS is also known to stimulate the gut microbes and mediate/improve the intestinal environment by promoting the production of signalling molecules, immune cells, and metabolites, which influence bone health through the SCFAs mechanism. FOS, a prebiotic supplement, is known for its Bifidogenic capabilities.FOS consumption helps in increasing the relative abundance of OTUs belonging to beneficial microbes that helps in maintaining the gut health. Inclusion of FOS in daily diet may be considered for potential for improvement in the gut, immune, metabolic and bone health of the elderly.

Suggestive Reading

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2. Gibson GR., et al. Expert consensus document: The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of prebiotics. Nature reviews Gastroenterology & hepatology. 2017;14(8):491-502.

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4. Whisner CM and Castillo LF. Prebiotics, Bone and Mineral Metabolism. Calcif Tissue Int. 2018;102(4):443-479.

ADVANCES IN FOOD ALLERGINICITY

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Introduction

In many countries, food allergy (FA) is now considered a significant public health concern, affecting 3% to 6% of children in the developed world (Rona, 2007). FA results in significant morbidity, but fatalities are rare (Umasunthar, 2013). A diagnosis of FA has been shown to negatively influence quality of life for patients and their families, and poses a significant financial burden (Walkner, 2015). There are many risk factors associated with the development of FA, including atopic family history, male sex (at least in childhood), ethnicity, atopic dermatitis (AD), and related genetic polymorphisms (Gupta, 2013).

There are many risk factors associated with the development of FA, including atopic family history, male sex (at least in childhood), ethnicity, atopic dermatitis (AD), and related genetic polymorphisms. Although genetic factors are clearly important in the development of FA, its increase in prevalence has occurred over a short period of human evolution, implying that FA does not arise as a result of germ line genetic changes alone. Factors such as hygiene and lack of exposure to microbial factors, composition of the intestinal micro biota , diet, obesity, Vitamin D, and environmental chemical exposure have all been proposed to contribute to this alarming rise in the rate of food allergy in countries with a Westernized lifestyle.

Proteins perform diverse biological functions which can vary from oxygen transfer between various cells (transport proteins), Enzymatic functions (enzymatic proteins), acting as substrates for various biological reactions leading to formation of distinct compounds, defence mechanisms in the body against foreign compounds (defence proteins) and as storage proteins. Though each protein is distinct in its structure, and composition leading to that specific structural conformation, they are formed due to the peptide bonds between the amino acids which are common in all the proteins. Food allergy occurs when a food component, mostly an incompletely digested protein is absorbed in the blood stream and elicits an immune response.

During digestion food proteins are broken down into individual components i.e., amino acids, which when absorbed in blood do not elicit any immune response, but an undigested protein or partially digested protein is treated as a foreign particle by the immune system, which then activates its IgE-mediated response to neutralize it.

and for individuals with certain skin lesions (possibly atopic dermatitis lesions) to avoid certain foods (Cohen, 2008). Food allergy is defined as "an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food" or as "an adverse reaction to food in which immunologic mechanisms have been demonstrated" (Muraro et al., 2014). Type I food allergy is defined as an IgE-mediated response to a protein (or proteins) in a food source. It is not known why a food protein that is innocuous and well-tolerated by most individuals triggers an allergic response in sensitive individuals. Cow's milk, hen's egg, wheat, and peanut allergies are the most common food allergies in children.

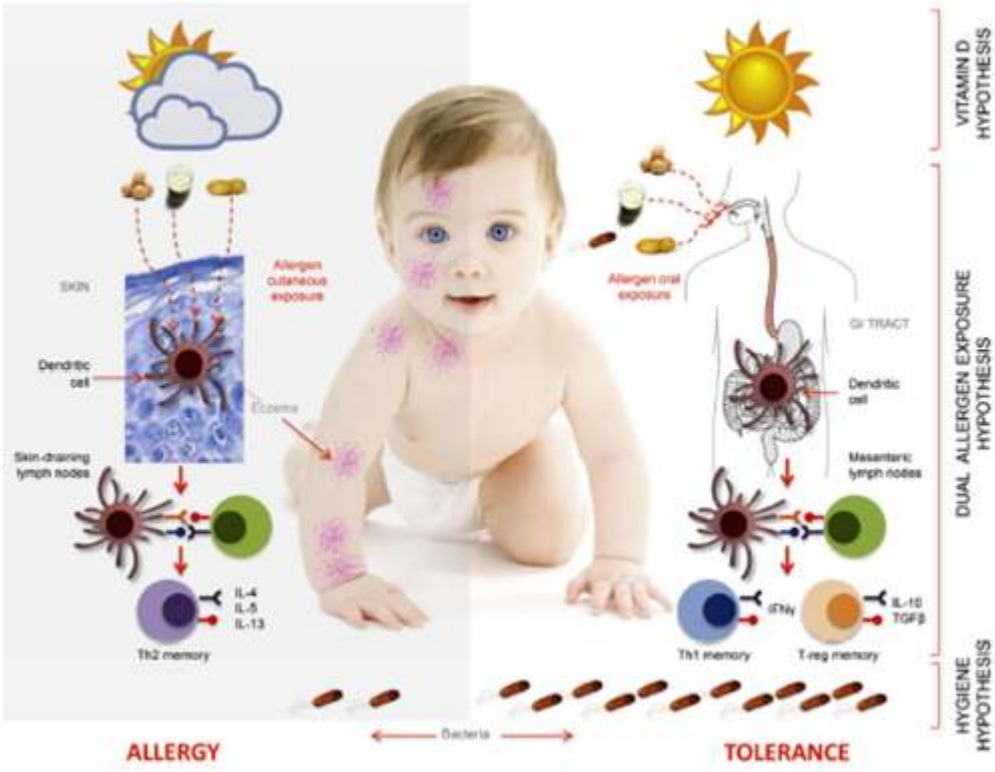


FIG 1. Integration of the vitamin D deficiency, hygiene and dual-all organ exposure hypotheses. Sufficient levels of vitamin D, a diverse microbiota, and oral all organ exposure collectively suppoert the development of tolerance. Conversely, allergic sensitization is promoted through cutaneous exposure, reduced diversity of microbiota and vitamin D deficiency. Diminished microbial diversity and vitamin D deficiency are thought to interrupt the regulatory mechanisms of oral tolerance, with the latter also contributing to decreased epidermal barrier function. GI, Gastointestinal; T-reg, regulatory T cells. Graphic modified from Lack G. Epidermiologic risks for food allergy. J Allergy Clin Immunol 2008;121:1331-6. Copyright 2008 Elsevier. Reprinted with persmission.

Historical background

Although the first account of food allergy is generally attributed to Hippocrates, the Chinese emperors Shen Nong (~2735 BC) and Huang Di (2698-2598 BC) provided advice in "Shi Jin-Jing" ("Interdictions concerning food") for pregnant women to avoid certain foods, e.g. shrimp, chicken and meats,

Regulation regarding which food allergens to consider varies globally, although the current FAO/WHO Codex General Standard for the Labelling of Pre-packaged Foods contains a defined list of eight foods or substances and their derivatives (FAO, 1985). Similarly, Canada currently recognizes nine priority food allergens: peanut, tree nuts, sesame seed, milk, egg, seafood (fish, crustaceans, and shellfish), soy, wheat, and sulphites. The United States of America recognizes soybeans in addition to the allergens in Codex (USFDA, 2004). Australia and New Zealand includes bee products (bee pollen, propolis, and royal jelly) besides the Codex standard (FSANZ). The European Union regulations includes soybeans, celery, mustard, sesame seeds, and lupin in addition to the Codex standard (EU commission).

Japan enforces the labelling of five allergens: wheat, buckwheat, egg, milk, and peanut; but recommends the labelling of another twenty foods: abalone, squid, salmon roe, shrimp, orange, crab, kiwi fruit, beef, walnut, salmon, mackerel, soybean, chicken, pork, matsutake mushroom, peach, yam, apple, gelatin, and banana (USDA). India is preparing to finalize its new food labelling regulation. On 25 June 2019, the Food Safety and Standards Authority of India (FSSAI) issued the press release providing an update to the new food labelling regulation, the Draft Food Safety and Standards (Labeling and Display) Regulations, 2018. The severity of patients' reactions to specific allergens and worldwide or regional incidence of the allergy constitute the general guideline to include allergenic foods on priority lists.

Although the exact mechanism of food allergies remains elusive, IgE cross-linking on the surface of mast cells by the allergen seems to be an obligatory step in triggering an allergenic response in a sensitive individual. The portion of the food protein recognized by IgE is called the epitope. Two types of epitopes, linear, and conformational, may occur on an allergen. In case of linear epitopes, amino acid residues that determine whether allergen would bind with IgE or not are known as critical amino acid residues. Any modification, deletion, or substitution of such critical amino acid residues may result in loss of IgE binding and may potentially result in reduction and or elimination of allergenicity.

If the epitope is conformational in nature, change in epitope conformation may permit modulation of allergic activity.

Food allergy occurs when a food component, mostly an incompletely digested protein is absorbed in the blood stream and elicits an immune response. During digestion food proteins are broken down into individual components i.e., amino acids, which when absorbed in blood do not elicit any immune response, but an undigested protein or partially digested protein is treated as a foreign particle by the immune system, which then activates its IgE-mediated response to neutralize it (Sampson, 2004; Sicherer and Sampson,2007).

Food processing, under appropriate processing conditions, offers opportunities to alter nature of epitopes. For example epitope conformation may be modified as a result of protein denaturation treatments (e.g., various thermal processing treatments) leading to reduction/elimination or in some cases, an increase, in IgE binding. Acid or enzyme hydrolysis of an allergenic protein may help delete critical amino acids of an epitope. Whether caused by protein denaturation or hydrolysis, loss of epitope and ensuing loss of IgE binding may help reduce/eliminate the bioactivity of an allergen. It should be emphasized here that processing, depending on the allergen and the processing method, may not affect the allergenic properties of all allergens. The common symptoms encountered due to various allergens are shown in the table below:

Symptoms associated with food allergic reactions.

Cutaneous	Pruritus Erythema/ Flushing Urticaria Angioedema
Ocular	Pruritus Tearing Conjunctival injection Periorbital edema
Respiratory	
Upper	Pruritus Nasal congestion Rhinorrhea Sneezing Hoarseness Laryngeal edema
Lower	Cough Wheezing Dsypnea
Gastrointestinal	Chest tightness/ pain Oral pruritus Oral angioedema (lips, tongue or palate) Pharyngeal pruritus/ tightness Colicky abdominal pain Nausea Vomiting Diarrhea
Cardiovascular	Tachycardia Dizziness Loss of consciousness/ fainting Hypotension
Miscellaneous	Metallic taste in mouth Uterine cramping/ contractions Sens of impending doom

Source: Sampson, 2016

Processing effect on allergen stability

The cause of allergic reaction in the body in most cases would be due to a small linear stretch of amino acids or a specific three dimensional structure which is a part of a much larger protein, which are known as “epitopes.” A single protein may contain distinct epitopes or just one epitope, which repeats itself throughout the structure, but more than one epitope causes the IgE cross-linking. The relationship between the number of epitopes, nature of epitope and the severity of the allergic reaction caused by a certain kind of epitope is still uncertain.

The processing of food involves wide array of physical, chemical, and biochemical changes which induce alteration of various components including protein and thus the allergenicity of the specific protein epitope. Depending on the processing the epitopes that are present within the food matrix may be destroyed or new epitopes may be formed which is described as “neoallergen formation”.

A few select examples are presented below, to illustrate the opportunities and challenges in using food processing methods to reduce or eliminate food allergens.

(i) Peanuts: Beyer et al. 2001 found that cooking peanuts in boiling water (100°C for 20 min) or frying in vegetable oil (5 min for Valencia peanuts and 10 min for Florunner) reduced IgE binding intensity of Ara h 1 more than roasting (170°C, 20 min). In addition, there were significantly less IgE binding to Ara h 2 and Ara h 3 in fried and boiled peanuts than in roasted peanuts. Chung et al. 2004 and Chung et al. 2005 reported that peroxidase treatment of peanuts reduced allergenicity of Ara h 1 and Ara h 2 in roasted but not in raw peanuts.

(ii) Hen Egg: hen egg white proteins ovalbumin (OA), ovomucoid (OVM), ovotransferrin (OTf), and lysozyme (Lyz) are known allergens. It was showed that reduction and carboxymethylation resulted in 22.6, 18.6, and 23.8% decrease in patient sera IgE binding of OTf, OVM, and Lyz; respectively (Mine and Zhang,2002).

(iii) Cow's Milk: cow's milk contains various milk caseins and whey proteins, many of which are known allergens. Milk allergies are outgrown by many but not all infants (Monaci et al, 2005). Research showed that Lactobacilli fermentation of milk caused proteolysis of b-lactoglobulin, one of the whey proteins known to be an allergen, but did not decrease the IgE binding when compared with its counterpart from nonfermented pasteurized milk. Barley lipid transfer protein (LTP) 1: LTPs are ubiquitous lipid binding proteins found in plants, originally thought to be responsible for transfer of lipids across membranes in vitro. Garcia-Casado et al. 2001 purified barley LTP 1 (a 9 kDa protein), using sera from four patients known to be allergic to beer. Immunoblotting, and skin prick testing, demonstrated the LTP 1 to be an allergen.

(iv) Wheat proteins: The stability of wheat proteins during bread making using patient sera IgE binding as well as Western blotting experiments demonstrate that although some allergenic proteins (e.g., a 16 kDa allergen) were destroyed by baking, many wheat allergenic proteins remain stable, in bread crust and crumb (Simonato et al. 2001). Lychee Fruit: Hoppe et al. 2006 investigated various processing parameters pertinent to industrial processing, notably thermal processing encountered during canning, as well as post-processing storage at 48ºC for 8 months on lychee fruit allergen stability.. These data suggested that while certain allergens in lychee fruit may be heat labile others were not sensitive enough to heat processing to be eliminated or rendered inactive. It is important to note that under the processing conditions where several allergens were denatured, the fruit quality was also adversely affected resulting in a product with unacceptable sensory, especially color, and texture, qualities.

(v) Tree nut seed allergens:

Studies show stability of almond, cashew, and walnut allergens toward a variety of processing methods including -irradiation alone as well as -irradiation followed by blanching, autoclaving, roasting, frying, and microwave heating (Venkatachalam et al, 2002; Su et al 2004) .

(vi) Physical manipulations such as separation, isolation or purification procedures can alter food allergenicity. Examples are removal of starch from potatoes or wheat, and production of butter from raw milk; these processes nearly completely remove the proteinogenic (i. e., allergenic) fraction of the unprocessed food. Purification by ultrafiltration is very effective for reducing allergenic proteins.

Alternatively, hypoallergenic products, such as infant formula, have been prepared by treating milk with proteolytic enzymes; this process only leave a small amount of intact protein in the resulting product, and these residual intact allergenic proteins can be removed by ultrafiltration.

Biochemical food processing methods often involve use of enzymes such as proteases, oxidases or transglutaminases. Studies showed that treatment with trypsin or elastase decreased the allergenicity of hazelnuts.

Similarly, treatment of rice with actinase, soybeans with proteases and wheat with bromelain decreased the allergenicity of these foods. Although enzyme-mediated proteolysis did not destroy IgE-reactive epitopes in peanut or peach, transglutaminase-treatment of casein or wheat proteins decreased allergenicity.

Genetic engineering has been used e. g. to generate novel variants of rice, soybean, peanut and apple which have lower allergenic potential. Unfortunately, this method is not very well accepted by consumers and increases food cost. Thus, it is unlikely that genetically engineered hypoallergenic foods will become commercially available products in the near future.

Future directions.

Diet and composition of the microbiota are two major inter-related factors that can modify susceptibility to food allergy. Future studies focusing on the intestinal microbiota are needed in human subjects and mouse models to develop rational microbial therapeutics (next-generation probiotics) for the prevention of food allergy. Allergen immunotherapy by the oral, sublingual, or epicutaneous routes show differing levels of efficacy and safety. Studies are needed to test the feasibility of adjuvants (or microbial therapeutics) to optimize the tolerogenic potential of allergen immunotherapy, as well as novel delivery vehicles or allergen modifications to improve safety.

Conclusions

Processing can dramatically alter the structure, function, and allergenicity of foods and that these alterations can be identified, characterized and manipulated through processing. The incomplete knowledge of the allergens in processed foods and commercially available diagnostic extracts increases the complexity of diagnosing food allergies.

In conclusion, it is very important for us to characterize the allergies at the molecular level which will help us in understanding them and their reactions with our immune system leading to development of techniques for their mitigation.

Thus, further careful evaluation has to be conducted for determining the influence of specific process on the allergens.

REPORT OF PFNDAI AND IFF WEBINAR ON "SENSORY SCIENCE WITH FLAVOUR EMPHASIS - AN EFFECTIVE TOOL FOR SUCCESSFUL NEW PRODUCT DEVELOPMENT"

HELD ONLINE ON FRIDAY, 13TH AUGUST 2021

AUTHOR
Ms. Abir Ansari,
Jr. Nutritionist, PFNDAI

Protein Foods & Nutrition Development Association of India (PFNDAI) In Collaboration with International Flavours & Fragrances (IFF) had organized an online webinar titled "Sensory Science with Flavour Emphasis - An Effective tool for successful New Product Development" on 13th of August 2021.

The event was attended by large number of audience who eagerly wanted to learn about the Science behind an acceptable product for the consumers. It was a fruitful and very interactive session conducted in series of events.

Welcome Address

Dr Jagadish Pai, Executive Director at PFNDAI gave a warm welcome to all the dignitaries who were present on the virtual dais. He deeply thanked IFF for the collaboration. Starting with the session, Dr Pai had briefly emphasized on Sensory Science and its importance in food industry to develop a new food product.

Introduction to the Speakers

Ms Swechha Soni, Manager- Food & Nutrition at PFNDAI welcomed and introduced all eminent speakers to the audience before their respective presentations and requested them to deliver talk on the given topics.

Session 1 : Introduction to sensory science – The basic tastes & Aromas by Ms Nalini Singh, Sensory & Consumer Insights Researcher, ISC, IFF

Ms Nalini initiated her talk by focusing on three main agenda: 1. Goal of Sensory Science, 2. Sense of taste, and 3. Definition of Flavour. She thoroughly explained the pathway that leads to generation of sensory perception. She also threw light on concept known as "Sensory Adaptation" and differentiated between sensation and perception. Ms Nalini has also described biological significance of taste including bitterness, saltiness, sweetness, umami and acidity with help of some example.

Session 2 : Role/ Need of flavour addition in a food product by Mr Chandrasekar Kumar, Group Leader Creation, Sr. Flavourist I, Creation & Design, IFF

To make audience understand flavours, Mr Chandrasekar began his presentation with explaining the role of nose and tongue (olfactory response) in flavour perception. He shared his knowledge on different flavour languages and its importance.

He also highlighted various physical forms of flavour such as Liquid flavour namely water soluble, oil soluble, water- alcohol extract and emulsion and Dry flavour including encapsulated, plated, extruded and seasoning ones. Also, Mr Chandrasekar had thrown some light on the role of flavourists in sensory science.

WEBINAR ANNOUNCEMENT

PFNDAI
PROTEIN FOODS AND NUTRITION DEVELOPMENT ASSOCIATION OF INDIA

iff
Where science & creativity meet

SPEAKERS

Session 3: Methods of sensory evaluation and sensory profiling by Mr R D Shenoy, Consultant, Food Industry

Mr Shenoy had addressed the delegates in regards to preparation required to become a sensory panellist. Proceeding further, in his talk, he very briefly explained sensory methods performed to test food sample such as Triangle test, Duo-trio test, Paired comparison test, Paired preference test as well as hedonic scale used while evaluating sample.

He also spoke about qualitative and quantitative analysis of sensory profile and explained the attributes such as flavour, taste and texture to the delegates. Mr Shenoy had shown couple of points to be considered while developing new product in a market.

Q & A Session: With the chain of informative sessions, audience had some questions, which was well addressed after the presentation of each speaker.

Panel discussion:

The Panel consisted of four dignified panellist namely

Dr Kirti Sharma,
Sr. Lead Scientist-
Foods Division,
ITC Ltd,

Mr Sanjay Naphade,
Director R&D -
PepsiCO AMESA Sector,

Ms Nirmala Metwal,
Sr. Consumer Science Chocolate Lead,
AMEA Region - Mondelez, International

and Mr Dinesh Pandey,
Head R&D Food- Dabur India Ltd.

The Panel was moderated by Dr Pai and Ms Soni with an insightful and interactive question and answer session.

Lastly, the webinar ended with a token of appreciation and thanks by Ms Dolly Soni, Executive- Digital and Marketing, PFNDAI to all eminent personalities and webinar audience.

NUTRITION FOR HEALTH AND WELLNESS

AUTHOR
Dr Eram Rao,
Vice Principal & Associate Professor,
Dept of Food Technology,
Bhaskaracharya College of Applied Sciences

Protein Foods & Nutrition Development Association of India organized a webinar to commemorate the National Nutrition month in collaboration with the Department of Food Technology, Bhaskaracharya College of Applied Sciences on "Nutrition for Health and Wellness" on 2nd September 2021.

The webinar was enthusiastically attended by approximately 270 participants from Delhi University colleges - Lady Irwin, Institute of Home Economics, Rajguru College of Applied Sciences and BCAS. Besides, students and faculty members from other Universities in Delhi NCR region like Amity, NIFTEM, Manav Rachna and Sharda University also enthusiastically participated. The event was sponsored by Marico, Hexagon Nutrition, Kellogg's and Samyog Health Foods supported by AFST(I) Delhi chapter.

Prof. Jagadish Pai, Executive Director PFNDAI welcomed the participants and the speakers and emphasized on the importance of Nutrition in the human life cycle. He emphasized that good nutrition combined with regular physical activity is the cornerstone for good health. Healthy scholars learn better. People with adequate nutrition are more productive. On the other hand, poor nutrition can lead to reduced immunity, increased vulnerability to disease, impaired physical and mental development, and reduced productivity.

Dr Eram S Rao, Associate Prof. Department of Food Technology delivered the inaugural address and stressed the importance of regularly consuming a diet which is not only healthy, balanced, nutrient dense but also diverse. The traditional Indian thali is a classic example of a healthy eating plate which includes dietary diversification, seasonal, regional and culturally acceptable foods which promote sustainability are consumed in moderation.

proteins that included weight loss, reducing the risk of NCDs, LDL, cholesterol etc.as they are higher in unsaturated fats which are healthier fats and significantly help in reducing the risk of heart diseases.

Ms Meghna Mandke, Lead-Tech. Marketing at Hexagon Nutrition Pvt. Ltd spoke on *"Role of micronutrients in immunity building and overall health"*. She explained the role of immune system and how our body protects us against infections and foreign threats. Ms. Megha stressed the need for consuming micronutrient foods daily as they play an important role in boosting our immunity.

Ms. Nadia Merchant, Senior Manager at Nutrition Kellogg's India spoke on *"Evolution of breakfast meals with respect to changing nutritional needs and environments"* and highlighted the importance of eating a wholesome breakfast regularly with at least three food groups i.e. proteins, carbohydrates and fruits and vegetables. Further, she emphasized on the consumption of nutria-cereals and whole grains and which should be an integral part of our diet. They are a rich source of dietary fibre and micronutrients and help prevent diet-related chronic NCDs.

She emphasized on the role of essential fatty acids such as omega-6 and omega-3, which play a significant role in boosting immunity and health and wellness. She highlighted the benefits of dietary fats and WHO recommendations for consumption of fats.

Mr Devendra Chawla, Founder of Samyog Health Foods Pvt. Ltd stressed that proteins are required for growth, development, maintenance and expression of immune response. Today plant proteins are proposed as preventive, cost effective and sustainable alternatives for growing populations. Therefore, Mr. Chawla justified the *"Overcoming Health Hurdles with the help of Proteins"*.

He pointed out numerous benefits of consuming plant

She emphasized the significance of gut health and how 80% of our immunity is in our gut microbiota. Fortified foods which are now available in the market is another way to ensure regular intake of micronutrients by the consumers.

Ms Meenu Yadav, Manager at Tech. Regulatory affairs, Marico focussed on *"Healthy fats as a booster to Health"* and how all fats are not unhealthy.

WINNING POSTERS & RECIPES

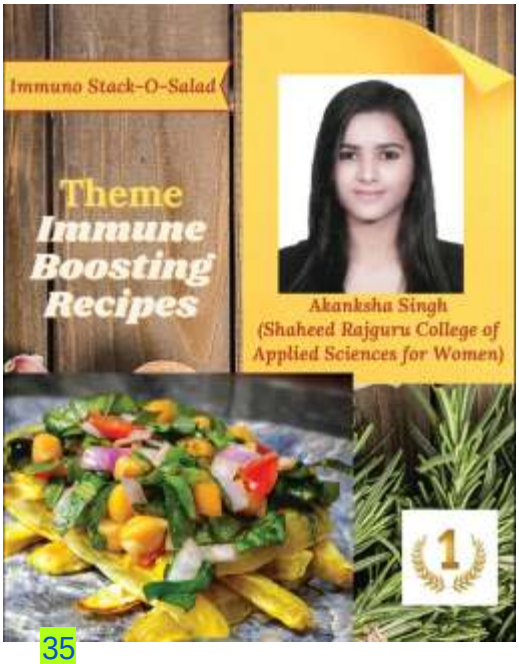
Digital Poster Making Contest - Topic: Maintaining Health in a Work from Home Model

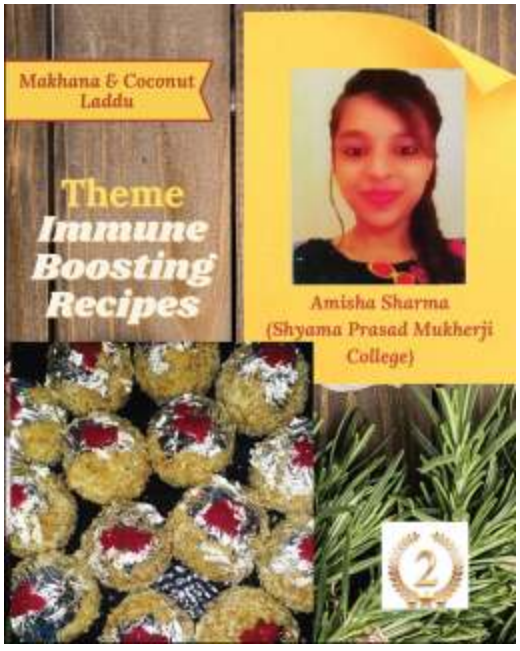
The nutrition activity for the undergraduate college students included the "Digital Poster Contest". The theme was "Maintaining health in a work from home model". A total of 28 entries were received from the students and it was judged by Dr. Rohini Sharma, Consultant Nutritionist, Food Technologist and Wellness Coach and Ms. Aparna Tandon, Sr. Manager- Nutrition &NPD. Signutra.Hitikk Chawla, Lakshay Goyal and Aman Yadav all from BCAS, DU won the 1st, 2nd and 3rd prizes respectively.

Recipe Contest – Topic: Immune Boosting Recipes

The "Immune Boosting Recipe Making Competition" was to promote and sensitize the students on the importance of nutrients and immunity. They were asked to prepare a recipe and upload it as a video. A total of 22 entries were received from the contestants and were judged by Dr Ashlesha Parchure, Director- VR Food Tech Pvt Ltd and Ms Purvi Varma, Sr. Manager Nutrition Science Marketing Abbott. The entries were evaluated based on the selection of ingredients, innovation, presentation and video output. The prizes were bagged by Akanksha Singh from Shaheed Rajguru College of Applied Sciences (SRCAS), Amisha Sharma from Shyama Prasad Mukherjee College and Asif Ahmed from Bhaskaracharya College of Applied Sciences as 1st, 2nd, and 3rdrespectively.

The program was concluded by a formal vote of thanks, which was proposed by Ms Anuja Padte, Food Scientist, PFNDAI.





REGULATORY ROUND UP

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

Dear Readers

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

Final Notification

Notification amending FSS (Health Supplement, Nutraceutical) Regulation, 2016. The amendment introduces Food for Special Dietary Use for sportspersons. Many new botanicals and nutraceuticals have been added. Soy polysaccharides and Oligosaccharides, Pectin and Hydrolyzed Guar gum have been recognized as prebiotics. Few probiotics have been added to Schedule VII.

Final notification amending FSS (Labelling and Display) Regulation, 2020. A non Gazetted draft was published amending some provisions of the said regulation was published in June 2021. A few amendments from the draft have now been notified. Warning declarations with regard to addition of non-calorie sweeteners. The provisions have to be complied with 17 November 2021. A tall order with just a few weeks left.

Final notification setting a tolerance limit of minus (-) 10% for the nutrients in fortified food under the FSS (Fortification of Foods) Regulation, 2018.

Draft Notification

A draft regulation on Vegan Foods has been notified. The draft defines Vegan Food and also stipulates conditions for Vegan claim. The product should not contain ingredients/products including additives, processing aid, enzymes of animal origin (including Honey). For example – FBOs have to look into the origin of even an additive like GMS – is it derived from vegetable oil or animal fat. To establish the vegan chain, vendors of ingredients and additives must declare the vegan status on their COAs. Licensing of FBOs claiming Vegan status is made stricter involving visit by licensing Authority, testing etc. The testing procedures to confirm status has not been spelt out. Claiming “Vegan” in future will not be very easy.

Amendments are proposed in FSS (Labelling and Display) Regulation, 2020. It includes rationalizing the height of numerals and letters with respect to principal display panel, exempting products like glucose syrup, maltodextrin derived from wheat from allergen declaration, etc.

Notification proposing amendments in FSS (Foods for Infant Nutrition), 2020. The change is with regard to nutrient levels in Infant and Follow Up Formula.

Draft notification amending FSS (Approval of Non-Specified Food and Food Ingredient), 2017. Procedure for approval has been modified to include timelines for scrutiny by the Authority, reply from the applicant, etc. The appeal procedure against the rejection has also been specified. A greater clarity has been brought in application Form I. Novel premix of ingredients/additives has been included. Details have been sought regarding health claims that are likely to be made and supporting documents to substantiate those claims. It is not clear why information about claims and claim documents are sought in a safety application review.

Changes have been proposed in FSS (Labelling and Display) Regulation, 2020 to include standards of identity for different types of bread like milk bread, fruit bread , multi grain bread, etc. The amendment identifies key ingredients and their minimum levels for such claims. In my opinion, these changes could have been brought under bread standards of FSS (Food Products Standards and Food Additives), Regulation 2011.

An amendment extending the list of permitted amino acids in Schedule II of FSS (Health Supplement, Nutraceutical) Regulation, 2016 has been proposed.

Draft notification introducing additional parameters in migration testing of plastic materials in contact with food.

Orders, Notices and Directions.

A detailed FAQ on Licensing and Registration is published.

FSSAI has made provisions to change the address or the location retaining the License or Registration number.

Deadline for declaring FSSAI license number in invoices, cash memo, etc has been extended to 01 January 2022.

Clarifications have been issued regarding the categorization and licensing of traditional Indian sweets and savouries.

All matters regarding sampling, improvement notices, adjudication, penalties will be notified through online FOSCOS system.

A long-lasting demand of categorization of mouth fresheners has been met. They are now brought under confectionery.

A new direction operationalizing the standards for naturally occurring formaldehyde in different types of fish and fish products has been issued.

FSSAI through a directive has categorically stated that license for products under FSS (Health Supplement and Nutraceutical) Regulation, 2016 can be issued only by Central Licensing authority.

Fishery units subjected to Export and Import Council (EIC) inspection are exempted form similar inspection by FSSAI.

RESEARCH IN HEALTH & NUTRITION

Consuming a diet with more fish fats, less vegetable oils can reduce migraine headaches, study finds Frequency, intensity of monthly migraines declined among those on higher fish oil diet

Science Daily July 1, 2021

A diet higher in fatty fish helped frequent migraine sufferers reduce their monthly number of headaches and intensity of pain compared to participants on a diet higher in vegetable-based fats and oils, according to a new study.

The findings by a team of researchers from the National Institute on Aging (NIA) and the National Institute on Alcohol Abuse and Alcoholism (NIAAA), parts of the National Institutes of Health; and the University of North Carolina (UNC) at Chapel Hill, were published in the July 3 issue of The BMJ.

This study of 182 adults with frequent migraines expanded on the team's previous work on the impact of linoleic acid and chronic pain. Linoleic acid is a polyunsaturated fatty acid commonly derived in the American diet from corn, soybean, and other similar oils, as well as some nuts and seeds. The team's previous smaller studies explored if linoleic acid inflamed migraine-related pain processing tissues and pathways in the trigeminal nerve, the largest and most complex of the body's 12 cranial nerves. They found that a diet lower in linoleic acid and higher in levels of omega-3 fatty acids (like those found in fish and shellfish) could soothe this pain pathway inflammation.

In a 16-week dietary intervention, participants were randomly assigned to one of three healthy diet plans. Participants all received meal kits that included fish, vegetables, hummus, salads, and breakfast items. One group received meals that had high levels of fatty fish or oils from fatty fish and lowered linoleic acid. A second group received meals that had high levels of fatty fish and higher linoleic acid. The third group received meals with high linoleic acid and lower levels of fatty fish to mimic average U.S. intakes.

During the intervention period, participants monitored their number of migraine days, duration, and intensity, along with how their headaches affected their abilities to function at work, school, and in their social lives, and how often they needed to take pain medications. When the study began, participants averaged more than 16 headache days per month, over five hours of migraine pain per headache day, and had baseline scores showing a severe impact on quality of life despite using multiple headache medications.

The diet lower in vegetable oil and higher in fatty fish produced between 30% and 40% reductions in total headache hours per day, severe headache hours per day, and overall headache days per month compared to the control group. Blood samples from this group of participants also had lower levels of pain-related lipids. Despite the reduction in headache frequency and pain, these same participants reported only minor improvements in migraine-related overall quality of life compared to other groups in the study.

Migraine, a neurological disease, ranks among the most common causes of chronic pain, lost work time, and lowered quality of life. More than 4 million people worldwide have chronic migraine (at least 15 migraine days per month) and over 90% of sufferers are unable to work or function normally during an attack, which can last anywhere from four hours to three days.

Women between the ages of 18 and 44 are especially prone to migraines, and an estimated 18% of all American women are affected. Current medications for migraine usually offer only partial relief and can have negative side effects including sedation, and the possibility of dependence or addiction. “This research found intriguing evidence that dietary changes have potential for improving a very debilitating chronic pain condition like migraine

without the related downsides of often prescribed medications," said Luigi Ferrucci, M.D., Ph.D., scientific director of NIA.

The NIH team was led by Chris Ramsden, a clinical investigator in the NIA and NIAAA intramural research programs, and UNC adjunct faculty member. Ramsden and his team specialize in the study of lipids -- fatty acid compounds found in many natural oils -- and their role in aging, especially chronic pain and neurodegenerative conditions. The UNC team was led by Doug Mann, M.D., of the Department of Neurology, and Kim Faurot, Ph.D., of the Program on Integrative Medicine. Meal plans were designed by Beth MacIntosh, M.P.H., of UNC Healthcare's Department of Nutrition and Food Services.

"Changes in diet could offer some relief for the millions of Americans who suffer from migraine pain," said Ramsden. "It's further evidence that the foods we eat can influence pain pathways."

The researchers noted that these findings serve as validation that diet-based interventions increasing omega-3 fats while reducing linoleic acid sources show better promise for helping people with migraines reduce the number and impact of headache days than fish-oil based supplements, while reducing the need for pain medications. They hope to continue to expand this work to study effects of diet on other chronic pain conditions.

Combining plant-based diet and healthy microbiome may protect against multiple sclerosis Metabolism of isoflavone by gut bacteria protects mice from MS-like inflammation

Science Daily July 13, 2021

A new University of Iowa study suggests that metabolism of plant-based dietary substances by specific gut bacteria, which are lacking in patients with multiple sclerosis (MS), may provide protection against the disease.

The study led by Ashutosh Mangalam, PhD, UI associate professor of pathology, shows that a diet rich in isoflavone, a phytoestrogen or plant-based compound that resembles estrogen, protects against multiple sclerosis-like symptoms in a mouse model of the disease. Importantly, the isoflavone diet was only protective when the mice had gut microbes capable of breaking down the isoflavones. The findings were published July 9 in Science Advances.

"Interestingly, previous human studies have demonstrated that patients with multiple sclerosis lack these bacteria compared to individuals without MS," Mangalam says. "Our new study provides evidence that the combination of dietary isoflavones and these isoflavone metabolizing gut bacteria may serve as a potential treatment for MS."

Isoflavones are found in soybeans, peanuts, chickpeas and other legumes. The study also found that mice fed the isoflavone diet have a microbiome that is similar to the microbiome found in healthy people and includes the bacteria which can metabolize isoflavones. Conversely, a diet lacking isoflavones promotes a microbiome in mice which is similar to one observed in patients with MS and lacks beneficial bacteria that can metabolize isoflavone.

Multiple sclerosis is an autoimmune disease of the brain and spinal cord where the immune system attacks the protective coating surrounding nerve fibers. The symptoms of this disease include muscles weakness, balance issues, and problems with vision and thinking. While there are treatments that slow down the disease, there is currently no cure for MS.

Although the exact cause of MS is unknown, a complex interaction between genetic and environmental factors are thought to initiate the disease. Recently, the gut microbiome -- the trillions of gut bacteria the live inside human intestines -- has emerged as a potential environmental factor that contributes to MS. In prior work, Mangalam and colleagues demonstrated that there are significant differences between the gut microbes of patients with MS and people without MS. Specifically, patients with MS lacked bacteria that are able to metabolize isoflavones. Although role of gut microbiome in human diseases such as MS is being appreciated, the mechanism through which these gut bacteria might influence the disease is poorly understood.

In the current study, Mangalam's team, including first author Samantha Jensen, a UI graduate student in immunology, found that the bacteria that are lacking in patients with MS are able to suppress inflammation in a mouse model of MS. The team compared the effects of an isoflavone diet and an isoflavone-free diet on disease in the mouse model of MS. They found that the isoflavone diet led to disease protection. However, when the team placed the mice on the isoflavone diet but removed the isoflavone-metabolizing gut bacteria, the isoflavone diet was no longer able to protect against MS-like symptoms. When the bacteria were reintroduced, the protective effect of the isoflavone diet was restored. Furthermore, the team was able to show that a specific isoflavone metabolite called equol, which is produced by the gut bacteria from isoflavone, is also able to provide protection against disease.

"This study suggests that an isoflavone diet may be protective so long as the isoflavone metabolizing gut bacteria are present in the intestines," say Mangalam, who also is a member of the Iowa Neuroscience institute and Holden Comprehensive Cancer Center.

Adding color to your plate may lower risk of cognitive decline

Science Daily July 29, 2021

A new study shows that people who eat a diet that includes at least half a serving per day of foods high in flavonoids like strawberries, oranges, peppers and apples may have a 20% lower risk of cognitive decline.

The research is published in the July 28, 2021, online issue of Neurology the medical journal of the American Academy of Neurology. The study looked at several types of flavonoids, and found that flavones and anthocyanins may have the most protective effect.

Flavonoids are naturally occurring compounds found in plants and are considered powerful antioxidants. It is thought that having too few antioxidants may play a role in cognitive decline as you age. "There is mounting evidence suggesting flavonoids are powerhouses when it comes to preventing your thinking skills from declining as you get older," said study author Walter Willett, MD, Dr PH, of Harvard University in Boston, Mass. "Our results are exciting because they show that making simple changes to your diet could help prevent cognitive decline."

The study looked at 49,493 women with an average age of 48 and 27,842 men with an average age of 51 at the start of the study. Over 20 years of follow up, people completed several questionnaires about how often they ate various foods. Their intake of different types of flavonoids was calculated by multiplying the flavonoid content of each food by its frequency. Study participants evaluated their own cognitive abilities twice during the study, using questions like, "Do you have more trouble than usual remembering recent events?" and "Do you have more trouble than usual remembering a short list of items?" This assessment captures early memory problems when people's memory has worsened enough for them to notice, but not necessarily enough to be detected on a screening test.

The people in the group that represented the highest 20% of flavonoid consumers, on average, had about 600 milligrams (mg) in their diets each day, compared to the people in the lowest 20% of flavonoid consumers, who had about 150 mg in their diets each day. Strawberries, for example, have about 180 mg of flavonoids per 100 gram serving, while apples have about 113. After adjusting for factors like age and total caloric intake, people who consumed more flavonoids in their diets reported lower risk of cognitive decline. The group of highest flavonoid consumers had 20% less risk of self-reported cognitive decline than the people in the lowest group.

Researchers also looked at individual flavonoids. Flavones, found in some spices and yellow or orange fruits and vegetables, had the strongest protective qualities, and were associated with a 38% reduction in risk of cognitive decline, which is the equivalent of being three to four years younger in age. Peppers have about 5 mg of flavones per 100 gram serving.

Anthocyanins, found in blueberries, blackberries and cherries, were associated with a 24% reduced risk of cognitive decline. Blueberries have about 164 mg of anthocyanins per 100 gram serving.

"The people in our study who did the best over time ate an average of at least half a serving per day of foods like orange juice, oranges, peppers, celery, grapefruits, grapefruit juice, apples and pears," Willett said. "While it is possible other phytochemicals are at work here, a colourful diet rich in flavonoids -- and specifically flavones and anthocyanins --

seems to be a good bet for promoting long-term brain health. And it's never too late to start, because we saw those protective relationships whether people were consuming the flavonoids in their diet 20 years ago, or if they started incorporating them more recently." A limitation of the study is that participants reported on their diets and may not recall perfectly what they ate or how much.

Preventing childhood obesity requires changes in parents' and clinicians' early-life care

Science Daily July 29, 2021

Rates of childhood obesity are at historically high levels in the U.S., yet there are few interventions that promote healthy weight gain in children from infancy to age two -- a critical period for the development and prevention of childhood obesity.

A new study published in Pediatrics found that fewer infants gained excess weight when low-income pregnant women received individualized health coaching in tandem with clinicians in community health centres and public health programs systematically changing how they delivered care to women and their infants. "Most interventions to prevent obesity in children attempt to change the behaviour of the child's parent or family," explains lead author Elsie Taveras, MD, MPH, chief of the Division of General Academic Pediatrics at Massachusetts General Hospital (MGH). "But a child's health is also influenced by how well clinical and public-health systems interact with families and provide care targeted to reducing the risk of obesity."

The novel intervention, called the First 1,000 Days program, has the potential to have a much broader impact on childhood obesity because it reaches all women and infants. "We can be so much more effective at preventing childhood obesity if all obstetricians pay close attention to a woman's excess weight gain in pregnancy and if all pediatricians are trained in identifying problematic weight gain in infants, for example," says Taveras, a professor of Pediatrics at Harvard Medical School (HMS). The First 1,000 Days program is also unique in combating obesity starting in the first trimester of pregnancy and in focusing on low-income families, who have the highest risk for childhood obesity.

The investigators compared infants' weight outcomes in women and infants who received the intervention and those who received usual care. The intervention group included 995 pregnant women in their first trimester and their infants receiving care at two community health centres affiliated with Mass General Brigham. The comparison group consisted of 650 pregnant women and their infants who received usual care at two other community health centres serving low-income patients.

The intervention had two goals: to promote the adoption of healthy behaviour in the women and their infants and to make systematic changes in the clinical care the women and infants received. The systems-level component of the intervention included, for example, standardizing obesity-prevention training for pediatric clinicians and staff, close tracking of infants' weight gain, screening pregnant women for adverse health behaviours and social determinants of health, and providing educational materials and text messages to families that promoted healthy feeding and sleeping behaviours of their infants.

In addition, women in the intervention group received individual support and coaching during pregnancy and the first six weeks postpartum on diet, physical activity, sleep and stress reduction.

Infants in the intervention group had 54% lower odds of being overweight at six months and 40% lower odds of being overweight at 12 months compared with infants who received usual infant care. The researchers will continue to follow the children through age two. Mothers at the intervention sites had modestly lower, but clinically insignificant, weight retention at six weeks' postpartum compared with mothers receiving usual care. But more women in the intervention group had a postpartum visit with a primary care clinician than the women who received usual care. "The first six weeks after delivery are very important for positively influencing a woman's health trajectory, so we may need a more robust intervention to achieve postpartum weight reduction," says Taveras.

Making changes in systems of care holds the promise to improve the health of all women and their babies at community health centres and public-health programs, Taveras adds. "We believe we can create a sustained reduction in childhood obesity by moving beyond simply modifying individual behaviours and risk factors, one parent at a time." The next steps for the research are to find the best approaches to disseminate the intervention to other health systems that care for low-income families and to train frontline clinicians in how to implement the program for preventing childhood obesity into their practices.

FOOD SCIENCE & INDUSTRY NEWS

When taste and healthfulness compete, taste has a hidden advantage

New research describes what goes on in your brain when you reach for a candy bar instead of an apple

Science Daily July 7, 2021

You dash into a convenience store for a quick snack, spot an apple and reach for a candy bar instead. Poor self-control may not be the only factor behind your choice, new research suggests. That's because our brains process taste information first, before factoring in health information, according to new research from Duke University.

"We spend billions of dollars every year on diet products, yet most people fail when they attempt to diet," said study co-author Scott Huettel, a professor of psychology and neuroscience at Duke. "Taste seems to have an advantage that sets us up for failure."

"For many individuals, health information enters the decision process too late (relative to taste information) to drive choices toward the healthier option." The new paper, which appears July 5 in Nature Human Behaviour, describes the advantage taste has over healthfulness in the decision-making process. "We've always assumed people make unhealthy choices because that's their preference or because they aren't good at self-control," said study co-author Nicolette Sullivan. "It turns out it's not just a matter of self-control. Health is slower for your brain to estimate -- it takes longer for you to include that information into the process of choosing between options."

The research was undertaken when Sullivan was a postdoctoral associate at Duke. She is now an assistant professor of marketing at the London School of Economics and Political Science.

For the study, Sullivan and Huettel recruited 79 young adults of a median age of 24.4 years. Study participants were asked to fast for four hours before the experiment to ensure they arrived hungry. Participants were asked to rate snack foods on their tastiness, healthfulness and desirability. They were then presented with pairs of foods and asked to choose between them -- and the researchers timed their choices. At the end of the experiment, participants were offered one of the foods they had chosen. Study participants registered taste information early in their decision process -- taking about 400 milliseconds on average to incorporate taste information. Participants took twice as long to incorporate information about a snack's healthfulness into their decisions. That may not sound like much time. In many cases though, it's enough to alter the choice we make. "Not every decision is made quickly -- house purchases, going to college -- people take time to make those choices," Huettel said. "But many decisions we make in the world are fast -- people reach for something in the grocery store or click on something online."

The authors say their findings could apply to other choices, not just food. For instance, some financial decisions, such as saving and spending choices, may also be affected by how -- and when -- the brain processes different types of information.

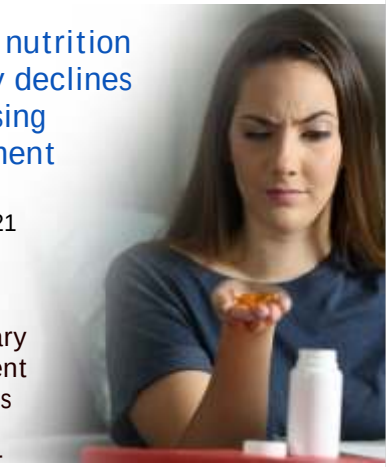
Meanwhile, all is not lost in the war against junk food cravings. Half of study participants received a blurb before the experiment, stressing the importance of eating healthy. Those participants were less likely to choose an unhealthy snack.

The authors also identified something simple that can help people with their food choices: slowing down the decision-making process. When study participants took longer to consider their options, they tended to pick healthier ones.

"There may be ways to set up environments so people have an easier time making healthy choices," Huettel said. "You want to make it easy for people to think about the healthfulness of foods, which would help nudge people toward better decisions."

Trust in nutrition industry declines amid rising supplement usage

30 Aug 2021
Nutrition Insight



The dietary supplement industry is facing consumer mistrust despite experiencing a significant period of recent growth.

This is according to Krishna Rajendran, CEO of Karallief, a nutraceutical company that distributes clinically studied herbal extracts.

"The supplement industry went through a major period of growth in 2020. The pandemic had a lot to do with that, as people were more inclined to take charge of their health," he tells NutritionInsight. "People have been looking for ways to maintain their immunity and have turned to dietary supplements. From the lessons we learned about consumer behaviours in 2020, we can make the necessary changes to help build trust in dietary supplements and expand the category even more." Reaffirming the surge in supplement use, a different survey by the Samueli Foundation found 29 percent of 2,000 US consumers began using supplements after the COVID-19 pandemic began, bringing the overall number of supplement users to 76 percent.

Consumer mistrust explained

Consumer concern about the quality and accuracy of supplements is due to supplements not being scientifically validated. When these supplements are scientifically researched, companies do not provide simple scientific information that consumers understand, comments Rajendran. "Moreover, supplements do not always contain the amount of the ingredient mentioned on the label. Some supplements may claim to have a certain ingredient on the label, but in reality, a different, inferior, low-cost substitute may have been used," he adds.

A study from Ireland's Waterford Institute of Technology previously found that 61 percent of 46 vision supplement goods marketed in Europe, Mexico and the US did not contain the amount of carotenoids, the active ingredient, claimed on the labels.

Testing concerns

Another reason for consumer mistrust is that some supplements may not have been thoroughly tested, including contaminants such as heavy metals and pesticides above the recommended levels, Rajendran notes. According to a prior test conducted by NOW, 12 of the 23 turmeric extracts tested failed to meet the potency standard, contained synthetic curcuminoids, heavy metals or used gelatin caps instead of the advertised vegetable capsules. However, Innova Market Insights' data reveals that supplement brands are working to achieve cleaner labels. The market researcher notes that supplement launches with a clean label claim experienced a 15 percent average annual growth between 2014 to 2018 in West Europe. Lastly, companies can also exaggerate the quality and ability, such as claiming that some products can cure diseases, adds Rajendran.

Adulteration in food supplement industry

Label inaccuracies are a huge risk for the food and supplement industry as these inaccuracies can lead to more issues for the industry as a whole. "Trust is very crucial, and when consumers find out that companies aren't providing accurate information, they lose that trust. That affects the industry as a whole because more people will collectively have a mistrust of the industry, and that will affect its growth in the future," says Rajendran. "Ingredient traceability in the supplement industry is necessary to understand where and how a problem occurred and how to prevent it from occurring again. The most important thing is to develop and maintain a detailed system of documentation that is updated to reflect additional new risks in the supply chain." In July, an ABC, AHP and BAPP partnership was formed to address the ongoing issue of adulteration in the dietary food supplement industry.

By Nicole Kerr

Nutrient density in plant-based: Consumers look for nourishing and sustainable options, says industry

25 Aug 2021 Nutrition Insight

As the plant-based market moves further into the mainstream, consumers are looking for the most nutritious plant-based NPD. Beyond sustainability and eco-consciousness, consumers are also looking for nourishing alternatives that cater to a holistic approach to health.

Experts from ADM and Beneo speak to NutritionInsight on how the category is maturing and expanding further. "Consumer demand for plant proteins is at an all-time high as many people experiment with plant-based options to meet their desire for healthy, nutritious, sustainable, clean label and novel products," says Jacquelyn Schuh, ADM's global protein marketing director. As the plant-based market matures, consumers are seeking more ingredient diversity and increased nutrient density in plant-forward foods and beverages, she explains.

"The COVID-19 pandemic has helped create a shift amongst consumers toward a new holistic view on sustainability. According to recent research: 'The old consumer paradigm of, 'I choose to eat what is good for me and also good for the planet' has now altered to a mindset of, 'What is good for the planet is also good for me,'" says Olivier Chevalier, senior product manager functional proteins at Beneo. "Coinciding with this, unsurprisingly, is a spotlight on health at present, with the majority of consumers saying that promoting long-term health is an important driver to them."

Swift shift to plant-based

ADM market research shows that the majority of global plant consumers – defined as flexitarians, vegetarians or vegans – believe taste and nutrition are equally important in plant-based products, reinforcing that brands must deliver on both of these characteristics.

"People are taking a more proactive approach to health and wellness because of the pandemic. In fact, global consumers say they are now more conscious about leading healthier lifestyles and are trying to eat and drink more healthily than they have in the past," Schuh details.

These shifting behaviours create opportunities for innovation in protein blends and functional label claims on a variety of products. Additionally, while greater accessibility to more nutritious alternative options pop up, the consistent consumer demand for clean, clear and shorter ingredient labels will not go away.

Long-term health and sustainability

Although plant-based products have seen rapid growth, primarily driven by health and eco-conscious shoppers, the pandemic widened the appeal of meat-alternative products even further, supports Chevalier. "As more mainstream consumers make changes to their diets to promote their long-term health and reduce their impact on the planet, there has been a recent upsurge in shoppers planning to include more plant-based foods in their diets, as a result of COVID-19." Many consumers perceive plant proteins as natural, healthy ingredients that are more sustainable than meat in their production, he says. "These proteins also have specific benefits such as being low in cholesterol, saturated fats and sugars, making them a popular choice for a growing range of plant-based applications."

Although there are many sources of plant protein, wheat is the top protein in meat substitutes, followed by soybean, pulses, pea and then potato, he adds.

Taste improvements

The popularity of wheat protein is, in part, due to its neutral taste and the wide variety of textures it can create. However, wheat protein is also an excellent source of many amino acids (such as cystéine, méthionine, phénylalanine, tyrosine and tryptophan). "It is also recognized to be more neutral in taste than other protein sources, which is important, as taste is a key repeat purchasing driver for consumers. As such, wheat-based protein is one of the most promising meat substitutes for meat-free burgers, nuggets and vegetarian sausages to name but a few," says Chevalier.

According to ADM research, more than 50 percent of flexitarian consumers say meat alternatives need taste improvements, and more than 20 percent say that texture needs to be improved. "Given that, ADM is focused on enhancing the sensory experience of plant-based meat and dairy products. For example, we find that product developers are better able to achieve desired taste and texture by combining multiple plant proteins in foods and beverages," Schuh notes.

Protein blends

Finding the right protein ingredients and blends for specific offerings is crucial for innovation in the plant-based space. "Brands can apply our NutriFlex line up of protein systems to expand formulation possibilities and get on-trend and versatile products on shelves faster. NutriFlex spans easy-to-use, nutritionally fortified powdered plant protein blends to turnkey culinary-inspired protein-forward product solutions," Schuh supports. "By combining the two proteins, we help our customers provide high-quality protein and achieve authentic taste, colour and texture for a wide range of superior plant-forward bakery and snack products."

Protein blends can also help create creamy, higher protein beverage alternatives, such as our five-plant protein milk alternative, which is a purposeful blend of five ADM proteins designed to deliver balanced flavor and ingredient diversity. "With the addition of Fibersol soluble corn fibre, the milk alternative also provides a boost of fibre and rich mouthfeel. Non-dairy beverages like this are a convenient, tasty solution for consumers seeking to add functional benefits through ingredients like fibre and protein to their diet."

Juicy meat textures

"This has proved popular with producers as it contains at least 65 percent protein (on the dry matter) and has a unique alveolar structure that allows the development of meat-like juicy texture," claims Chevalier.

"It also takes only five to 15 minutes to hydrate, eradicating the need for long soaking and making it convenient for production. As well as enabling the creation of meat-free products with a meaty texture and granular, fibrous structure, BeneoPro W-Tex can also be flavoured with a variety of tastes, herbs and spices, making it a flexible meat substitute." However, as the consumer palate for plant-based foods continues to evolve, a wider variety of meat alternative foods are now being created.

Versatility in formulations

"To meet growing demand, producers want even more versatility when it comes to fine-tuning their plant-based product's organoleptic profile [its taste, sight, smell and touch] and its texture." To facilitate this process, Beneo created BeneoPro W-Tex variants that deliver, both in terms of taste and texture, no matter the plant-based food application. "For minced beef meat replacement recipes, the company created two prototype BeneoPro W-Tex variants." "BeneoPro W-Tex's existing formulation has been recreated in a smaller particle size of average 5 mm, instead of the standard 7 mm, for producers looking for finer textures in ground meat replacement products, as well as plant-based sausages."

For those producers looking to replace the texture of chicken, in imitation chicken nuggets or strips, a variant has been created that has a slightly lower protein content of a minimum 60 percent (on dry matter). It has a higher water holding capacity and as a consequence, creates softer, juicier and more "chicken-like" textures. "With demand for plant-based products growing at an impressive rate, as more and more consumers look to promote their long-term health and make sustainable purchasing choices, there is a wealth of opportunity for producers looking to capitalize on the trend," Chevalier concludes.

By Kristiana Lalou

Seaweed surges as demand for clean label healthy snacking heats up

03 Aug 2021
Nutrition Insight

The move to better-for-you and functional snacking has caused new ingredients – like seaweed – to come under the spotlight for their nutritional potential.

In this space, Chile-based Amarea is focalizing how the underwater plant can tap into clean label demands. Innova Market Insights reports that snack launches with seaweed as an ingredient have seen a CAGR of 16 percent from 2016 to 2020. Some of the most popular health positionings include No Additives/ Preservatives and GMO-Free. The market research notes that in Europe and North America, more specific clean label claims are taking the stage, often in combination with free-from claims that are more easily understood by consumers.

Embracing short ingredient lists

Amarea notes that many health foods snacks include "a host of unnecessary ingredients." It argues that this can make it difficult for consumers to be informed about what they're buying. Notably, a 2020 Innova survey found that 85 percent of consumers see product information as being of major importance and want to know what a product contains. "All too often, 'healthy' snacks replace low-quality ingredients with organic or allergy-sensitive alternatives. The specific elements used to create a recipe may change for the better, but at the end of the day, the quantity of ingredients too often remains mind-numbingly long," the business states. The brand limits each of its products to three ingredients. Usually, this consists of an oil, a flavouring – like sesame or olive – and the seaweed itself. The offerings are also gluten-free, keto-friendly and positioned as a healthy snack for any time of day or night. Notably, snacking is causing a shift away from traditional mealtimes, as conventional eating schedules break down.

Packed with nutrients

Amarea works with a network of local enterprises to harvest "cochayuyo," the name Chileans give to their indigenous brand of seaweed. Scientifically known as Durvillaea antarctica, the Chilean seaweed is positioned as a superfood that contains sodium, iodine, folic acid, calcium, potassium, chlorine, sulphur, phosphorus and vitamins A, B1, B12, C, D and E. Amarea recently entered the US health food marketplace, targeting further growth. Other regions are also picking up on the seaweed trend, with Australia's marine bio-industries recently landing nearly AU$270 million (US$202 million). Meanwhile, The Dutch Weed Burger – which is being purchased by the Livekindly Collective – uses seaweed as a key ingredient in its plant-based offering.

Edited by Katherine Durrel

REGULATORY NEWS

India's new RDA rules see increase in vitamin A, C, zinc levels, while biotin remains unchanged

By Tingmin Koe 26-Jul-2021-
NutraIngredients Asia

The Food Safety and Standards Authority of India (FSSAI)has published new rules on the Recommended Dietary Allowance (RDA) of vitamins and minerals which will come into force from July 1, 2023, with increases in the RDA of calcium, iron, zinc, vitamin A, C, and D etc.

The RDA of vitamin C has increased from 40mg to 80mg for men and 40mg to 65mg for women, while that of zinc went up from 12mg to 17mg for men and 10mg to 13.2mg for women. On the other hand, the RDA of sodium has been reduced from 2100mg to 2000mg for men but increased from 1900mg to 2000mg for women. With the new rules, companies can now increase the daily dosage of essential vitamins and minerals in their nutraceutical products. However, the dosage should not exceed the RDA limits and products which exceeded the limits will need to be sold as a pharmaceutical drug instead of a nutraceutical. The new RDAs, referred to as RDA 2020, was set by the Indian Council of Medical Research (ICMR) last year.
"The RDA 2020 shall come into force from 1 July 2023 for compliance. Till such time, food businesses may comply with RDA 2010 [the current RDA rules] or RDA 2020," the FSSAI said in a statement. This means that the industry has a two-year period to transit to the new RDA rules.

More opportunities

Speaking to NutraIngredients-Asia, Sandeep Gupta, founder and CEO at Expert Nutraceutical Advocacy Council (ENAC) – an industry association from India – said the move to revise the RDA has been welcomed by the industry and was a "good and beneficial step". "This will open up a big opportunity for the big internationally brands which are still not officially present in India's nutraceutical market. This is something which is going to give a push to a number of big brands into India and also major Indian brands who would like to get an opportunity to revise their product RDA to cater to a larger population. New brands would also have the opportunity to bring the right, evidence-based products with the right set of RDAs[into the market]," he said.

For companies which have vitamins and minerals marketed as pharmaceuticals, the products have to be recommended by the physicians, which Gupta said was a limited approach and the revised RDA would give them an "opportunity to rethink". "Probably they will rethink, and they will redesign the product, and they will come under the nutraceutical route, and they will have an opportunity to offer the product with the new RDA levels. The awareness about vitamin C, zinc and vitamin D has absolutely increased significantly in the Indian population[due to COVID-19]. So, by following the RDA 2020, companies can develop nutraceuticals and make their products more visible and available in the pharmacies, modern trade or e-commerce platforms. However, if the product [does not follow RDA 2020], it is considered a medicine and cannot be advertised like a nutraceutical," he said.

While the RDA of several vitamins and minerals has increased, that of biotin, also known as vitamin B7, has remained at 30 g, which Gupta said could impact the nutricosmetics and anti-aging nutraceutical sectors. "Biotin has been used across the globe spanning from five miligrammes (5,000 g) to 10 milligrammes (10,000 g) in a product. This [unchanged RDA of biotin] will impact the anti-ageing and the hair, skin, and nail nutraceutical sector, and both are huge markets. The hair nail and skin market is also one of the largest and fastest growing markets in India," he said. On the other hand, Gupta said that ENAC would continue to advocate the adoption of RDA by tolerable upper limits (RDA by TUL).

In its announcement, the FSSAI said that the TUL system – made available to the public on its website since2018 – was "only for information" and "not for use by the food businesses." The RDA by TUL refers to the maximum amounts of vitamins and minerals that one can safely take without risk of an overdose or serious side effects per day. This is different from the FSSAI's practice, whereby manufacturers need to ensure that they do not exceed the prescribed RDA value when formulating vitamins and minerals.

RDA 2020

Nutrients	RDA for men		RDA for women (not including pregnant, lactating mothers)	
	Old RDA	New RDA	Old RDA	New RDA
Calcium	600mg	1,000mg	600mg	1,000mg
Iron	17mg	19mg	21mg	29mg
Zinc	12mg	17mg	10mg	13.2mg
Vitamin C	40mg	80mg	40mg	65mg
Vitamin D	400IU	600IU	400IU	600IU
Vitamin A	600µg	1,000µg	600µg	840µg
Sodium	2,100mg	2,000mg	1,900mg	2,000mg

"ENAC has been doing consistent preparation for a few years [on advocating RDA changes]. The adoption of RDA2020 by the FSSAI is a step towards success and is welcomed by the industry." "However, we will continue to engage the FSSAI to persuade the authorities in adopting RDA by TUL," Gupta said. Based on the RDA by TUL system, the recommended RDA of vitamin C is 2000mg and 100 g for vitamin D.

India's RDA levels: Regulator again revises vitamin and mineral rules with increase in magnesium, biotin

By Tingmin Koe 11-Aug-2021-NutraIngredients Asia

The Food Safety and Standards Authority of India (FSSAI)has again amended its rules on Recommended Dietary Allowance (RDA) of vitamins and minerals, a matter of weeks after originally publishing updated regulations. On July 16, the FSSAI published a new set of RDAs, known as RDA2020, and announced that the new rules will come into force from July 1, 2023.

The FSSAI said that the latest version, released on August 2, was a "partial modification" of the RDA guidelines released on July 16 and was "revised based on revision of RDA 2020 by ICMR-NIN." ICMR-NIN is the Indian Council of Medical Research – National Institute of Nutrition. A comparison between the July 16 and the amended version published on August 2 found various changes. First, the RDAs of magnesium and biotin were increased for both men and women. For example, the RDA of magnesium for men increased from 385mg to 440mg and from 325mg to 370mg in women. Biotin was previously stated as 30 g for adults. Now, it has been increased to 40 g and specifications were made for pregnant, breastfeeding mothers and children. In pregnant women, the RDA of biotin is stated as 40 g, while that of breastfeeding/lactating mothers is 45 g. As for adolescents, it is stated as 35 g, and 25 g for children age 4 to 10, and 20 g for children age one to three.

Biotin, also known as vitamin B7, is found in eggs, seeds, nuts, meat, and vegetables such as spinach and broccoli. It is commonly used in hair, skin, and nails nutricosmetics. The revised level of biotin is higher than that of countries such as the US. In the US, the RDA of biotin is 30 g for adult males and females above 19 years old and 35 g for pregnant and breastfeeding women. As for adolescents between 14 and 18, it is 25 g and in children age one to three, it is 8 g.

Similarly, the RDA for pantothenic acid has been bifurcated in the latest version into pregnant women, lactating women, adolescents and children, Sandeep Gupta, founder and CEO at the Expert NutraceuticalAdvocacy Council (ENAC) pointed out.

For adults and pregnant women, the RDA of pantothenic acid is 5mg, 7mg for lactating women, 5mg for adolescents, and 4mg for children. On the other hand, the RDA for amino acids remain unchanged.

NutraIngredients-Asia has approached the FSSAI for comments on the amendments to RDA 2020 and has not received a response as of the time of publication. The RDA of vitamin B12, iron, iodine, copper have been reduced in the latest guidelines. The RDA of vitamin B12 has been reduced from 2.5 g to 2.2 g and that of iodine has reduced from 150 g to 140 g for adults. For copper, it has been reduced from 2mg to 1.7mg. As for iron, it has been reduced from 40mg to 27mg for pregnant women.

Another striking difference is the removal of the RDA for carbohydrates and the addition of the RDA for dietary fibre, Gupta noted. In addition, the RDA of dietary fibre is specified for adults engaged in different categories of work –sedentary, moderate, and heavy. For men and women engaged in sedentary work, the RDA of dietary fibre is 30g and 25g respectively. This increases to 40g and 30g for men and women engaged in moderate work. A number of RDA changes was also seen for children, especially for protein, zinc, and magnesium.

In children age one to three, the RDA of protein has increased from 11.3g to 12.5g and that of zinc has increased from 3mg to 3.3mg. On the other hand, the RDA of magnesium has been reduced from 135mg to 90mg for children age one to three, from 155mg to 125mg for children age four to six, and from 215mg to 175mg for children age seven to nine.

New rules cut the mustard: Indian industry lauds government's blended oil ban to prevent fraud and increase value

By Pearly Neo 23-Jun-2021- Food Navigator Asia

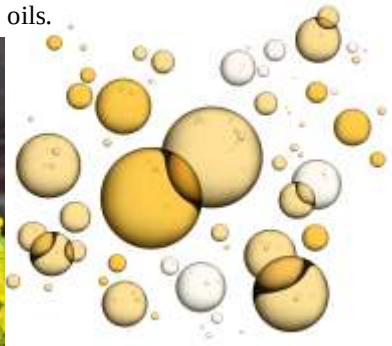
The edible oil industry in India has lauded the Food Safety and Standards Authority India(FSSAI)'s recent enforcement of a ban on blended mustard oils, saying it is crucial to prevent adulteration and drive premiumisation in the category.

FSSAI gazetted the banning of all blended vegetable oils containing mustard oil earlier this year, but only recently issued a formal order to the food safety authorities in all states and Union Territories in India. "Any multi-source edible vegetable oil containing mustard oil manufactured on or after June 8 2021 [is prohibited and all] multi-source edible vegetable oils shall not be sold in loose form [but] in sealed package weighing not more than 15kg," said FSSAI CEO Arun Singhal via a formal notice.

According to Indian edible oils firm BL Agro, the reasoning behind this ban is the widespread use of mustard oil in adulteration due to its natural colour and pungency. "A lot of adulteration in the edible oils industry was happening due to the blending of mustard oil with other oils, as its high pungency levels and colouration covered up any traces of poor quality even if the other oil use was very substandard," BL Agro Managing Director Ashish Khandelwal told FoodNavigator-Asia.

"It got to the point where even when minimum amounts of mustard oil were used in a blend and it was mostly made of substandard oils, people were taking advantage and selling this as a mustard oil or mustard oil blend.

"So considering the practices associated with such oils, it was imperative to ban the blending of oils with mustard oil in the name of public interest, and mustard oil should not be permitted to be put in any kind of blend." Khandelwal added that in India, mustard oil is generally considered to be a more premium type of oil, similar to canola in other places, and mustard blended oils were generally also preferred due to having additional nutritional properties, but the frequency of oil adulteration had been hard on the reputations of both types of oils.



"Mustard oil has long been highly regarded as a premium product in India because it has the component allyl isothiocyanate that reduces skin irritation, which is frequent due to our many seasons and variations of temperature and humidity," he said. "It is also used in Ayurveda to relieve joint issues due to its uric acid content, and is also antifungal and antibacterial– so many consumers prefer mustard oil in India even if just for basic cooking and consumption.

"Proper mustard blended oils, such as mustard oil and rice bran oil blends, also carry benefits in terms of bringing additional nutritional properties from both types of oils, but because so many people were misusing blended oils, even reputable oil firms had to stop blending mustard oils, [and] this was also bad for the reputation of the oils – the hope is that this will now change."

In addition to BL Agro, edible oil industry body Central Organisation for Oil Industry & Trade (COOIT) said that the FSSAI ban would also lead to benefits higher up the supply chain. "Mustard farmers will be encouraged to produce more mustard, which will mean more domestic mustard oil production which can help with reducing edible oil imports to some extent," he said in a statement. "Now since there will not be mixing of any other oil, the demand of pure mustard oil will increase."

Khandelwal agreed that this ban would provide benefits higher up the value chain as well, citing a leap in prices since the ban was announced. "Previously mustard oil prices were in the INR4,300 (US$58.64) per ton range – after the ban, it has gone up to more like INR7,300 (US$99.55) which gives more incentive to the farmers by benefitting their financial position," he said.

The hope now is also that with this ban, mustard oil will be restored to its former glory, and from BL Agro's numbers, this seems to be happening. "The outlook for mustard oil is definitely going up – at BL Agro, we have seen some 40% of 45% sales increase in this since last year [when word of the ban came out] and more people looked for pure mustard oil," said Khandelwal. "So the driver here is consumers gaining more awareness of the situation, and more consciousness about the benefits of mustard oil such as its nutritional benefits and ability to be consumed raw."

Keep up: Novel food innovation outpacing regulatory frameworks and consumer communication

By Guan Yu Lim 10-Aug-2021- Food Navigator Asia

Novel food product development is rapidly outpacing regulation and consumer understanding, with experts calling for better communication and policy advances to ensure innovation leads to commercialisation.

At the Pinduoduo Food Systems Forum hosted by China's agriculture and grocery retail platform Pinduoduo, experts from the Future Ready Food Safety Hub, University of Cape Town, and Dentons Law Offices discussed the current regulatory landscape of novel foods.

The panel was moderated by Xin Yi Lim, Pinduoduo's executive director of sustainability and agricultural impact.

Currently, there are no Codex standards for novel foods. Although, Singapore was the first worldwide to grant regulatory approval for cell-based chicken as a food ingredient last year.

This lack of standards and harmonisation add to the complexity of market access.

However, the panellists agreed that communication was key to accelerate the regulatory landscape for novel foods.

Dr Ben Smith, director at the Future Ready Food Safety Hub (FRESH), said: "A lot of this new technology is being done by the scientists in the lab. But the regulators and risk assessors, they are not scientists and need to be educated to better understand the new technology. This is often the bottleneck in regulations."

Consumer attitudes around food and food safety are always changing, which may also hinder regulatory approval and market access of novel foods.
According to Smith, most of these changing attitudes are influenced by confidence and trust in the regulatory system. "(I think) here in Singapore, we have strong trust in our regulatory system, and consumers tend to be confident that the right things are being done to bring new products to market and so there's a lot of enthusiasm and interest ."

He explained a key part in having this confidence and trust was communicating to consumers, ensuring that they understand the technologies used in cell-based foods. Wilfred Feng, senior counsel, at Dentons Law Offices stressed the importance of public consultations, noting this was a relatively recent development in markets such as China.

For scientists and researchers behind innovations, it is crucial they consider not only regulatory, but how consumers would perceive the product or technology, according to Smith. One classic example is Golden Rice, a genetically engineered rice, fortified with vitamin A. While it was intended to reduce vitamin A deficiency in developing countries, it has suffered from widespread misinformation around negative health impacts. Smith said it was key to start building safety and regulatory approval requirements into the innovation process, and not just on the finished product.

According to Professor Jennifer Thomson, Emeritus Professor at the University of Cape Town, this remains the case with GMO foods. "GMO foods need science-based regulations, and good communication with farmers, public, regulators, politicians to address fears ," she said in her presentation.

She added that the benefits of GMO foods far outweigh potential drawbacks, and while success is not instantaneous, government support is necessary for regulations and research, which impacts commercialisation. Feng added: "I do not think that consumers are afraid of new things, it's whether they can see the value to them ,"and cited how innovations such as nano technology or quantum technology tend to be perceived in a positive light, while GMO is perceived as something bad.