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FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN SEP 2022

ROLE OF PROTEIN IN SATIETY AND WEIGHT MANAGEMENT

Dr. Agatha Betsy

DIET AND NUTRITION FOR IMMUNITY

Prof. Subhadra Mandalika

IMPORTANCE OF SPORTS NUTRITION TO SPORTSPERSONS AND OTHERS

Prof. Jagadish Pai

NUTRIENT ABSORPTION THROUGH SKIN

Ms. Nidhi Gupta

GERMINATION IN FOOD PROCESSING

Ms. Prerana Patil

WEBINAR REPORT: MAKING CONFECTIONERY HEALTHY YET TASTY

Ms. Nidhi Gupta &
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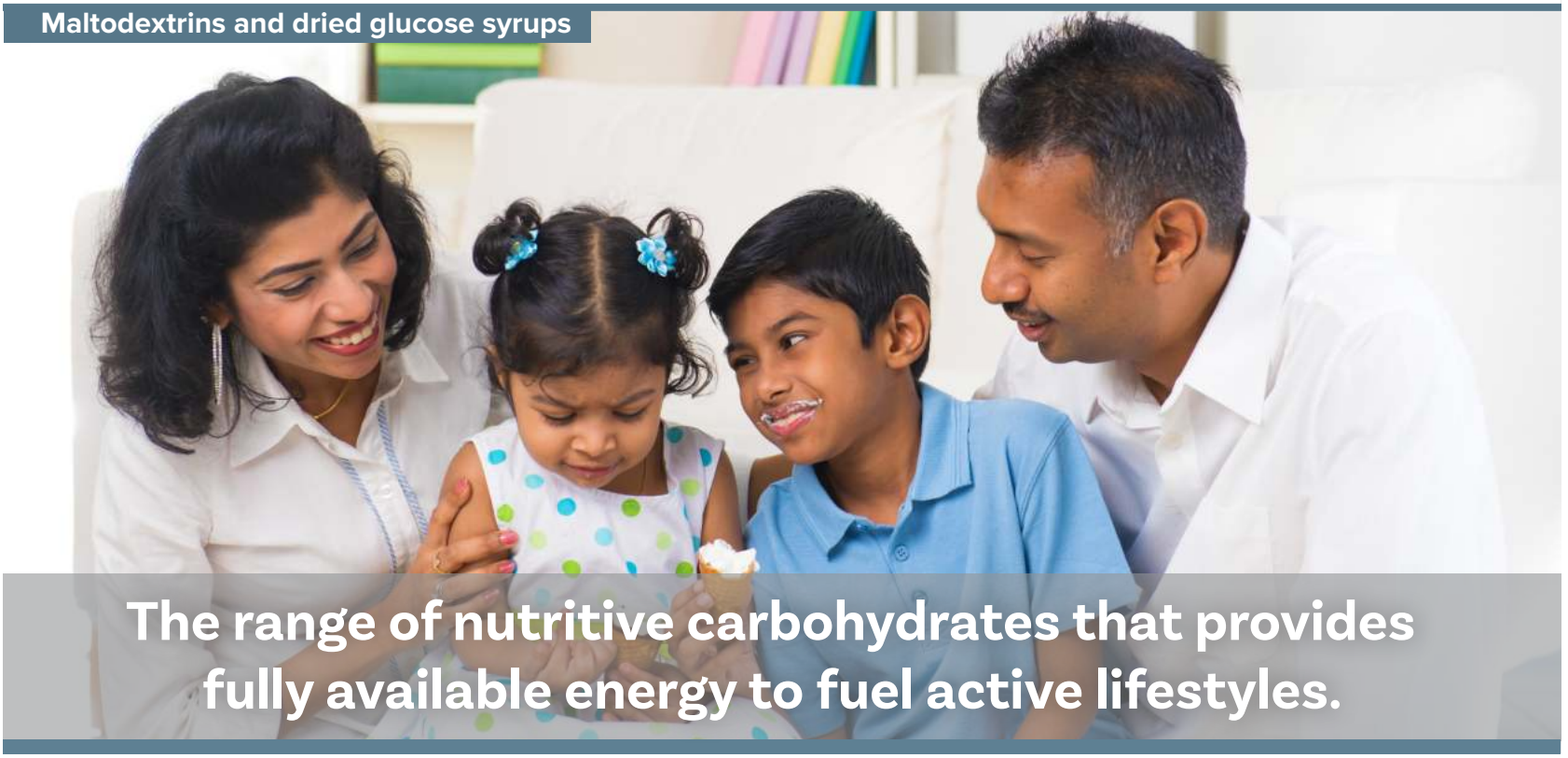

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EDITORIAL

This is again the Nutrition Month or as our Prime Minister called it "Poshan Maah". We must talk about how we could deficiency of various nutrients we have among our population. As our government is already doing vigorously efforts to reduce the micronutrients deficiency through FSSAI fortification programme, we will try to talk of another problem we have namely, the protein deficiency.

Various studies have pointed out this problem prevailing among all Indians. Whether rich or poor, urban or rural, male or female and young or old, very high percentage of our population is facing the problem of protein deficiency. Therefore, we need to do everything in our capabilities to reduce this substantially as protein deficiency causes a great harm.

There is already a lot of interest among consumers as well as in food industry for smart or alternative proteins. It has started with plant-based proteins. Many sources of proteins are being explored for bridging the gap in protein consumption. Many new products have entered market that mimic meat products like chicken burgers, chicken nuggets and fingers, sausages, kheema and patties, all made of plant-based substances. Protein comes mostly from soya to which corn, wheat, canola, rice, pea, chickpea and/or other proteins are added.

These have become very popular among vegetarians and concerned about environment and animal welfare, who would like the experience eating globally popular products like burgers and nuggets but not eat meat. There is one problem at present and that is these imitation products are much more expensive than the real things. However, it is expected that the economy of scale will prevail when large-scale manufacture of all these plant-based ingredients are made and marketed by many manufacturers and cost will come down.

However, this will not be the solution to our protein deficiency, although this will make an excellent beginning and create awareness and developers will think of innovative products of higher protein contents. We much think of using less expensive protein ingredients to be added to existing diets of Indians. It is extremely difficult to change diets, not only because of habit and likes, but because of poverty.

We need solutions like fortification by micronutrients. Adding vitamins or minerals to salt or sugar does not make a great shift in diets. There is one big difference though. As protein is macronutrient, much larger quantities are needed to added to the diet and will not be possible through salt or sugar or spices.

One possibility is the common soya chunks, badi, or granules, which are available at fairly low price. These could be added to meals prepared using spices. These will increase the protein without much change in the characteristics of food preparation. Soya flour has been added to many other foods including roti, chapatti and bread. There can be other ingredients that could be tried.

One trend we need to reverse and that is our pulse production has gone down and prices have increased over decades. These are our protein sources and we need to increase their production and consumption so people can fulfil the protein requirements as they used to earlier.

Government must ensure that farmers are encouraged to produce more pulses and properly compensated. Among grains millets may also partly help us tackle this problem. The combination of pulses and cereal proteins will elevate the protein quality.

Prof Jagadish Pai,
Executive Director, PFNDAI

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REGULATORY VIEWPOINT

AUTHOR
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Chairman, Regulatory Affairs, PFNDAI

The Food Safety and Standards Act (2006) established the FSSAI as the sole food regulator. While it dispensed with agencies connected with food, others with no product specific mandates include foods under their embracive writs relating to “Standards” or “Consumer”.

For example, Legal Metrology (Packaged Commodity Rules) requires a label declaration of prime ingredients upon which its unique selling proposition (USP) is made. Their writ covers a wide range of products from gas stoves to ready to eat food, even though the latter is within the legal purview of FSSAI. Bureau of Indian Standards under its Food and Agriculture Division develop and duplicate food standards. Multiplicity is one-half of the problems faced by industry the other is the quality of their setting.

Before a standard is contemplated, two important questions must be answered. One, for whom is the standard made, who is being served and; two, why is it necessary. For a biscuit manufacturer, the product is packed and labelled, in a shelf stable container, designed to please the consumer and none else. He ensures that the product delivers all the sensory parameters a customer will look for. The regulator sees the biscuit pack as merely a set of specifications (moisture, ash, acid insoluble ash, acidity etc), to be tested for prosecutable offence. The consumer – at consumption- looks for the same sensory attributes of snap or bite,colour and texture, that the product delivers.Both manufacturer obligations and consumer expectations are met, even though the standard conveys none of these parameters.

A standard is necessary to resolve trade disputes, to set trading quality or to prescribe identity parameters or seek to reduce risk. These are clear outcomes, namely resolutions in trade, conformity in commodity quality (tea, coffee, oil, food grain), or adherence to prescribed identity (margarine, mayonnaise, juice and jam) or risk reductions (pesticide residues, contaminants, novel foods). In the absence of a feedback loop through an SME system, intended outcomes of Indian standards remain unknown.

Not every product needs a vertical standard. If the available evidence is insufficient or unsupportive of a stated purpose (as above), the standard lacks merit and should not be set. Every food in existence will provide such generic parameters as moisture, ash content, acid insoluble ash or acidity. Every parameter in a standard enlarges the scope for prosecution even though they are not risk based nor meet consumer expectation. Every parameter analysed – relevant or not – requires a cost and should be measured for benefit before release.

Lastly, once made, no one attends to a standard, and even if businesses wish to improve upon it, the task of resetting parameters is laborious. Standards should be reviewed not merely for change in parameter values but validatedfor purpose and its upholding value. If these are not forthcoming, the standard should be abandoned. There is an invitation for serious discussion on the overabundance of standards with each examined for achievement of its stated goal, if any.

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ROLE OF PROTEIN IN SATIETY AND WEIGHT MANAGEMENT

AUTHOR
Dr Agatha Betsy,
Head,
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Prolicious, Samyog Health Foods

Satiety is defined as the feeling of being satisfied or feeling of fullness with the food we eat. This sense of satisfaction enables us to hold on for some time without feeling to eat again or crave for food. People of the newer generation not only eat for nutrition and hunger but also for enjoyment and other cues.

During such episodes, frequent feeling of satiety is important to restrict overeating leading to overconsumption of calories and in turn obesity (Joseph 2018).

Important hormones playing significant role in satiety managements are Leptin and Ghrelin. Leptin decreases hunger sensations and ghrelin on the other hand increases them (Westerterp-Plantenga et al., 2012; El Khoury et al. 2006). Adopted from: *The Importance of Satiety: How It Controls Food Cravings (nutritionadvance.com)*

Macronutrients have varied effects on satiety signals in the human body.

Amongst all the macronutrients, Protein plays the most important role in maintaining satiety. Protein is a macromolecule made up of amino acids as their basic building blocks (Satyanarayana & Chakrapani, 2013). Protein has a wide range of functions and benefits in human body like bone and muscle development, immune functions, endocrine functions. A secondary effect of these functions is manifested as weight management and satiety. Hence, an ideal required amount of protein should be consumed every day to maintain normal protein levels in the body, mainly because they are stored in the human body.

Requirements of proteins

The Recommended Dietary allowance to prevent protein deficiency for an average sedentary adult is 0.8gms/Kg Body weight. ICMR recommends a wide range of dietary requirements for various age groups and physiological conditions (NIN 2020). Protein requirements shoot the highest among adolescents (16-18y boys). Ideally, 10- 30% of the total calories should come from protein. If our total calorie needs are 2000K.cal,

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then about 200-700 calories should come from protein (50-100gms protein per day).

Protein and Satiety

Dietary sources of protein (both vegetarian and non-vegetarian) have increased capacity of maintaining high satiety level as compared to carbohydrates and fats. A higher dietary protein intake increases levels of the hormones that help maintain satiety in turn helping decrease levels of the hunger hormone. By replacing carbohydrates and fat with protein, it helps to boost levels of hormones that maintain satiety (Westerterp-Plantenga et al., 2012, Astrup 2005).

Higher dietary protein intake reduces appetite thereby making us consume lesser calories (Yancy et al. 2004; Westman et al. 2002). High dietary protein intake can reduce hunger and appetite via several different mechanisms. This in turn helps to reduce total calorie intake of individuals. As a result, people end up eating lesser calories throughout the day without counting calories and controlling portion sizes. (Joseph 2018). Research has shown that when people increase their dietary protein intake, they tend to consume fewer calories (Joseph 2018; Izadi et al. 2014). Mechanism of Calorie control on High Protein diet — the concept of calorie reduction works on a meal basis, as well as a controlled daily reduction in calorie intake provided protein intake is kept high consistently.

A general energy distribution from macronutrients is about 45-55% from carbohydrates, 15-30% from fats and 12-20% from proteins. Indians consume a very high amounts of carbohydrates (65-80%) and very low amounts of proteins. However, when protein constitutes 30% energy in daily diet, it helps people to achieve reduction in total calorie intake (Gosby et al. 2014; Gosby et al. 2011). This sometimes has been clubbed with low carbohydrates (30g/day) (Westman et al. 2002).

Other set of studies have shown that high proteins (20%E) with normal carbohydrates (50%E) and fats (30%E) could improve metabolic parameters.

This suggests that weight management depends more on higher amounts of proteins than on lower amounts of other nutrients. The same is also recommended for accurate management of diabetes either as remission during early stages or prolonging the onsets (INDIAB study, 2022). Inherently, high protein diets not only have an important role in metabolism but also in minimizing satiety, making it much easier to reduce calories compared to lower protein diets(Westerterp-Plantenga et al., 2012).

Dietary Protein and Appetite control

High-protein diets make us feel full for a longer time when compared with the ones constituting low protein foods. This, therefore, makes it easier to limit calories on a high-protein diet. Protein also helps in controlling binge snacking. Food cravings are ones worst enemy. Food cravings are of the important reasons for failures in following dietary routines.

People who tend to gain weight experience cravings so they snack and uncontrolled snacking leads to overeating. This snacking adds to extra calories with the total calories consumed throughout the day.

Dietary proteins play a very important role in the body. Some of the important functions of protein include synthesis of other body proteins, controlling body temperature, controlling blood sugar levels and satiety. However, these processes are most distinct when the protein intake is above the dietary reference intake (20-30%E).

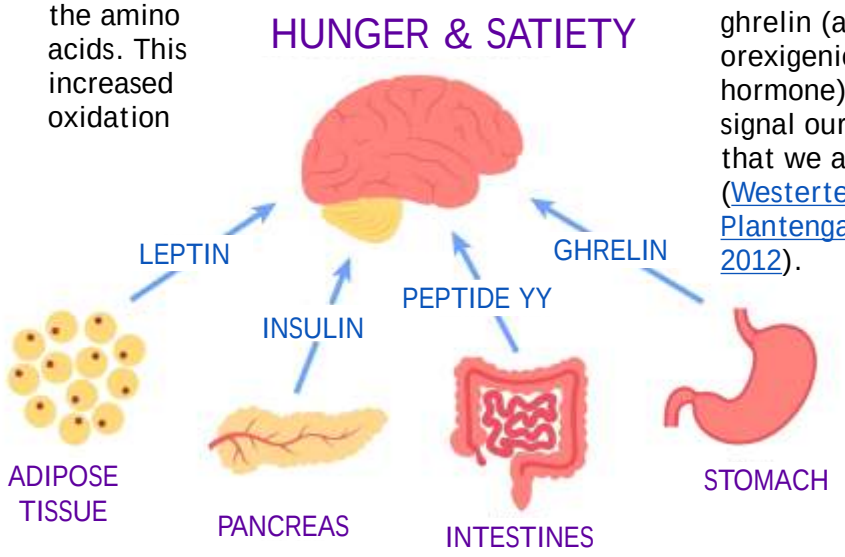
People who follow a high-protein diet, with 30 % of the calories coming from protein (Beaudry & Devries 2019), eat less compared to people who have a normal protein intake. Protein-rich foods include fish, chicken, beans, pulses and lentils, meat, eggs, dairy products, etc. When we eat protein, its building blocks, called amino acids, need to get digested.

A higher intake of protein increases the amount of amino acids in gut thereby increasing process of digestion, or oxidation, of the amino acids. This increased oxidation helps in boosting sensation of feeling full (Westerterp-Plantenga et al., 2012).

Satiety and short-term High Protein Diet

Satiety is important to induce a negative energy balance leading to increase in fat free mass. Short-term satiety is also improved with a meal that has a high protein content. Satiety is highly stimulated after consuming a high protein meal in comparison to low protein meals, even if both high protein meal and low protein meal provide same amount of calories.

This is because dietary protein stimulates secretion of satiety hormones (GIP, GLP 1), reduce the secretion of ghrelin (an orexigenic hormone) that signal our brain that we are full (Westerterp-Plantenga et al., 2012).



Protein Satiety and Diabetes

The prevalence of pre-diabetes (PD) and type 2 diabetes (T2D) has risen dramatically in recent years affecting millions of adults worldwide. There are 77 million diabetics and India is the Diabetic capital of the world. The risk of T2D increases with age, with the sharpest rise in diagnosis occurring after the age of 40 years.

With age, there is also a progressive decline in muscle mass starting after the age of 30. The decline in muscle mass and function due to aging is termed sarcopenia and immediately precedes the sharp rise in T2D. A current discussed the role of protein to attenuate declines in muscle mass and insulin sensitivity to prevent T2D and sarcopenia in aging adults.

The current ICMR recommended dietary allowance for protein consumption is set at 0.8 g/kg/day and is based on studies on young healthy men and may not be sufficient for older adults. Protein consumption upwards of 1.0–1.5 g/kg/day in older adults is able to induce improvements in glycemic control and muscle mass (Gosby et al. 2014, Gosby et al. 2011).

Effect of high protein diet on Blood glucose

A high-protein diet lowers blood glucose post-prandially in persons with type 2 diabetes and improves overall glucose control.

However, longer-term studies are necessary to determine the total magnitude of response, possible adverse effects, and the long-term acceptability of the diet (Beaudry & Devries 2019; Gannon et al. 2003).

Weight loss and High Protein Diet

High protein diets have been shown to be potential in weight loss as well. A diet is high in protein if it contributes to about 20% energy. High protein and low carbohydrate diets are efficacious in weight management. After weight loss from an energy-restricted diet, enhancing the protein intake also increases the chance of maintaining the new body weight.

Weight loss induces a decrease of energy expenditure, but an enhanced protein intake spares fat-free mass, which inhibits this decrease. Proteins also induce thermogenic effects to foods which in turn, uses energy for utilization and hence provides a negative energy condition (Moon & Koh 2020).

A protein intake of more than 35% of the total calorie intake has not been shown to give any additional effect on weight loss. Therefore, it is imperative to eat a well-balanced meal comprising of all macronutrients in appropriate proportions of AMDRs (Adequate Macronutrient Distribution Range).

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Several clinical trials have found that consuming more protein than the recommended dietary allowance not only reduces body weight (BW), but also enhances body composition by decreasing fat mass while preserving fat-free mass (FFM) in both low-calorie and standard-calorie diets.

Fairly long-term clinical trials of 6–12 months reported that a high-protein diet (HPD) provides weight-loss effects and can prevent weight regain after weight loss (NIN 2020)

Protein Specific Appetite

A protein-specific appetite purportedly exists to maintain protein requirements and to prevent excess protein consumption (El Khoury et al. 2006).

This concept is summarized by the protein leverage hypothesis, which suggests that a protein-specific appetite will stimulate the drive for increased food intake when the protein density of the diet is limited but will reduce intake of diets with higher protein density (Moon & Koh 2020). This hypothesis suggests a mechanism linking dietary protein intake and energy balance.

In conclusion, an appropriate amount of protein should be included in regular diets to fight the deficiency, match up the physiological functions in normal humans and to provide added benefits for people with modified physiology as in case of obesity and diabetes.

COMING EVENTS

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International Conference on Nutrition & Health (ICNH)
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DIET AND NUTRITION FOR IMMUNITY

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Immunity is capacity of the body to fight against infections-bacterial, viral and parasitic. Human body possesses two types of immunity-innate immunity which is present in the body from birth, and adaptive immunity which the body procures from environment upon exposure to pathogens either through naturally occurring infections or through vaccines.Weak immune system increases proneness to infections.Also pre-existing clinical conditions such as Cancer, uncontrolled diabetes, fevers etc., impair immunity of the patients and increase their susceptibility to infections.

Every physiological system in the body needs good nutrition to function at its optimum level. Immune system is no exception. The relationship between nutrition and impaired immunity or infection is a vicious cycle (Bapat et al, 2015) (Figure-1). Poor nutrition impairs immunity and infections affect the individual's ability to consume, digest, absorb and assimilate food. Both macro (Carbohydrates, lipids and protein) and micronutrients (Vitamins and minerals) are required for immunity.

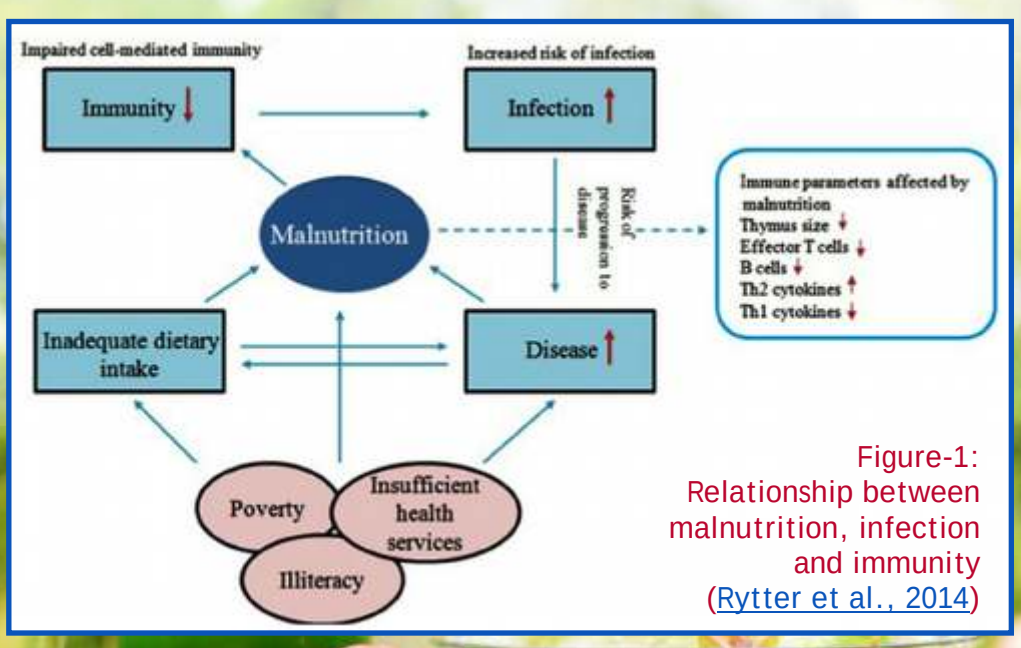

Figure-1: Relationship between malnutrition, infection and immunity (Rytter et al., 2014)

Severe protein and energy deficiency was found to impair immunity and increase susceptibility to infections. India is currently going through triple burden of malnutrition which includes energy intake exceeding or lower than the recommended allowance along with micronutrient deficiency. Micronutrient deficiencies were implicated in low phagocytic activity, NK cell activity, DTH, antigen-specific antibody production, and the proliferative response of T cells (Shuichi Kaminogawa & Masanobu Nanno, 2004).In addition to nutrients, other food constituents that could positively influence our immune system are phytochemicals and probiotic organisms. The role of foods and nutrients in immunity has been discussed below.

Role of foods in immunity:

Cereals and Legumes

Whole grains including cereals, millets (Whole wheat, Brown rice, Millets-Ragi, Jowar, etc.,) and legumes (Moong, Rajma, Chana etc.,) are good sources of dietary fibre, protein, vitamins and minerals. As prebiotic foods, they help in the survival and maintenance of gut microbiota. The dietary fibre is fermented by gut microbes and produce short chain fatty acids along with certain vitamins (Vitamins Folic acid and B12) in the gut. These products, especially the butyric acid exhibit immune properties locally in the gastrointestinal tract as well as in other parts of the body. Moreover, whole grains contribute to immunity upon fermentation due to the accelerated antioxidant capacity.

Fruits and vegetables

Fruits and vegetables are rich sources of several micronutrients and phytochemicals all of which contribute to immunity. Vitamin C, Vitamin K, Folic acid and Magnesium are the immuno nutrients present in variety of fruits including berries, citrus fruits etc. Flavonoids, Carotinoids and Polyphenols function as antioxidants that can neutralise the impact of pathogens in the body (Farheen 2022). Consumption of whole fruits is advised to enjoy the benefits of multiple immunonutrients and phytochemicals simultaneously. For example, the antioxidant flavone, Hesperetin is present in the peels and albedo (white portion) of citrus fruits, and the flavonoids- rutin and quercitin are present in the pulp of Amla (Indian Gooseberry). Hence consumption of whole fruits would offer more health benefits than juices. Kiwi fruit has been found to reduce the upper respiratory tract infections due to its high vitamin C and phytochemical content (Skinner et al, 2013).

The immunity boosting components in vegetables include carotenoids, Folic acid, Vitamin C in Spinach; isothiocyanates and quercetin in Broccoli; minerals and phenolic acids in sweet potato; Lycopene in Tomatoes etc. The antimicrobial effect of Moringa leaf extract on E.coli, , S. typhi and P. aeruginosa has been well documented (Abalaka, et al. 2012). Consumption of moringa leaf powder effectively boosts immunity (Soni & Kumar 2021). Fermented cabbage and cucumber were found to reduce the mortality from COVID-19 by 11-13.6% due to their increased antioxidant potential (Fonseca et al., 2020).

Nuts and oilseeds

The mono and poly unsaturated fatty acids, good quality protein, variety of minerals and bioactive substances present in Almonds, cashews and walnuts promote immunity. The pistachio nuts are rich sources of immunonutrients such as Vitamins E, K, B2, B6, Folate and minerals such as copper, Zinc, Selenium etc. Pumpkin seeds are reported to be effective against parasitic, bacterial, and viral infections due to the variety of phytochemicals they possess. The lipid soluble lignans present in Sesame seeds/oil has been reported to improve immune response of the body (Farheen et al., 2022). Moreover, several nuts and oilseeds are also prebiotic foods.

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Spices and condiments

Spices and condiments have been used as an integral part of treatment for various infections in our ancient ayurvedic system of medicine. In every household, these are used as natural remedies in several infective diseases. Ginger, Garlic, Cloves etc., have proven antibacterial and antiviral effects (Mishra et al. 2020).The commonly used spices Turmeric, Ajwain, Black pepper, cinnamon, Cloves, Garlic, star anise and Cardamom have been proved to be effective against all varieties of microorganisms. Though their extracts containing concentrated amounts of the active components are more effective, regular inclusion of some of these spices in the diet would be certainly beneficial to health (De, 2020).

Traditional foods/Functional foods

India has a rich culture of fermented foods such as Idli, Dosa, pickles, dhokla, cereal/millet/soy beverages, fermented milk products e.g. curd, shrikhand etc., consumed across various communities, rural, tribal and urban regions. Most of these are fermented foods. Fermentation of the ingredients gives rise to development of various immunomodulatory, antioxidant, antimicrobial components. The fermented foods are also good sources of bioactive peptides and micronutrients (calcium, B-vitamins) which are designated as immunonutrients/ immunoboosters (Sen et al. 2021).

Role of nutrients in immunity:

Carbohydrates

Role of carbohydrates in immunity and inflammation is slightly complex. Glycoproteins, glycolipids and free polysaccharides present in the cell membrane are documented to facilitate adaptive immunity. Membrane carbohydrates in the intestinal mucosal cells can help in recognising the pathogenic bacteria and function as local barriers against pathogens (Cobb & Kasper, 2005; Kato & Ishiwa, 2015).

Lipids

The role of PUFA especially omega 3 fatty acids (EicosaPentaenoic acid and DocosaHexaenoic acid present in oily fish) in immunity and inflammation has been well documented. They improve fluidity of cell membrane and facilitate phagocytosis while inhibiting the production of proinflammatory substances such as cytokines. Omega 3 FA aid in production of anti inflammatory substances (protectins, resolvins and maresins) where as omega 6 FA promote production of pro inflammatory cytokines. However, excessive consumption of omega 3 FA is contraindicated as it may increase oxidative stress. Hence consumption of an oil/ combination oil with healthy composition of PUFA:MUFA:SFA

contributes to our immunity.

Protein

Proteins are building blocks of every cell in the body including immune cells. Antibodies too are protein in nature.
Some non-essential amino acids e.g. arginine and Glutamine are considered conditionally essential during physiological stress including infections as they stimulate the production of antimicrobial substances such as nitric oxide besides stimulating antibody synthesis. Therefore, consumption of good quality protein on a daily basis which contains all the essential amino acids is necessary for strong immunity.

Vitamins and Minerals:

Micronutrients are very essential to maintain immunocompetence against infections. Among micronutrients, vitamin A, vitamin D, Vitamin E, C, B6, Folic acid, both fat-soluble and water-soluble vitamins play crucial role in immunity. Vitamin A stimulates T and B cell proliferation thereby facilitate antibody mediated immunity. Supplementation of vitamin A along with Zinc controlled infective diarrhoea in children who are deficient (Khan & Sellen 2011).

Vitamin D and vitamin C strengthen body's immunity against viral infections in particular respiratory infections such as COVID-19. Regular consumption of Vitamin D supplement by persons with insufficient and deficient status has been reported to improve body's ability to fight against viral infections and also to recover fast from the impact of infections (Philip C Calder, 2022). Vitamin C and Vitamin E perform dual role as antioxidants as well as anti-inflammatory nutrients, and proved to be more effective in people who experience high levels of physiological stress during infections.

Supplementation of adults and children suffering from common cold with Vitamin C in therapeutic doses (4-8g/day) was found to reduce the duration of cold significantly (Hemila H and Chalker E., 2013; Ran et al. 2018). Folic acid and vitamin B12 are required for the synthesis of lymphocytes and their differentiation, thus playing an important role in immunity.

Among minerals, those with antioxidant properties i.e. Zinc, Copper and Selenium in the body are prioritised for supplementation during infections. In addition to its antioxidant ability, Zinc is also required for the synthesis of over 200 enzymes involved in the metabolism of nutrients and nucleic acids. Thus, Zinc facilitates integrity of our immune system (Mishra et al. 2020).

Role of probiotics, prebiotics and synbiotics in immunity:

Human gastrointestinal tract contains around 10^{14} bacteria involved in various biological processes. The inter relationship between foods/nutrients, gut microbiota and immunity is crucial to maintain the immune response of the body against pathogens. Nutritious food is required to maintain gut integrity and Healthy mucosal membrane offers strong physical resistance to infections.

Table-..: Modulation of immune functions by Major food derived substances

Nutrients/nutricines	Immune-modulating functions
Nutrients/calorie	Indispensable for normal development of immune system
Amino acids	
Glutamine	Trophic for immune cells, circumvention of oxidant stress
Arginine	Substrate for synthesis of nitric oxide, enhancement of Th cells
Fatty acids	
n-3 PUFAs	Anti-inflammatory
Vitamins	
Vitamin A	Regulation of Th1/Th2 balance
Vitamin C	Circumvention of oxidant stress
Vitamin E	Circumvention of oxidant stress, anti-inflammatory
Minerals	
Selenium	Stimulation of cell-mediated immune response
Zinc	Stimulation of cell-mediated immune response
Nucleotides	Stimulation of cell-mediated immune response
Probiotics	
Peptidoglycan, lipoteichoic acids	Stimulation of IL-12/ IL-10 production
CpG oligonucleotides	Anti-inflammatory

(Shuichi Kaminogawa1 and Masanobu Nanno, 2004)

Probiotics, according to a consensus definition, are 'living micro-organisms, which upon ingestion in certain numbers, exert health benefits beyond inherent basic nutrition' (de Vrese & Schrezenmeir 2008). Probiotic organisms attach themselves to the pathogen and prevent its contact with mucosal cells in the gut. In addition, they stimulate the gut associated lymphatic tissue and protect the gut from bacterial and viral infections.

Probiotics are reported to reduce the severity of respiratory and urinary tract infections. The benefits of probiotics are strain specific e.g. Lactobacilli were proved to offer protection against respiratory viral infections. The anti-microbial benefits offered by the Gut microbiota extend to lungs via gut-lung axis which is bidirectional. However, higher dose of probiotics ($\geq 10^6$ to $\geq 10^8$ cfu per gram) would be required in infections to exhibit the antimicrobial benefits (Cencic & Chingwaru 2010).

A prebiotic is "a selectively fermented ingredient, or a fibre that allows specific changes, both in the composition and/or activity of the gastrointestinal microflora, resultantly conferring benefits on the well being and health of host "(de Vrese & Schrezenmeir 2008). The criteria for a prebiotic is completely fulfilled only by the bifidogenic, non-digestible oligosaccharides (particularly inulin, its hydrolysis product oligofructose, and (trans)galacto-oligosaccharides).

Nutrients in foods including proteins or peptides, unsaturated fatty acids, micronutrients and macronutrients also demonstrated prebiotic properties. A synergistic combination of pro- and prebiotics are called symbiotic (yoghurt, probiotic enriched dry fruits/nuts c.,). They offer indirect health benefits by supporting the growth of probiotic organisms. Probiotic organisms produce shortchain fatty acids (SCFA-acetate, propionate and butyrate) along with Folic acid and Vitamin B12 by fermenting the complex carbohydrates present in the prebiotic foods/food components. The SCFA exhibit antioxidant, anti cancer and anti-inflammatory properties that are highly beneficial to the host. Bioactive components and Phytochemicals can exhibit prebiotic like benefits may inhibit pathogenic bacteria while stimulating the growth of beneficial bacteria, exerting prebiotic-like effects.

However, malnutrition affects the composition of gut microbiome and causes dysbiosis (movement of gut microbes from large to small intestine) which increases gut permeability making it more susceptible to infections. High simple carbohydrate/sugar and high saturated fat/red meat diets promote dysbiosis. Hence consumption of low salt low sugar foods help to maintain our gut microbiome besides offering other health benefits.

Role of Nutraceuticals/ phytochemicals/functional foods

Foods contain several bioactive nutritional and non-nutritional constituents with immense health benefits. These are called nutraceuticals and include individual nutrients and phytochemicals such as Resveratrol, Flavonoids, Saponins, Lutein and many more.

Conclusion

The recent pandemic has sensitized population towards the need for strong immunity and the importance of diet towards the same. The natural way of strengthening our immunity is regularly consuming a healthy diet composed of variety of nutritious foods possessing immune boosting nutrients, bioactive substances and phytochemicals. In addition, following a healthy lifestyle helps us to maintain healthy gut microbiome that would help us prevent and/or fight against infections..

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IMPORTANCE OF SPORTS NUTRITION TO SPORTSPERSONS AND OTHERS

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It was long established that good health depends on good nutrition to a great extent. Now the impact of good nutrition on sporting performance has been accepted as science namely Sports Nutrition. It is not just for the professional athletes and sportspersons competing at various events and matches but even a weekend sports player and a dedicated daily exerciser would find great improvement in performance due to nutritionally adequate diet with greatly enhanced results.

This realisation is not just among the professionals and the manufacturers of sport nutrition products but also in laypersons who realise that they need to drink fluids and nutrients while preparing and performing the sports or any physical activity. This realisation has greatly increased the market for such products.

Future Market Research has indicated that global sports nutrition market was over US $ 19 billion in 2021 and increasing at CAGR of 9.3%. Growth is spurred by North America especially USA followed by Europe and Asia. Large demands are expected from India and China. Another research company estimated even higher market size of US $ 40 billions in 2021. The growth rate for coming decade is expected to be 8.6% due to increasing demands for sports supplements, drinks & foods, meal replacement and weight loss products. There was a big 35% decline during Covid pandemic but it has recovered and market is growing.

Indian market is very small, about Rs 1,300 crore (over US $ 160 million), but is rapidly growing at 22.8% CAGR (Mariwala 2021). Indian market contains products like supplements, sports drinks, energy bars and protein powders. The bulk is made of protein supplements containing whey protein and protein isolates. Pandemic actually helped create awareness of immunity and its impact on health, which boosted the sales of supplements.

Need for Sports Nutrition

(Sporting Performance 2022) The energy and nutrients needs of a person increases when he or she starts becoming physically active. Walking and running need

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much more energy than standing, sitting or sleeping. Some of the sports are more vigorous physically e.g. basketball or soccer compared to others such as cricket. A short sprint of say 100 metres may need large amount of energy for a short period of time whereas long distance race may need energy less intensely but for a much longer duration.

There are other considerations like loss of water from body due to perspiration during sports, which can cause dehydration with consequent problems unless this water is not put back by drinking especially during longer events.

Many vigorous sports puts a lot of strain on muscles and after the event there is a need for repair of various tissues. This needs nutrients that help in repair of wear and tear that may have taken place. Training period is very important as it not only helps train body to utilise the stored energy but also proper nutrition helps create optimum stores of nutrients needed during the sporting event. Some events facilitate intake of nutrients during the event but in some this may not be possible.

Sports nutrition is the science that studies all these aspects and guides the nutritionists and trainers about the times and amounts of nutrients to be given to sportspersons considering the type of sport, intensity and duration of the event, weight and age of the individual, environmental conditions and other such considerations, all of which may affect the needs for nutrients. Proper nutrition will not only enable the person to remain healthy during and after the event but also will allow most efficient performance.

Carbohydrates

As any physical activity needs extra energy to perform, carbs become quite important. After absorption, the carbs are digested to sugars, mostly glucose, which is either utilised for energy or stored in liver or muscle as glycogen. This glycogen may be utilised when needed by body for energy. If there is restriction of carbs then ability to store the amount of glycogen would be limited and would affect the athlete's ability draw energy for intense physical as well as endurance sports. This may also result in muscle protein and tissue as body may start breaking down body protein to meet energy needs.

Carbohydrates in diet will depend on the needs for fuelling as well as recovery from the sports and will increase with intensity and duration of the sports. Carbs are primary fuel used by physically active muscles so adequate intake is necessary to prevent muscle fatigue (Whitton 2022).

Glycemic index (GI) is quite important for athletes. Although GI of carbs in a diet with adequate total carb and energy intake may not greatly impact the sports performance, timing of ingestion of carbohydrate foods with different GI around exercise may be important. Low GI foods may be useful before exercise to provide sustained release of energy while moderate and high GI foods may be beneficial during exercise and recovery period.

When the physical activity of exercise lasts over an hour, carb intake to maintain the glucose level and avoid fatigue is necessary. Several options are available in form of sports gels, sports drinks, sports bars or sandwiches among other things. The intake should be regular throughout the activity. Consumption of fluid like sports drink, diluted fruit juice or water is also very important during prolonged activity to avoid dehydration.

Replacement of glycogen soon after the exercise is important. If there is another session of exercise within a few hours then it is better to choose high GI carb for replenishing. Along with it, it is better to replenish the loss of fluids.

Proteins

These also play an important role post-exercise recovery and repair. Generally most athletes meet their proteins needs along with sufficient energy requirements in diet. Amount of protein needed would be slightly higher than that is recommended for general public and active people, who are recommended about 1g per kg body weight. Non-endurance events may require slightly higher may be up to 1.2g. However, those in endurance like long distance events as well as strength events like weight lifting may need up to 2g per kg. Even those athletes trying to lose weight may need more.

Although the needs of proteins is high in certain sports activities involving endurance and in strength events as well as for building muscles, for other sports a slight increase in protein may be enough. Most endurance athletes are aware of high carb requirements but importance of protein, daily intake as well as immediate consumption after the event, may not be known. It is very important to consume protein to improve recovery, alleviate muscle damage and maintain muscle mass. (Vitale & Getzin, 2019) Excess protein intake in diet is not only quite expensive but may also impact bones and kidney function.

Importance of Nutrients

Well-planned meals containing all the vitamins and minerals would be adequate to meet all the requirements of sports nutrition. Supplementation will be necessary if there are deficiencies found such as of iron and calcium. Nutritional supplements can come in many forms e.g. tablet, capsule, powder or liquid. They may contain vitamins, minerals, botanicals and phytochemicals.

Athletes take supplements. A few may merit in endurance sports. Nitrates help reduce oxygen cost and delay exhaustion. Antioxidants may help recovery specially in multi-stage events. Caffeine helps provide energy but has side effects. Probiotics are helpful in upper respiratory and gastro-intestinal symptoms especially prevalent in endurance sportspersons.

There are many other supplements but some may be restricted. It is always better to consult certified trainer or better a registered health professional, as there may be some restricted substances in some supplements that may not be permitted by sports authorities. (Vitale & Getzin, 2019)

Many supplements are made by responsible manufacturers, some supplements may contain dangerous and undisclosed ingredients including steroids, stimulants and other dangerous drugs. Some consumers may want to maximise sport performance and may go to these substances with very attractive claims. (Nutrition Guide USADA 2022)

Importance of Hydration

Any sports activity can make the sportsperson perspire with substantial loss of water along with minerals especially sodium and potassium from body. This dehydration may impair sports performance, if not replenished promptly and in severe cases, could lead to collapse or even death.

Exercising raises body temperature, so body tries to cool it by sweating. This results in loss of water and salts through sweat. Sweating depends on intensity and duration of exercise as longer and higher intensity sports cause more sweat loss. Hot and humid conditions make people sweat more. Warmer or more clothing causes quicker sweating. Some people are genetically more prone to sweating. Average sweating rate is between 0.5 to 2 litres per hour during exercise and if this is not replaced, person may quickly undergo dehydration.

Dehydration can cause tiredness and affect physical performance by reducing strength and aerobic capacity. Therefore, it is very important for sportspersons to stay hydrated during as well as after the event.

Water is suitable for short duration events but having some sodium help absorb water. Excess hydration should be avoided as it thins out blood leading to seizures and other problems. Sports drinks contain carbohydrates, commonly glucose along with electrolytes like sodium and potassium. They improve endurance performance and recovery. (BNF 2020)

Future

Lately sports are becoming very popular among all ages. People not only want to watch but they would like to participate in sports activities. People are realising that physical activity is very important for remaining healthy. Therefore, either they play sports or they try to remain physically active by going to gym or go for walks and jogs.

People have also realised that sports and physical activity also require proper nutrition so they not only perform well but they get the maximum out of physical activity for health.

Sports nutrition has become a big industry and is growing rapidly. With plenty of research being carried out to support, the science of sports nutrition is maturing. This not only supports intense competition in sports but also helps sportspersons to perform at their best and also remain healthy and with minimum damage even during the intense and/or endurance sports as well as during the training and recovery periods.

As the science progresses, newer ingredients and substances would be found to be supporting the sports activities. These need to be investigated for safety and efficacy and also should be approved by sports authorities. There is also emerging concept of personalised sports nutrition (Guest et al. 2019) that would be useful as there are differences in individuals due to genetic differences. Their needs would vary depending in their differences in muscle strength, skeletal structure, heart and lung size, tendon elasticity etc.

As the science of sports nutrition develops and newer substances appear for better performance, there is also need for involvement of sports nutritionists and medical supervision that should not be overlooked by sportspersons and especially those who play sports or undertake physical activity just to keep themselves fit. Without this, there is likelihood of harmful consequences if the nutrients are not consumed as per the needs.

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NUTRIENT ABSORPTION THROUGH SKIN

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Nutrient absorption in skin can happen through two ways. One is through topical application while the other is oral ingestion that is nutrient absorption through food. Nutrition plays an important role in maintaining skin health. Skin is exposed to various external factors like environment, genetics and nutritional contributors. Without proper nutrient delivery, many skin surface issues can arise. Nutrients in skin come from consuming many vitamins and minerals. The delivery method of nutrients plays an important role in absorption of nutrients.

Pathways through which chemicals enter into skin:

1. Intercellular Absorption:
Ingredients can absorb through the “glue” between cells of the stratum corneum. The intercellular lipid material is made up of ceramides, cholesterol, cholesterol esters, and fatty acids. Oils have a good chance of absorbing this way while water based ingredients are repelled since oil and water do not mix well.

2. Intracellular Absorption:
The second absorption route is through the dense, functionally dead cells of the outermost layer of the skin, the Stratum Corneum. This layer of skin is 15 to 20 layers thick.

3. Trans-appendageal or Follicular Absorption:
Compounds can enter skin through openings that already exist in your skin as conduits between the lower and upper layers. Pores and hair follicles reach down past the upper layers of the epidermis and into the dermis where blood vessels nourish the skin. Certain types of molecules may prefer the follicular route for skin absorption, so it depends on the type of compound.

When ingredients come in contact with the dermis (second layer of the skin), they reach blood vessels and structural tissues like collagen and elastin. Ingredients make the skin look firm, tight and plump. Compounds circulate into lymph and blood, so the healthier the ingredient the better.

Skin being thinner on the face than the other areas of the body, like hands and feet, ingredients are absorbed more easily into skin when applied to the face and this is why facial skin is more reactive to ingredients.

Topical applications for skin nutrients can be effective

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depending on the type and method of application. Topicals for the skin must be formulated correctly in order to be absorbed properly. If the filters are poorly bonded, the sunscreen is easily degraded by skin enzymes. Topical applications on skin have been demonstrated to improve overall skin health. Popular

Skin absorption

supplements like hyaluronan and biotin have been used to strengthen and improve skin. It is important to maintain moistness in the skin tissues. Ingested hyaluronic acid positively affects knee joints and skin. Intake resulted in a significant increase of skin moisture and improved dry skin on the whole body and face.

Certain vitamins like vitamin C are absorbed better through topical application rather than internally. The level of vitamin C attained in the skin with an oral vitamin is 20 to 40 times lower than a topical application. Vitamin C can provide additional UVB protection in a sunscreen formulation. Topical application of vitamin E oil works well to unclog pores which results in fewer breakouts. Probiotics have also been incorporated in topically applied products. Probiotics not only relieve skin conditions such as acne, but can reduce inflammatory conditions like eczema and rosacea.

Topicals are crucial in wound healing. When the skin repairs itself, topicals containing vitamins help smooth out the healing areas and relieve associated pain. Micro and macronutrients work together to maintain the barrier functions of skin in the face of challenges. Lack of vitamin A can cause or worsen conditions like acne, wound healing and photo-aging. Lack of vitamin B12 can result in hyper-pigmentation or vitiligo. An excess of vitamin A can cause shedding of skin or an excess of beta-carotene can cause yellowing of skin. Hence, it is important to have balanced nutrition, as both the lack and excess of vitamins can cause skin issues.

Studies have demonstrated that there is a relationship between nutrition and skin health. Milk and dairy products have an aggravating effect in acne pathogenesis.[2] Milk was the most commonly implicated food in acne flares. Acne has been positively correlated with intake of milk, particularly skim milk, instant breakfast drink, sherbet and cottage cheese, all dairy products with elevated plasma insulin concentrations. Atopic dermatitis has also been positively correlated with the intake of macronutrients and micronutrients. Dietary supplementation with blackcurrant seed oil reduced the prevalence of atopic dermatitis. Psoriasis, an inflammatory condition is aggravated by an inflammatory diet.

Inflammatory diet consists of foods one is allergic to or foods unbalanced in omega-3 and omega-6 fatty acids. Hence, diets like low protein diet, are recommended for someone with psoriasis. Correlation between skin colour and fruit/vegetable consumption has also been studied. Consumption of three portions of fruits and vegetables for six weeks showed a difference in both the yellowness and redness of the skin. A decrease in lightness of skin was also observed.

Novel Technology for nutrient delivery on skin

Novel delivery formats via skin could result in improved compliance in nutritional intake, and lower incidence of nutrient deficiencies in India. Researchers at IIT-B have developed a first of its kind technology to deliver multivitamins and other nutrients (including vitamin B12, vitamin D, folate and iron) into the bloodstream through application on skin.

Dr.Rinti Banerjee, head of IIT-B's department of biosciences and bioengineering has developed a technology to offshoot this problem through development of cosmetic products including body lotion, facemasks and lip salves, which could be used to deliver these nutrients. The massaging action would enhance the delivery of these nutrients. Her team's objective was to address nutrient deficiencies in expectant mothers – who need to tend to folic acid and iron. The technology used takes care of interaction with the outermost layer of skin- the stratum corneum, which acts as a barrier and prevents substances from entering the body through the skin.

The nutrients however, in this technology are encapsulated in a way, which allows them to pass through this layer. The technology uses tiny liposomes- vesicles containing a lipid found in soybean and a naturally occurring unsaturated fatty acid – with which the research team developed a formulation consisting of flexible, biodegradable nutrient rich soft materials, which were stabilised into nutrient-rich soft materials.

These materials allow the nutrients in these products to interact with barrier lipids in the uppermost layer of the skin creating temporary gaps, which then allow them to pass through the rest of the skin layers. Commercialisation of these oils could lead to major improvements in public health. The research team is able to come up with some similar formulations containing higher doses of multivitamins and iron. This could be used a preventive product which contributes to overall well being.

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3. Nutritional skincare solution? Scientists hope novel vitamin delivery system could improve public health in India

4. Can skin absorb that? Everything you want to know about skin absorption of chemicals from cosmetics

GERMINATION IN FOOD PROCESSING

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Cereals and pulses are great sources of macronutrients, micronutrients, & phytochemicals. However, the bioavailability of these nutrients is less as the different components interact with each other internally in the food matrices resulting in formation of insoluble components. Formation of these insoluble components reduces the bioavailability of the nutrients. So, for increasing the bioavailability of nutrients various methods have been implemented. Germination can be one such effective way. It disrupts these internal interactions and increases the availability of nutrients. Hence, germination is considered as a green processing technology.

What is germination?

Germination or commonly known as sprouting is a non-thermal process and a house hold practice in India. It is a very simple process, grains are soaked in the water and then the water is removed and grains are allowed to sprout. Various factors like light, soaking time, temperature affect the germination process.

A grain is a dried seed of cereals consisting of embryo (germ), endosperm, and the coat of fruit (pericarp). When grains are exposed to optimum moisture content they imbibe the water resulting in rehydration of grain and expansion of cells which ultimately reactivates the grains metabolism that leads to biochemical, organoleptic and nutritional changes (Ikram et al., 2021; Idowu et al., 2019).

Many studies have also shown that germination increases the nutrient content and bioactive compounds in many cereals. Sprouting also degrades the antinutritional factors. Macronutrients like carbohydrates, proteins, fatty acids are reduced in molecular size to glucose, fructose, amino acids and organic acids respectively, thus increasing digestibility.

Effects of germination on nutrients-

Cereals and legumes have a very high nutritional profile with respect to both micronutrients and macronutrients. However, factors like anti-nutritional factors, enzyme inhibitors, and metal chelating agents reduce their bioavailability. So, germination has been proven to be an effective method to overcome these problems.

Germination activates endogenous enzymes. The effectiveness of germination on the digestibility of carbohydrates mainly depends on the release of amylolytic enzymes.

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These enzymes break down starches into simpler sugars resulting in increased digestibility. Germination also increases the fibre content as the macronutrients are broken down and the cellular structure increases.

Fibres slow down the release of glucose from food and also help in achieving satiety. Fibres are fermented by gut bacteria causing formation of short chain fatty acids like butyrate, acetate, which have many physiological functions (Nkhata et al., 2018).

In the case of proteins, the effect of germination can vary depending upon the grains. A study showed that protein levels in green gram, chickpea and lentils increased by 6.1% to 9.7% (Ghavidel & Prakash, 2007) upon germination.

Some studies have also shown a decrease in protein content after germination. A study revealed that sprouted quinoa contained higher amounts of amino acids lysine, tryptophan and methionine, but the total protein content was reduced (Bhatal & Kaur, 2015).

The increase in protein content is mainly because the carbs and lipids are utilized in respiration. In addition, the reduction in protein can be attributed to the proteolysis.

However, germination increases the digestibility of protein, which contributes to the biological value and quality of proteins.

According to a study, the protein digestibility in quinoa and soybean increased upon germination (Rojas et al., 2010).

Germination also helps in increasing the level of bioactive substances. Germination has proven to increase ascorbic acid, total phenolic content and antioxidant capacity in edible seeds like mung beans.

In addition, most of the phenolic compounds like caffeic acid, catechin, ferulic acid, gallic acid and rutin gradually increase upon germination of mung beans (Gan et al., 2016).

Sprouting has also shown to increases the folate content in mung beans and soybeans. Recent studies have proven that germination can increase the content of vitamin C in edible seeds such as buckwheat, lupin, mung bean, soybean, chicken pea, and cowpea when germinated.

Sprouting showed to increase the Vitamin C content up to29 and 27.7 mg/100 g in soybean and mung respectively, which was present in negligible amounts in raw grains (Idowu et al., 2019; Shohag et al., 2012).

Legumes and cereals contain high amounts of macronutrients and micronutrients but also anti-nutritional factors. Major anti-nutritional factors, which are found in edible crops, include saponins, tannins, phytic acid, gossypol, lectins, protease inhibitors, amylase inhibitor, trypsin inhibitors, phytates and goitrogens (Samtiya et al., 2020). Anti-nutritional factors get their name because they combine with nutrients and reduce nutrient bioavailability.

Legumes like soybean contain trypsin inhibitors, which reduce the availability of proteins for absorption by combining with them. Trypsin inhibitor is highly heat stable so thermal process cannot deactivate these compounds. However, germination lowers the level of such proteinaceous antinutritional factors increasing the trypsin activities (Nkhata et al., 2018).

Cereals and legumes have a high amount of minerals. However, due to anti-nutritional compounds like phytic acid their bioavailability is reduced. When phytic acid combines with minerals, they form phytates known as chelating agent. These phytates can be hydrolysed by the action of phytases. Germination has been proven to be an effective method in increasing the activity of phytases and thus reducing the level of phytates.

Mineral availability of different grains upon germination can differ depending on various factors like phytase activation, phytate content, and extent of binding of mineral. (Luo et al., 2014; Ikram et al., 2021; Nkhata et al., 2018)

Utilizing germination in different food products-

Along with improving nutritional profile, germination can also help in improving the functional properties of cereals. These functional properties may vary depending upon the grain. Germination causes fat, sugars and proteins to break down resulting in reduced bulk density. As the germination proceeds, amylolytic enzymes are activated which degrade starch into simple sugars resulting in reduced viscosity. This property is very helpful when designing weaning foods and geriatric foods. Most of the weaning foods are prepared from cereals with high starch and are usually reconstituted with water. Water causes the starches to swell which fills the small stomach of infants quickly. Therefore, infants do not consume enough nutrients. Using germinated cereals can result in reduced viscosity thus making the meal more calorie dense. Same goes for geriatric nutrition. With age our digestive capacity reduces so, including cereals with low viscosity and high digestibility is very useful (Luo et al., 2014).

Breakdown of polysaccharides into simpler sugars provides more sites for interaction to the water resulting in increased water holding capacity.

Apart from polysaccharides, proteins are also broken down during germination causing solubilisation and dissociation of resulting in increased oil holding capacity. Also, due to the changes occurred in protein quality during germination the emulsion stability increases (Siddiqua et al., 2019).

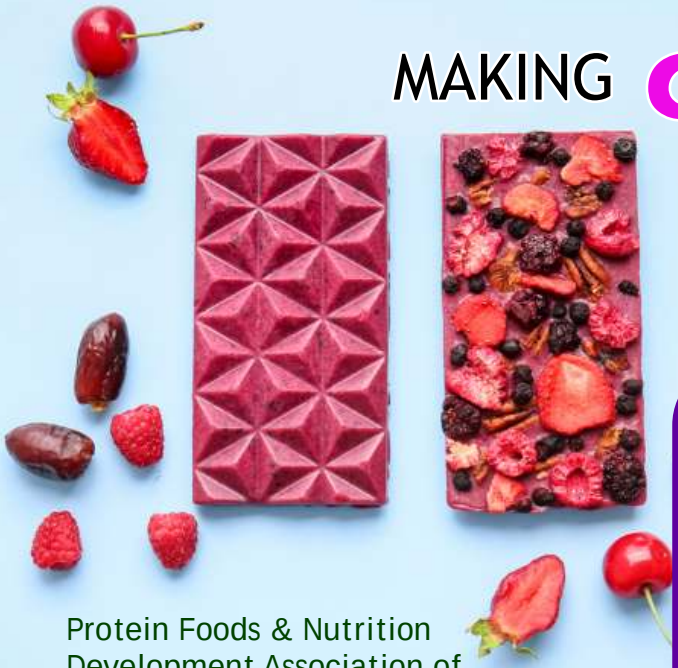
Due to these, functional properties germinated cereals are used in preparing bakery and confectionery products like bread, cookies, and granola bars etc. A study stated that the use of biologically modified preparations including sprouted wheat enhanced the overall sensory attributes of bread at 15% level (Iordan et al. 2013). Also germinated maize and sorghum can be used in the preparation of gluten free products.

Malting is a special form of germination, which involves soaking of grains followed by germination and kilning. Cereals and malt contain oligosaccharides that are derived during the malting process which help in stimulating the growth of probiotic bacteria (Hubner & Arendt, 2014).

The results of germination may vary for different grains but they indeed help in improving the functional properties, bioavailability and digestibility of nutrients.

So, germination can be used as an effective method in improving nutritional profiles of cereals, legumes and achieving desirable functional properties for designing of various food products.

WEBINAR REPORT: MAKING CONFECTIONERY HEALTHY YET TASTY



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Protein Foods & Nutrition Development Association of India (PFNDAI) in association with Avinashilingam Institute for Home Science and Higher education for Women Coimbatore organized a webinar under the Nutritional Awareness Activity (NAA) on the topic "Making Confectionary Tasty Yet Healthy" on 29th July 2022 via Zoom Platform. The NAA was sponsored by Mother Dairy, Hershey India, Hexagon Nutrition, and Mondelez International.

Dr Jagadish Pai

Dr. J. S. Pai, Executive Director, PFNDAI welcome the participants and speakers. The NAA convenor Ms. Dolly Soni, Manager-Marketing & Projects, PFNDAI, introduced all the speakers before the speakers addressed different aspects of Confectionery.

Mr. Mayank Kumar, Deputy General Manager- R&D at Mother Dairy gave presentation on "Difficulties & Solutions in making Ice Cream Healthier." He spoke about how ice cream is made. He said ice cream is a dispersion of air bubbles, ice crystals, and fat in a freeze-concentrated solution of sugars, proteins, and minerals. He defined various types with different fat percentages, total solids, and milk protein, etc. Milk fat in ice cream is not less than 10%, however, lower fat products may have less.

Mr Mayank Kumar

Mega Drivers for ice cream include pleasure and indulgence followed by health and convenience.

Ice cream is a seasonal product where peak demand is between April to June and lean demand is during winters. Since ice creams contain milk solids, sugars, stabilizers, emulsifiers, flavouring, and colouring. The need for healthier ice creams arises due to the rising prevalence of Type 2 diabetes.People are becoming health conscious. Further, food items with the incorporation of healthy and natural ingredients are trending. Natural ingredients such as fruits, no additives, no added colour, and flavour along with higher protein and dietary fibres can enhance the nutritional value of ice creams. Need-based ice creams can also be designed as low fat, no added sugar, lactose-free, and probiotic ice creams. However, there lies its own set of challenges in replacing ingredients like the proper combination of alternative ingredients, freezing point depression adjustment, hydrocolloid selection, and flavour adjustment.

Many carbohydrate fat replacers like cellulose products, starches, dextrins, and maltodextrins are used to limit ice crystal growth while replacing fat. Decreasing fat content in ice creams decreases the creamy sensation and increases the intensities of flavours of skim milk powder and corn syrup. It is thus important to mask the flavour of alternative ingredients. Similarly, challenges in no sugar ice creams exist like imbalance in freezing point depression, and chances of having laxative effects. Also, the ice cream obtained is a very hard and very cold kind of icy product without sugar incorporation which leads to a weak body and poor keeping quality. Fructo-oligosaccharides, polyols, and polydextrose are used as bulking agents to serve as sugar alternatives.

These alternative sweeteners match the freezing curves of conventional formulations due to their freezing point depression characteristics.

Ms. Ritika Mathur, Scientific Affairs & Regulatory Affairs Manager in Mondelez India presented on the topic "Health Benefits of Dark Chocolate". She defined Dark chocolates as containing no less than 35% total cocoa solids, not less than 18% cocoa butter, and not less than 14% fat-free cocoa solids. It could include optional components such as emulsifiers and flavours.

Ms Ritika Mathur

Talking about the nutritional profile of cocoa bean, it contains 54% cocoa butter, 31% carbohydrates, 11% proteins, 3% polyphenols, and <1% minerals. Cocoa fat/butter contains stearic acid, oleic acid, and palmitic acid.Cocoa beans contain starch in the form of amylose and amylopectin. The cocoa bean is also a rich source of dietary fibre, with possible evidence of being therapeutic in many CVD diseases.Cocoa beans are a rich source of polyphenols like flavonoids: catechin and epicatechin, procyanidins, anthocyanins, cyanidin glycosides, and flavonols-quercetin glycosides. They exert an anti-platelet effect, anti-inflammatory, and antioxidant activity.

Dark chocolate contains best polyphenols content (1617 mg/100 g) compared to its othercounterparts like semisweet chocolate (1483 mg/100g), milk chocolate (515 mg/100g) , red wine(241 mg/100 ml) andinstant coffee (133 mg/100g), Green tea (85 mg/ 100 ml) and Drinking chocolate (60 mg/100 g) . Hence, dark chocolate is a balancing act between sweetness and bitterness, which impacts the benefits of cocoa. Dark chocolate is used as a medium to deliver propositions of all natural/vegan/Single origin, which by its design becomes expensive and inaccessible to certain sections of consumers.


Ms Rachna Negi

Ms. Rachna Negi, Senior Executive NPD Nutritionist, Hershey India presented on Making chocolates healthier through fruits, nuts, & other ingredients. She discussed the rising awareness among consumers post-Covid and their mindful choices with foods including indulgence foods like confectionery. There is a growing focus on functional confectionery, featuring ingredients like protein, dietary fibre, vitamins, and minerals that deliver health benefits in a tasty and appealing manner. A survey amongst consumers showed the choice in chocolate confectioneries with the highest influential factor being familiar taste and tasty nutrition.

Other factors like Texture and comforting taste also ranked high. Nuts and Fruits have been the top ingredients in chocolates. The top 10 inclusions in chocolate were dominated by hazelnuts and almonds in chocolates in the past 2 years. Chocolates are also available in different formats like bars, chocolate coated and filled bars. Proteins and dietary fibres are the leading functional ingredients and vegan chocolate variants are also becoming prevalent. Almonds, Hazelnuts, and super seeds like flaxseeds and chia seeds offer several nutritional benefits. Almonds are a rich source of Mg which helps in reducing bad LDL cholesterol, Hazelnuts are rich in flavonoids and vitamin E and have been shown to increase antioxidant protection. Omega 3,6 and 9 help in maintaining a healthy lipid profileand are hence essential for heart health. Raisins are a source of natural sugars, antioxidants, iron, magnesium, and potassium. It is one of the best sources of iron for vegan diet individuals. They are rich in soluble dietary fibre and essential for gut health. Cranberries are highest in phenols and anthocyanins and are a rich source of bioactive compounds like A-type pro-anthocyanins, which may help prevent UTIs.

Chocolates are being fortified with proteins from several sources like soy protein, pea protein, wheat protein, rice protein, chickpea protein, hemp protein, milk protein, and others like egg protein, collagen, and insect protein. Proteins offer benefits in immune health, and weight management besides offering energy. High dietary fibre chocolates also offer numeral advantages like lowering of LDL cholesterol, weight management, and reduced blood transit time besides offering prebiotic benefits.

They also offer mood and mental health benefits. Dietary fibres could be both soluble and insoluble. Soluble fibres include pectin, inulin, fructo-oligosaccharides, dextrin, psyllium, and beta-glucans. Insoluble fibres include bran, cellulose, hemicellulose, lignin, and Resistant Starch. Plant-based chocolates are lactose-free, clean-label, premium quality, and offer holistic health. They are prepared from vegan milk derived from powdered oats, almonds, rice, cashew,and coconut or milk-fat replacers. Many plant-based chocolates exist in the market like Oat made, Unreal, Plant Protein chocolate by Vedge& others.

Some of the key product trends to watch out for in the market for vegan chocolates includehealth claims, sugar-free, naturalness, and simplicity (claims like raw, organic), and offering plant extract formulations (fruit/vegetable concentrates, e.g. Ashwagandha). The future aspects include healthy yet indulgent chocolates, inclusion chocolates, protein claims chocolates, and vegan chocolates.

Ms Sukhada Bhatte

Ms. Sukhada Bhatte, AGM-Regulatory & Nutrition Affairs, Hexagon Nutrition spoke on Fortification of Food Products with a special emphasis on confectionery. Staple food like atta, oil, milk, and rice can be fortified with essential nutrients and helps combat micronutrient deficiencies. The success story of fortified salt is well known for fighting goitre. Sugar fortified with Vitamin A shot down Vitamin A deficiency in Central America. Hence staples are fortified with micronutrients to combat micronutrient deficiency which is a public health issue.

Fortification offers several advantages like they are proven to be simple and effective, and offering high stability during cooking and storage. They are safe, rapid, and practical. Choice of food matters in fortification in order to help utilize and reach the end consumer. Fortified Processed foods include staples that are already fortified, or they might have micronutrients that are added later in the food to increase their nutritional value. The Food Fortification Regulation, 2022 says that it should meet 15-20% of the RDA provided one consumes 600 kcal from processed foods.

Targeted Fortification is a solution that needs to be looked at compared to the generalized approach. Identifying nutrients for micronutrient deficiencies should be identified and it should not be a blanket premix for all the confectionery.

Healthier variants of the product could be looked. Standards and Regulations needs to be followed, also the levels of fortification need to be defined to prevent overdosing. Fortification should not be used as a marketing tool. Healthy confectionery idea has been catching up with the consumers with around 6000+ confectionaries being fortified globally and 300+ new fortified products developed annually. Dark chocolate has been fortified with vitamin D3. The use of iron-fortified candies exists to fight malnutrition in Jakarta, Indonesia. A decrease in anemia in children was noticed from 50% to 8.8% after a 12-week intervention. Hence, confectionery definitely has therapeutic benefits, which include lifestyle supplements, specialized beauty care, wellness, immunity, sleep, Digestive Health, beauty and care, nail and skin health, and others.

Ms Dolly Soni

Ms Prerana Patil

Ms. Dolly Soni, Manager-Marketing & Projects, PFNDAI and Ms. Prerana Patil, Food Technologist, PFNDAI presented jointly "Making Indian Traditional Sweet Healthier." Ms Dolly took several examples of Indian sweets and ways on improving their health benefits. Gulab Jamun for example is a good source of calcium, vitamin A, and proteins. Modaks containing ghee and coconut offer health benefits like prevention of constipation, healthy heart maintenance, provides essential minerals like iron, manganese, copper, and magnesium.

Kulfi is denser and creamier than ice cream and is a dense dessert. Laddoos are small ball-shapedsweets and several varieties like Gond laddoo are nutritious. Ayurvedic gond (gum) is good for boosting immunity, lubricating joints, and boosting strength.

Ms. Prerana continued the presentation and mentioned the health benefits of ghee like anti-inflammatory, combating obesity (due to conjugated linoleic acid), and is a good source of fat-soluble vitamins.

It will be unfair to categorize Indian sweets as just empty calories as they contain several other ingredients like nuts, seeds, pulses, cereals, milk, spices, ghee, sugar, and Jaggery. The inclusion of dietary fibre and proteins can help prevent a sharp rise in blood glucose.

Sugar reduction in sweets with the use of honey/jaggery and by using polyols can help overcome the reduced sweetness. Honey has two main bioactive compounds flavonoids and polyphenols.

It is used in the treatment of conditions like diabetes, CVD, and nervous systems, and used in cancer treatment as well. Jaggery also has several health benefits like improvement in digestion, helps purify the blood, relieving constipation, boosting energy, is anti-toxic and anti-carcinogenic, and is used to treat bronchial and lung infections. Spices and nuts, seeds are addedto make sweets healthier. Botanicals like tulsi leaves can be added as well to prepare sweets like rasgulla. However, moderation is the key tothe consumption of any confectionery product.

The last segment of the webinar included a Q & A session with Mr. Mayank Kumar addressing the query on challenges in making no sugar ice cream formulation. He highlighted the role of sugar polyols in suppressing the freezing point as that of sugar. Additional sweetness is balanced by other non-nutritive sweeteners.

Ms. Rachna Negi answered the question, “Why is salt becoming a highlighted ingredient in the dark chocolate flavour category." She mentioned the WHO limit of salt to be set at 5g/day as high salt consumption leads to high blood pressure and the need to consume salt within the limit.

Ms. Ritika answered a question on the taste vs. health aspect of dark chocolates available in the market. It depends on the consumer's palatability to opt for a higher cocoa content chocolate (also offering better health benefits) as cocoa content also contributes to bitterness levels. The Indian consumers’ palates are still evolving to the high bitterness levels of dark chocolates.

Ms. Prerana answered the question of whether polyols are harmful. She mentioned that excess intake of polyols can have a laxative effect; hence, it is usually combined with other non-nutritive sweeteners like acesulfame-K.

Dr.M. Sylvia Subapriya (Professor & Head Dept of Food Science Nutrition, Avinashilingam Institute) then declared the results of the Recipe and Digital Poster competitions conducted under the nutrition awareness activity.


Dr Zubeda Tumbi


Dr Swati Shukla


Dr Rupali Sengupta


Ms Kajal Bhatia

A) Innovative recipes with dark chocolate as hero

The judges for the recipe competition were Dr Zubeda Tumbi, Founder, Health Watch Nutrition Clinic & Dr Swati Shukla, Innovation and Science,Amway.

The results were as follows-

1. Sanjana rani.R – Avinashilingam Institute for Home Science and Higher Education for Women – Chocolate Health Bar

2. Sanjitha lakshmi R – Avinashilingam Institute for Home Science and Higher Education for Women – Dark Chocolate Honey Tart

3. Candace Francena – Karunya Institute of Technology and Sciences – Gluten-Free Dark Chocolate Ragi Cookies

B) Digital Poster Contest - Balancing confectionery and Health

The judges for the poster competition were Dr Rupali Sengupta, Coordinator & Prof. M.Sc. Program, Dr. BMN College of Home Science & Ms. Kajal Bhatia, Nutritionist & Founder, Plant Power.

The results were as follows-

1. Helen Eldo - Karunya Institute of Technology and Sciences

2. Swethaa H K. - Avinashilingam Institute for Home Science and Higher Education for Women

3. Saranya - Avinashilingam Institute for Home Science and Higher Education for Women

Prof. Thyagarajan, Vice president of Avinashilingam University gave the presidential address and he thanked PFNDAI for the collaboration and sponsors for the support toward the Nutrition Awareness Activity Program.

Dr. S. Kowsalya, Registrar congratulated the organizers of the webinar and thanked the speakers for their value-added presentation which will help young students and professionals for making more valuable products.

Dr. PA. Raajeswari, Associate Professor, Dept of Food Science Nutrition, Avinashilingam Institute gave vote of thanks.


Making Confectionary Tasty Yet Healthy
Held on 29th July 2022; 3:00 PM
Mr. Mayank Kumar
Ms. Ritika Mathur
Ms. Rachna Negi
Ms. Sukhada Bhatte -Paralkar
Dr. Jagadish Pai
Ms. Dolly Soni
Ms. Prerana Patil

REGULATORY ROUND UP

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

Dear Readers

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

Here is a new bomb from the Department of Consumer Affairs. A consultation paper has been circulated, proposing an introduction of an amendment in Rule 6 (1) of Legal Metrology (Packaged Commodity Rules) 2011 as follows.

Provided that in case, a commodity contains more than one constituents, the front side of the package shall have a declaration of two or more prime constituents of the commodity with the Brand Name/ Logo. The declaration of two or more prime constituents shall contain the percentage/ quantity of unique selling point / unique selling proposition (USP) of the product and in the same font size in which the declaration of unique selling point / unique selling proposition (USP) is made.

The proposed amendment requires that prime constituents of the product be listed along with the brand name on the front of the panel. In addition, the ingoing % of the highlighted ingredient (USP ingredient) is to be declared on the front of the panel. These two requirements are already met in case of food products by 5 (2) of the FSS (Labelling and Display) Regulation 2020. Our advocacy should be that food products covered under FSS Act (2006) are exempted from the proposed rule. Such exemptions to food products in case of many provisions have been given.

A final notification amending FSS (Prohibition and Restrictions on Sales) Regulation, 2011. The amendment confirms that products under infant nutrition for which BIS standards are available can be sold only under BIS certification. Infant Nutrition Regulation, 2020 does include products like for Inborn Error Metabolism for which no corresponding BIS standards are available. In such cases, BIS certification is not mandatory.

FSS (Packaging) Regulation, 2018 is amended to include two parameters Antimony and Phthalic acid, bis (2-ethylhexyl) ester (DEHP) in the list of substances to be studied during the migration studies of plastic materials in contact with the food. However, this amendment was operationalized in 2020 but will now be enforced with effect from 30 August 2022.

FSS (Advertising and Claim) Regulation, 2018 is amended with regard to permitted health claims in edible vegetable oil (Schedule II A). This Schedule is replaced with a new one which includes health claims related to Chia oil, Avocado oil, High Oleic Sunflower and Safflower oil.

FSSAI vide its letter dated 31 August 2022 has mandated that all applications under FSS (Non Specified Food) Regulation 2017 are to be made only through online Electronic Product & Claim Approval Application System ("e PAAS") portal under FOSCOS. No physical application or application through mail would be accepted on or after 30 October 2022.

FSSAI vide its letter 18 August 2022 has permitted importers of blended edible vegetable oil to such blends without the AGMARK certification. This exemption is also extended to other products like Fat Spread which also comes under mandatory AGMARK certification. However, AGMARK certification continues to be mandatory for such products in case of Indian manufacturers. This is not level playing field. Does the exemption mean that the certification can be done away with or is not very critical? If Yes, why not for Indian manufacturers too?

List of products approved, rejected and under consideration under FSS (Non - Specified Foods) Regulation, 2017 as on 31 August 2022.

FSSAI mandates all laboratories recognized by FSSAI under Section 43 (1) and 43 (2) to be accredited under FSSAI – NABL integrated assessment before the expiry of the NABL or on or before 30 June 2023 whichever is earlier.

Additional list of FSSAI approved and authorized additional 47 of Non-Food Production units for the collection of used cooking oil from food business operators.

RESEARCH IN HEALTH & NUTRITION

Study finds children with vegetarian diet have similar growth and nutrition compared to children who eat meat

Science Daily May 2, 2022

A study of nearly 9,000 children found those who eat a vegetarian diet had similar measures of growth and nutrition compared to children who eat meat. The study, published in Pediatrics and led by researchers at St. Michael's Hospital of Unity Health Toronto, also found that children with a vegetarian diet had higher odds of underweight weight status, emphasizing the need for special care when planning the diets of vegetarian kids.

The findings come as a shift to consuming a plant-based diet grows in Canada. In 2019, updates to Canada's Food Guide urged Canadians to embrace plant-based proteins, such as beans and tofu, instead of meat.

"Over the last 20 years we have seen growing popularity of plant-based diets and a changing food environment with more access to plant-based alternatives, however we have not seen research into the nutritional outcomes of children following vegetarian diets in Canada," said Dr. Jonathon Maguire, lead author of the study and a pediatrician at St. Michael's Hospital of Unity Health Toronto.

"This study demonstrates that Canadian children following vegetarian diets had similar growth and biochemical measures of nutrition compared to children consuming non-vegetarian diets. Vegetarian diet was associated with higher odds of underweight weight status, underscoring the need for careful dietary planning for children with underweight when considering vegetarian diets." Researchers evaluated 8,907 children age six months to eight years. The children were all participants of the TARGet Kids! cohort study and data was collected between 2008 and 2019. Participants were categorized by vegetarian status – defined as a dietary pattern that excludes meat – or non-vegetarian status.

Researchers found children who had a vegetarian diet had similar mean body mass index (BMI), height, iron, vitamin D, and cholesterol levels compared to those who consumed meat. The findings showed evidence that children with a vegetarian diet had almost two-fold higher odds of having underweight, which is defined as below the third percentile for BMI. There was no evidence of an association with overweight or obesity.

B12 deficiency harms young children's development

Science Daily May 3, 2022

Vitamin B12 deficiency in infants leads to poor motor development and anaemia, according to a study from Burkina Faso conducted by the University of Copenhagen and Médecins Sans Frontières. B12 deficiency is an enormous, yet overlooked problem, and the food relief we currently supply is not helping. According to the researchers, the problem calls for new solutions.

In Denmark, cases of poor psychomotor development are regularly seen in young children raised on vegan diets, though such outcomes are preventable with daily B12 supplements. But for children in low-income countries, the chances of ever meeting their vitamin B12 requirements are far worse. This is reflected in widespread B12 deficiency among young children in Burkina Faso, according to a study from the University of Copenhagen conducted in collaboration with Médecins Sans Frontières (Doctor's Without Borders). The results have been published in the journal Plos Medicine.

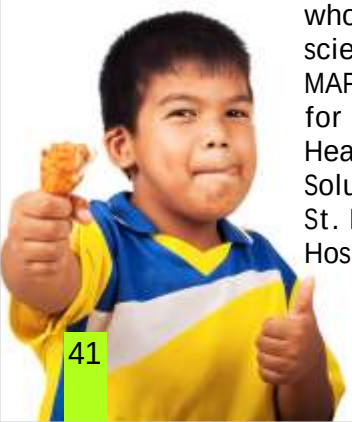
A lack of vitamin B12 doesn't just potentially lead to anaemia, it can damage the nervous system. And for young children, B12 is crucial for brain development. "Among the many children who participated in our study, we found a strong correlation between vitamin B12 deficiency and poor motor development and anaemia," says Henrik Friis, first author of the study and a professor at the University of Copenhagen's Department of Nutrition, Exercise and Sports.

For many years, there has been a focus on vitamin A, zinc and iron deficiencies when it comes to malnutrition across the globe, whereas there is a paucity of research on B12 deficiency. "B12 deficiency is one of the most overlooked problems out there when it comes to malnutrition. And unfortunately, we can see that the food relief we provide today is not up to the task," says Henrik Friis, who has worked with nutrition and health in low-income countries for many years.

Underweight is an indicator of undernutrition, and may be a sign that the quality of the child's diet is not meeting the child's nutritional needs to support normal growth. For children who eat a vegetarian diet, the researchers emphasized access to healthcare providers who can provide growth monitoring, education and guidance to support their growth and nutrition.

International guidelines about vegetarian diet in infancy and childhood have differing recommendations, and past studies that have evaluated the relationship between vegetarian diet and childhood growth and nutritional status have had conflicting findings.

"Plant-based dietary patterns are recognized as a healthy eating pattern due to increased intake of fruits, vegetables, fibre, whole grains, and reduced saturated fat; however, few studies have evaluated the impact of vegetarian diets on childhood growth and nutritional status. Vegetarian diets appear to be appropriate for most children," said Dr. Maguire, who is also a scientist at MAP Centre for Urban Health Solutions at St. Michael's Hospital.



Over 1,000 children with acute malnutrition aged 6-23 months participated in the study. The children's B12 levels were measured both before and after three months of daily food relief rations containing the recommended B12 content. When the study began, two-thirds of the children had either low or marginal levels of B12.

Short term food relief does not fill up B12 stores

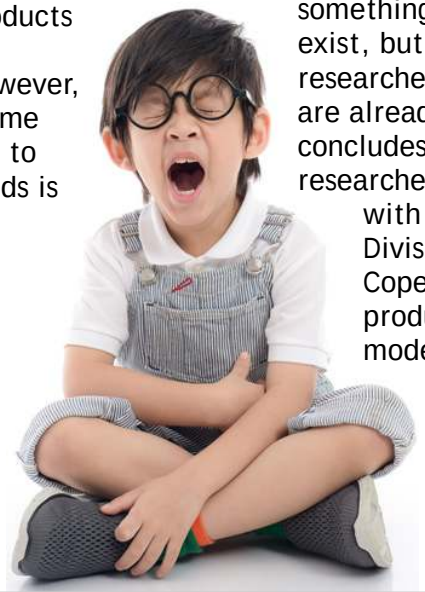
"During the period when children were provided with food relief, their B12 levels increased, before decreasing considerably once we stopped the programme. Despite provisioning them with food relief for three months, their stores remained far from topped up. This, when a typical food relief programme only runs for four weeks," says Henrik Friis.

Even after three months of food relief, one third of the children continued to have low or marginal levels of B12 stored. The unfortunate explanation is that there is a cap on how much B12 can be absorbed. "A child's gut can only absorb 1 microgram of B12 per meal. So, if a child is lacking 500 micrograms, it will take much longer than the few weeks that they have access to emergency food relief," explains Vibeke Brix Christensen, a pediatrician and medical advisor to Médecins Sans Frontières and co-author of the study. "Furthermore, longer-term relief programmes aren't realistic, as humanitarian organizations are trying to reduce the duration of treatment regimens with the aim of being able to serve a larger number of children for the same amount of money," continues Vibeke Brix Christensen.

She points out that it might make a difference to divide the necessary amount of vitamin B12 across several meals, which would probably allow children to absorb the same amount of B12 each time. But the problem is that if widespread B12 deficiency appears among children in low-income countries, it is difficult to do anything about it.

New solutions needed on the table

Preventing B12 deficiency would be the best course of action. Unfortunately, lasting solutions have yet to become readily available according to Professor Friis. Because our bodies cannot produce B12 on their own, we need to have it supplied to us through animal-based products or synthetic supplements. However, in many low-income countries, access to animal-based foods is incredibly difficult for the general population. One might wonder, are tablets or fortified foodstuffs the way to prevention?



"Possibly, but the problem in low-income countries is poorly resourced and weak health care systems. Handing out tablets to millions and millions of people is not cost-effective. And to enrich foods with B12, it must be added to foodstuffs that are accessible to the poor. This requires industrial expansion, as many people currently eat only what they can produce themselves. Furthermore, it requires legislation that it is not based on voluntary participation," says Henrik Friis, who has greater faith in other types of solutions: "Individual households could be incentivized to keep chickens and perhaps goats, which a mother could manage and use to provide access to animal-based foodstuffs. Finally, work needs to be done to develop fermented products with B12 producing bacteria -- something that doesn't yet exist, but towards which researchers and companies are already working," concludes Henrik Friis. The researchers are in dialogue with UNICEF's Supply Division, based in Copenhagen, about how products to treat moderate to acute malnutrition can be improved.

Diet type can increase potentially harmful gas in the gut

Science Daily May 3, 2022

Published in Clinical Nutrition, researchers from the University of Minnesota Medical School looked at colonic hydrogen sulphide -- a toxic gas in the body that smells like rotten eggs -- production in people in response to animal- and plant-based diet interventions.

"Although the role of hydrogen sulphide has long been a subject of great interest in the pathogenesis of multiple important diseases -- such as ulcerative colitis, colon cancer, and obesity -- past investigations have not been able to link dietary data, microbiome characterization and actual hydrogen sulphide production," said Alexander Khoruts, MD, a gastroenterologist in the U of M Medical School and M Health Fairview. "This is what we have done here."

From a human cohort, the study supports the general hypothesis that hydrogen sulphide produced by the gut microbiota increases with an animal-based diet. However, the results also suggested the existence of gut microbiome enterotypes that respond differentially and even paradoxically to different dietary input.

The study found that:

- In the majority of participants, a plant-based diet resulted in a lower hydrogen sulphide production compared to an animal-based (i.e., western) diet.
- As expected, a plant-based diet contained more fibre, while an animal-based diet contained more protein.
- In some individuals, plant-based diets did not lower hydrogen sulphide production and even led to some increases in it.
- Preliminary results suggested the existence of different compositions of gut microbiota (enterotypes) that correlate with differential responsiveness to diet in terms of hydrogen sulphide production.

"The study was consistent with the general understanding that regular intake of fibre-containing foods is beneficial to gut health," said Dr. Levi Teigen, a nutrition researcher in the Division of Gastroenterology in the U of M Medical School. "Future analyses of the gut microbiome may help to individualize nutrition interventions."

The study was funded by Healthy Foods Healthy Lives, Achieving Cures Together, the Allen Foundation and the University of Minnesota MnDRIVE Initiative. The research team envisions future work that will lead to more personalized nutritional counselling that will be informed by microbiome-based diagnostics.

Vegan diets boost weight loss, lower blood sugar in adults with overweight or type 2 diabetes

Science Daily May 7, 2022

A 12-week vegan diet may result in clinically meaningful weight loss and improve blood sugar control in overweight adults and those with type 2 diabetes, according to a

meta-analysis of 11 randomised trials involving almost 800 participants (aged 18 or older), being presented at this year's European Congress on Obesity (ECO) in Maastricht, Netherlands (4-7 May). The study is by Anne-Ditte Termannsen and colleagues from the Steno Diabetes Center Copenhagen, Denmark.

However, vegan diets that are rich in fruits, vegetables, nuts, legumes and seeds, with no all animal derived foods, did not affect blood pressure or triglycerides (a type of fat in the blood) compared to other diets.

For this study, the researchers conducted a systematic review and meta-analysis of all relevant English language randomised trials, published up to March 2022, comparing the effect of vegan diets to other types of diets on cardio-metabolic risk factors -- body weight, body mass index [BMI], blood sugar levels, systolic and diastolic blood pressure, total cholesterol, low-density lipoprotein cholesterol (so-called 'bad cholesterol'), high-density lipoprotein cholesterol, and triglycerides.

Vegan diets were compared with either passive control groups (participants continuing normal diet with no dietary changes) or active control groups (participants following other dietary interventions such as Mediterranean diets, different diabetes diets, or portion-controlled diets).

Data were analysed for 11 studies involving 796 individuals (average age ranging from 48 to 61 years) with overweight (BMI of 25 kg/m2 or over) or type 2 diabetes. The trials lasted for at least 12 weeks (average duration 19 weeks) and considered weight loss of at least 5 kg (11lbs) clinically meaningful.

Analyses found that compared with control diets, vegan diets significantly reduced body weight (effect average -4.1 kg) and BMI (-1.38 kg/m2). But the effects on blood sugar level (-0.18 %-points), total cholesterol (-0.30 mmol/L) and low-density lipoprotein cholesterol (-0.24 mmol/L) were rather small.

Further analyses found even greater reductions in body weight and BMI when vegan diets were compared with continuing a normal diet without dietary changes (-7.4 kg and -2.78 kg/m2 respectively), than compared with other intervention diets (-2.7 kg and -0.87 kg/m2).

"This rigorous assessment of the best available evidence to date indicates with reasonable certainty that adhering to a vegan diet for at least 12 weeks may result in clinically meaningful weight loss and improve blood sugar levels, and therefore can be used in the management of overweight and type 2 diabetes," says Termannsen. "Vegan diets likely lead to weight loss because they are associated with a reduced calorie intake due to a lower content of fat and higher content of dietary fibre. However, more evidence is needed regarding other cardio-metabolic outcomes."

Diet plays key role in ADHD symptoms in children

Science Daily May 19, 2022

Here's a good reason for children with attention deficit hyperactivity disorder (ADHD) to eat their fruits and vegetables: It may help reduce inattention issues, a new study suggests.

As part of a larger study, researchers asked parents of 134 kids with ADHD symptoms to complete a detailed questionnaire about the

typical foods the children ate, including portion sizes, over a 90-day period.

Another questionnaire asked parents to rate symptoms of inattention -- a hallmark of ADHD -- in their kids, such as having trouble staying focused, not following instructions, difficulty remembering things, and difficulty regulating emotions.

Results showed that kids who consumed more fruits and vegetables showed less severe symptoms of inattention, said Irene Hatsu, co-author of the study and associate professor of human nutrition at The Ohio State University. "Eating a healthy diet, including fruits and vegetables, may be one way to reduce some of the symptoms of ADHD," Hatsu said.

The study was published online recently in the journal Nutritional Neuroscience.

The data for this research was collected as part of the Micronutrients for ADHD in Youth (MADDY) Study, which examined the efficacy of a 36-ingredient vitamin and mineral supplement to treat symptoms of ADHD and poor emotional control in the 134 kids aged 6 to 12.

The study that evaluated the effectiveness of the supplement showed that children who took the micronutrients were three times as likely to show significant improvement in their ADHD and emotional dysregulation symptoms, than those who took a placebo. That study was published last year in the Journal of the American Academy of Child and Adolescent Psychiatry.

How eating eggs can boost heart health

Science Daily May 24, 2022

Researchers have shown how moderate egg consumption can increase the amount of heart-healthy metabolites in the blood, publishing their results today in eLife. The findings suggest that eating up to one egg per day may help lower the risk of developing cardiovascular disease.

Eggs are a rich source of dietary cholesterol, but they also contain a variety of essential nutrients. There is conflicting evidence as to whether egg consumption is beneficial or harmful to heart health. A 2018 study published in the journal Heart, which included approximately half a million adults in China, found that those who ate eggs daily (about one egg per day) had a substantially lower risk of heart disease and stroke than those who ate eggs less frequently. Now, to better understand this relationship, the authors of this work have carried out a population-based study exploring how egg consumption affects markers of cardiovascular health in the blood.

"Few studies have looked at the role that plasma cholesterol metabolism plays in the association between egg consumption and the risk of cardiovascular diseases, so we wanted to help address this gap," explains first author Lang Pan, MSc at the Department of Epidemiology and Biostatistics, Peking University, Beijing, China.

Pan and the team selected 4,778 participants from the China Kadoorie Biobank, of whom 3,401 had a cardiovascular disease and 1,377 did not. They used a technique called targeted nuclear magnetic resonance to measure 225 metabolites in plasma samples taken from the participants' blood. Of these metabolites, they identified 24 that were associated with self-reported levels of egg consumption.

Their analyses showed that individuals who ate a moderate amount of eggs had higher levels of a protein in their blood called apolipoprotein A1- a building-block of high-density lipoprotein (HDL), also known as 'good lipoprotein'. These individuals especially had more large HDL molecules in their blood, which help clear cholesterol from the blood vessels and thereby protect against blockages that can lead to heart attacks and stroke.

The researchers further identified 14 metabolites that are linked to heart disease.

They found that participants who ate fewer eggs had lower levels of beneficial metabolites and higher levels of harmful ones in their blood, compared to those who ate eggs more regularly.
“Together, our results provide a potential explanation for how eating a moderate amount of eggs can help protect against heart disease," says author Canqing Yu, Associate Professor at the Department of Epidemiology and Biostatistics, Peking University. "More studies are needed to verify the causal roles that lipid metabolites play in the association between egg consumption and the risk of cardiovascular disease.”

Protein supplement helps control Type 2 diabetes

Science Daily May 27, 2022

Drinking a small amount of whey protein before meals has been shown to help people with type 2 diabetes control their blood sugars.

In a study, which holds potential for dietary management of the condition, people with type 2 diabetes drank a pre-made shot before meals, which contained a low dose of whey protein. They were monitored for a week as they went about normal daily life.

To compare the potential benefits of whey protein, the same participants also spent a week drinking a control shot that contained no protein in order to measure the results against each other.

Results from continuous glucose monitoring revealed that glucose levels were much better controlled when taking the whey supplement before meals. On average, they had two hours extra per day of normal blood sugar levels compared to the no protein week. In addition, their daily blood glucose levels were 0.6 mmol/L lower compared to when they consumed the supplement without any protein.

Dr Daniel West, Senior Lecturer and Principal Investigator working within the Human Nutrition Research Centre and Diabetes Research Group at Newcastle University, UK said: "While previous studies for a few hours in the lab have shown the potential for this dietary intervention, this is the first time that people have been monitored as they go about normal life.
"We believe the whey protein works in two ways, firstly, by slowing down how quickly food passes through the digestive system and secondly, by stimulating a number of important hormones that prevent the blood sugars climbing so high.

"As we see growing numbers of people around the world developing diabetes, investigating the potential of alternatives to drugs such as food supplements becomes more important."

18 people with type 2 diabetes consumed a small drink -- in a 100 ml shot- with 15 grams of protein 10 minutes before breakfast, lunch and dinner over seven days and remained on their prescribed diabetes medication.

Continuous glucose monitoring automaticall y tracked blood glucose levels over the course of the week.

Guarana extract offers gut microbiome and antioxidant efficacies, research discovers

10 May 2022 Nutrition Insight

The extract from the seeds of guarana (Paullinia cupana), offers nutraceutical potential to support healthy gut microbiota, according to new research. Guarana seed extract was also shown to have "high antioxidant capacity." The researchers discovered that guarana extract extended the lifespan of roundworms used in the study, while decreasing E. coli folate production.

"The high capacity of guarana in scavenging free radicals was also patent in vivo, given that the activity of two of the major antioxidant enzymes was significantly lower when the worms were exposed to the guarana extract. However, the antioxidant and life-extending effects did not correlate in terms of the extract concentration," they note.

"We hypothesized that guarana might have extended the worm lifespan, not only due to its antioxidant capacity but also by reducing the folate production of E. coli. Indeed, we found out that it significantly reduces the production of 5-methyl THF-glu3 and 5/10-formyl THF-glu3."

Full of caffeine and polyphenols

The guarana seed extract was found to contain caffeine, which is naturally present in guarana in high amounts. "On the other hand, the phenolic compounds found – catechin, epicatechin and A-type procyanidin dimer – are also often detected in guarana, despite its content possibly varying, depending on the geographical location of the plant," say the study authors.

Edited by Olivia Nelson

About 3 grams a day of omega-3 fatty acids may lower blood pressure, more research needed

Science Daily June 1, 2022

About 3 grams daily of omega-3 fatty acids, consumed in foods or supplements, appears to be the optimal daily dose to help lower blood pressure, according to a research review published today in the Journal of the American Heart Association, an open access, peer-reviewed journal of the American Heart Association.

Omega-3 fatty acids docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) are typically found in fatty fish, such as salmon, tuna, sardines, trout, herring and oysters. Some people also take combined DHA and EPA in supplements. While some studies suggest that consumption of omega-3 fatty acids may lower blood pressure, the optimal dosage needed to lower blood pressure has not been clear.

The National Institutes of Health has established an adequate intake of omega-3 fatty acids for healthy people at 1.1- 1.6 grams daily, depending on age and sex.

"According to our research, the average adult may have a modest blood pressure reduction from consuming about 3 grams a day of these fatty acids," said study author Xinzhi Li, M.D., Ph.D., assistant professor and program director of the School of Pharmacy at Macau University of Science and Technology in Macau, China.

Researchers analyzed the results of 71 clinical trials from around the world published from 1987 to 2020. The studies examined the relationship between blood pressure and the omega-3 fatty acids DHA and EPA (either individually or combined) in people aged 18 and older with or without high blood pressure or cholesterol disorders. There were nearly 5,000 participants combined, ranging in age from 22 to 86 years. Participants took dietary and/or prescription supplement sources of fatty acids for an average of 10 weeks.

The analysis found:
• Compared to adults who did not consume EPA and DHA, those who consumed between 2 and 3 grams daily of combined DHA and EPA omega-3 fatty acids (in supplements, food or both) had reduced systolic (top number) and diastolic (bottom number) blood pressure by an average 2 mm Hg.
• Consuming more than 3 grams of omega-3 fatty acids daily may have added blood pressure-lowering benefit for adults with high blood pressure or high blood lipids:
• At 3g a day of omega-3s, systolic blood pressure (SBP) decreased an average of 4.5 mm Hg for those with hypertension, and about 2 mm Hg on average for those without.
• At 5g a day of omega-3s, SBP declined an average of nearly 4 mm Hg for those with hypertension and less than 1 mm Hg on average for those without.
• Similar differences were seen in people with high blood lipids and among those older than age 45.

About 4-5 ounces of Atlantic salmon provide 3 grams of omega 3 fatty acids. A typical fish oil supplement contains about 300 mg of omega-3s per pill, but doses vary widely. "Most of the studies reported on fish oil supplements rather than on EPA and DHA omega-3's consumed in food, which suggests supplements may be an alternative for those who cannot eat fatty fish such as salmon regularly," Li said.

"Algae supplements with EPA and DHA fatty acids are also an option for people who do not consume fish or other animal products."

The U.S. Food and Drug Administration (FDA) announced in June 2019 that it did not object to the use of certain health claims that consuming EPA and DHA omega-3 fatty acids in food or dietary supplements may reduce the risk of hypertension and coronary heart disease. However, they noted that the evidence was inconclusive and highly inconsistent.

"Our study supports the FDA guidance that EPA and DHA omega-3 fatty acids may reduce the risk of coronary heart disease by lowering high blood pressure, especially among people already diagnosed with hypertension," he said. "However, while our study may add a layer of credible evidence, it does not meet the threshold to make an authorized health claim for omega-3 fatty acids in compliance with FDA regulations."

FOOD SCIENCE & INDUSTRY NEWS

Fungi-based meat alternatives to help save Earth's forests

Science Daily May 4, 2022

The market-ready meat alternative is very similar in taste and texture, but is a biotech product, which -- by replacing beef -- involves much less land resources and greenhouse gas emissions from agriculture and land-use change. This goes under the assumption of a growing world population's increasing appetite for beefy bites, and it is the first time researchers have projected the development of these market-ready meat substitutes into the future, assessing their potential impact on the environment.

"The food system is at the root of a third of global greenhouse gas emissions, with ruminant meat production being the single largest source," says Florian Humpenöder, researcher at PIK and lead author of the study. That is because more and more forests that store a lot of carbon are cleared for cattle grazing or growing its feed, and because of further greenhouse-gas emissions from animal agriculture. Part of the solution could be existing biotechnology: Nutritious protein-rich biomass with meat-like texture produced from microbes like fungi via fermentation, what scientists call "microbial protein."

"The substitution of ruminant meat with microbial protein in the future could considerably reduce the greenhouse gas footprint of the food system," says Humpenöder. "The good news is that people do not need to be afraid they can eat only greens in the future. They can continue eating burgers and the like, it's just that those burger patties will be produced in a different way."

Sustainable burgers: replacing minced red meat with microbial protein

The team of researchers from Germany and Sweden included microbial protein in a computer simulation model to detect the environmental effects in the context of the whole food and agriculture system, as opposed to previous studies at the level of single products. Their forward-looking scenarios run until 2050 and account for future population growth, food demand, dietary patterns as well as dynamics in land use and agriculture.

As meat consumption will likely continue to rise in the future, more and more forests and non-forest natural vegetation may be doomed to extinction for pastures and cropland.

"We found that if we substituted 20 per cent of ruminant meat per capita by 2050, annual deforestation and CO2 emissions from land-use change would be halved compared to a business-as-usual scenario.

The reduced numbers of cattle do not only reduce the pressure on land but also reduce methane emissions from the rumen of cattle and nitrous oxide emissions from fertilizing feed or manure management," says Humpenöder "So replacing minced red meat with microbial protein would be a great start to reduce the detrimental impacts of present-day beef production."

Taste buds can adapt to low salt diet

Science Daily May 23, 2022

A taste adaptation intervention lowers salt intake and increases enjoyment of a sodium restricted diet in patients with hypertension, according to a small study presented at ACNAP-EuroHeartCare Congress 2022, a scientific congress of the European Society of Cardiology (ESC).

"One of the major barriers to sticking to a low salt diet is that people do not like the taste, but few studies have addressed this issue," said study author Professor Misook Chung of the University of Kentucky, Lexington, US. "Our pilot study in patients with high blood pressure shows that it is possible to change taste perception and learn to like food with less salt."

Hypertension affects more than one billion people worldwide and is the leading global cause of premature death.2 A healthy lifestyle, including salt restriction, is recommended to delay the need for blood pressure lowering drugs or complement their effects. However, the benefits of reduced sodium intake on blood pressure tend to diminish with time, partly due to poor adherence.

The researchers developed the Sodium Watchers Programme -- Hypertension (SWaP-HTN) for gradual taste adaptation to low salt food. This study examined its short-term effects on sodium intake, blood pressure, preference for salty food, and enjoyment of a sodium-restricted diet.

A total of 29 adults with hypertension were randomly assigned to the intervention or usual care in a 2:1 ratio. Participants in the usual care group received routine medical and nursing care for hypertension including advice to follow a sodium-restricted diet and take prescribed medications.

The intervention group received 16 weeks of education and follow-up with a study nurse via video call on a tablet. Sessions were held weekly for six weeks, then every two weeks for 10 weeks.

The programme was individualised to each patient's barriers and weekly goals and included salt added at the table, salt used during cooking, grocery shopping, and eating in restaurants. Participants received an electronic device that detects salt content to enable them to identify and avoid high salt food.

Professor Chung explained: "One of the first steps was for patients to realise how much salt they were eating. Using the electronic device they could test the salt content of restaurant meals and ask the chef to reduce or eliminate salt on their next visit. They also used it at home to lower the salt content in their own cooking.

Some people automatically added salt at the table before tasting the food so we asked participants to count the number of 'shakes' and set goals for reducing it. Most participants removed the salt shaker from the table within three weeks."

At baseline and 16 weeks, all participants provided a 24-hour urine sample to assess sodium intake and had their blood pressure measured. In addition, preference for salty food and enjoyment of a salt restricted diet were assessed on a 10-point scale.

The average age of participants was 63 years and 55% were men. Three patients withdrew from the study and the final analysis included 17 and 9 participants in the intervention and usual care groups, respectively. The researchers compared changes from baseline to study completion between groups. The intervention led to a significant reduction in sodium intake and increased enjoyment of a salt restricted diet. There was a trend of decreasing mean systolic blood pressure in the intervention group, from 143.4 to 133.9 mmHg, but it did not reach statistical significance. The intervention did not change preference for salty food.

Professor Chung said: "In the intervention group, sodium intake dropped by 1,158 mg per day, which was a 30% reduction from baseline, while the control group increased daily intake by 500 mg. Enjoyment of a low salt diet increased in the intervention group, from 4.8 to 6.5 on a 10-point scale, although patients still preferred salty food. It is likely that the intervention did not translate to a statistically significant fall in blood pressure because of the small sample size."

She concluded: "Our study indicates that we can retrain our taste buds to enjoy low sodium food and gradually reduce the amount of salt we eat. The gradual taste adaptation programme has the potential to control blood pressure but needs to be tested in a larger trial with longer follow up."

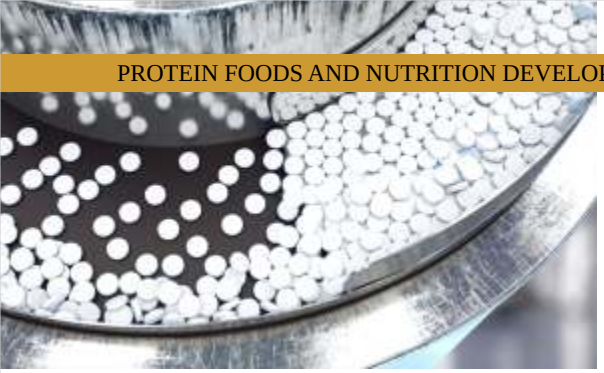
Synthetic versus natural ingredients: more than meets the eye

19 May 2022 Nutrition Insight

As consumers increasingly seek out natural alternatives for their supplementary needs, industry is observing a knowledge gap surrounding synthetically produced vitamins and minerals. Companies are increasingly turning to formulations in a bid to tap into growing holistic and wellness trends, utilizing ingredient synergies.

NutritionInsight speaks to a roundtable of experts from Gnosis by Lesaffre, Univar Solutions, Dr. Paul Lohmann and PharmaLinea, who delve into the changes across the space and how companies are adapting to the developments. “The natural products industry strives to provide formulas that deliver nutrients as close as possible to what is found in nature, and that begins with raw materials,” says Xavier Berger, global market manager at Gnosis by Lesaffre.

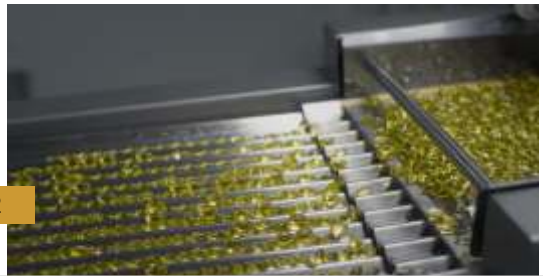
Interest within the space is driven by health-conscious consumers who want to ensure the uptake of the necessary nutrients, which includes athletes seeking to support their active lifestyle. “Regionally, we note that consumers from countries in Latin America and in the Middle East have a growing interest in the quality of nutritional supplements – they appreciate products with good bioavailable minerals,” outlines Klaus Brockhausen, sales director, business unit food, Dr. Paul Lohmann.

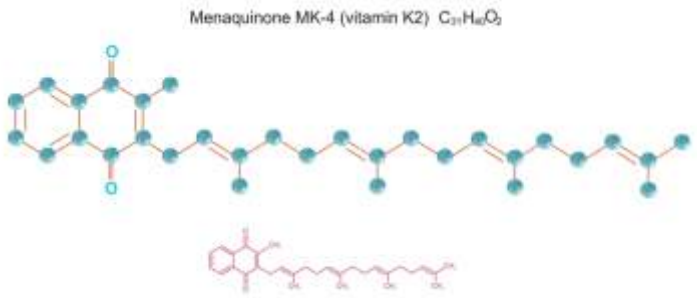


Natural vs. synthetic

With clean label demands on the rise, there is also greater interest for naturally sourced ingredients, as opposed to synthetic. The former is readily found in nature, mostly available in complex forms. Naturally sourced ingredients can be sourced either from a plant or an animal, or mineral, explains Silvi Siddhu, global scientific and technical manager for nutraceuticals at Univar Solutions. "Synthetic is when it is industrially produced through various methods, from a wide range of ingredients to mimic the structure and function of the natural form. Synthetic alternatives have long been used to treat deficiencies and they work. It is easy to make synthetic alternatives more potent, and they are usually more economical."

Maja Orešnik, science and research director at PharmaLinea echoes similar observations. "In most vitamins, it used to be completely acceptable that synthetic sources are used." Nonetheless, consumers are increasingly seeking out natural items without a clear understanding of what the difference is, she adds. "For example, with certain vitamins, where there is a purified product, and the chemical structure is the same, there is no concrete difference between synthetic and natural sources. In the case of vitamin K2, where the end product is menaquinone 7 with minimal levels of impurities no matter the source it came from, the 'natural' label is more or less grounds for a marketing angle."





Focus on ingredient purity

According to Berger, purity is an important factor when meeting market demand for synthetics. "It is not just about delivering the 'active,' but ensuring the quality and purity of the synthetic material," he explains. "While some K2 suppliers talk about the beginning stages of the synthetic process and the sourcing, that is not the full story. The essential step that synthetic material must undergo is the purification process, providing an exceedingly pure quality product."

The isomeric purity of vitamin K2 as MK7 determines its bioactivity, he adds. The all-trans isomers are the active form of vitamin K2 as MK7 as found in nature. K2 as MK-7 contaminants are known as cis isomers and their bioactivity is less understood. "It is difficult to mimic the molecule as it is found in nature when it is produced from chemical synthesis. Further, the synthetic process is the result of a succession of chemical reactions, which can produce other impurities."

Production process is key

Similarly, Brockhausen explains that most minerals do not exist with food-grade purity in nature. Certain impurities and also pure palatability must be often considered. "The good thing is that we have the chance of purification of the material within the production process. This includes the elimination of impurities like heavy metals, residues from mining, foreign matter and others." For each element, individual impurities are characteristic, he adds. Magnesium is typically accompanied by nickel, whereas zinc occurs with lead and cadmium. Furthermore, iron salts are often accompanied by various heavy metals, and a purification step is crucial.

"Apart from the elimination of impurities, we are able to create a clearly defined structure for the final (organic or inorganic) salt. This can only be ensured by using sophisticated manufacturing processes. The result is a highly pure and fully-reacted mineral salt – clean, bioavailable, functional."

As ingredient formulations become more complex, protective technologies are required to make the process much smoother, ensuring a stable menaquinone ingredient, Berger underscores. To this end, Gnosis by Lesaffre introduced its Matrix technology to make it easier to create more complex formulations utilizing vitamin K2, and to open new formulation opportunities. Iron deficiency is a worldwide phenomenon the industry is tapping into.

Growing popularity

Vitamins and minerals continue to dominate the nutraceuticals industry in terms of revenue either as single or multiple vitamins and minerals, Siddhu underscores. Some ingredients such as vitamin C, D, calcium, zinc, iron and magnesium continue to be widely used because of their key benefits and synergy with other ingredients, such as adding vitamin C as a collagen booster to collagen products, she adds.

"Vitamin D, which consumers primarily connect with healthy bones is gaining popularity as an immune health supporting ingredient. We have been observing a rise in consumer education on Vitamin K2 and chelated minerals." Orešnik adds magnesium is an "omnipresent" ingredient, as are vitamin D3 and K2, due to their wide array of applications.

Ironing out opportunity

With iron deficiency being one of the most common nutritional deficiencies across the world, industry is also eyeing the offerings iron can provide. "One opportunity and major space for progress is iron. The market traction is following – iron supplements are some of the fastest growing market segments in very different markets, and are following in the footsteps of the Italian iron market – the most developed in the world," highlights Matevž Ambrožic, marketing and PR director at PharmLinea.

"The largest pharmaceutical and supplement players are picking up on the opportunity, and the battle for dominant market shares among advanced iron supplements with added-value iron sources (liposomal, microencapsulated, chelated) is underway in markets from Southeast Asia to Latin America."

By Andria Kades

Vitamin D bioavailability higher in milk and water than juice, finds study

23 May 2022 Nutrition Insight

Vitamin D food fortification works better with water and milk than with juice, according to a new study presented at the 24th European Congress of Endocrinology in Milan, Italy. By measuring the maximum concentration over time, researchers found bioavailability of vitamin D to be higher in milk and water than in juice.

The study highlights vitamin D insufficiency has been linked with multiple health issues, including the immune response to COVID-19. Estimates show that as much as 40% of the European population could be suffering from vitamin D deficiencies, with 13% potentially suffering from severe vitamin D deficiency. Therefore, vitamin D supplements are "vital" – and knowing whether they will be absorbed and how best to aid absorption is "crucial", the study underscores.

"Surprising" findings

Dr. Rasmus Espersen of Aarhus University Denmark and his research team conducted a randomised trial on 30 postmenopausal women aged 60-80 with vitamin D deficiency.

The study aimed to measure immediate changes in blood concentrations in response to the consumption of various food items containing 200 g D3.

In a random order, 500 mL of water, milk, juice, juice with vitamin D bound to whey protein isolate as well as 500 mL of water without vitamin D (placebo) were presented to the study participants. Blood samples were collected at 0h, 2h, 4h, 6h, 8h, 10h, 12h, and 24h on each study day.

"One surprising aspect was the fact that the results seen in the water and milk groups were equal. This was quite unexpected given the fact that milk contains more fat than water," says Dr. Espersen.

The study revealed that whey protein isolate (WPI) in apple juice did not enhance maximum concentration of D3 compared to juice without WPI. However, compared to juice, D3 concentrations were significantly higher in response to intake of milk and water. No difference was observed between milk and water.

Therefore, the conclusion from this study is that vitamin D fortification works better in water or milk than in juice.
Edited by Natalie Schwertheim

New Probiotic Boosts Health in Africa

Miranda Grizio April 1, 2022, Food Technology

Many people are aware of the health attributes of yogurt, but a food science innovation has taken its health benefits to a whole new level in nearly 200 communities in Africa. That innovation comes via Yoba for Life, a program that provides African dairy co-ops and entrepreneurs with simple tools and shelf-stable cultures to transform locally produced milk into healthy, probiotic yogurt.

The Yoba for Life Foundation, a Dutch nonprofit organization, was started by food biotechnologist Wilbert Sybesma and microbiologist Remco Kort in 2009. Their goal was to develop a low-cost probiotic with science-backed health benefits that could be used to make yogurt in dairy-producing communities in Africa. (The name "Yoba" is derived from "yogurt bacteria.")

The scientists identified Lactobacillus rhamnosus GG (LGG), the most extensively researched probiotic to date, as the gold standard for efficacy. The health benefits of LGG include reducing and preventing diarrhea, infections, and allergies. Since LGG was a patented probiotic, however, Sybesma and Kort set about developing a "generic" strain (a first for probiotics). Their efforts paid off with Lactobacillus rhamnosus yoba 2012, a variant of LGG with the same health-supporting mechanisms.

The next challenge became how to grow L. rhamnosus yoba 2012 in milk since, unfortunately, it cannot ferment lactose. The solution came by using an adjuvant culture, Streptococcus thermophilus C106, which could convert lactose into glucose and galactose as food for the yoba culture. This strategy enabled the L. rhamnosus yoba 2012 to reach final levels of 1x109/mL, a dose sufficient to be effective as a daily probiotic. The final steps involved making the probiotic cultures shelf-stable through freeze-drying, grinding, and blending with maltodextrin before packing into pre-portioned, watertight sachets.

With the R&D complete, the Yoba for Life program was launched in 2012 at Life Dairy in Kateete, Mukono district in Uganda.

A sachet of Yoba starter culture. Photo courtesy of Yoba for Life

By 2014, the program was expanding quickly throughout Southwestern Uganda, with Yoba for Life providing support that included facility design, process and food safety training, and the provision of probiotic cultures.

The production of Yoba yogurt uses simple, accessible methods. The milk is pasteurized in a saucepan and added with the cultures into large milk cans for an eight-hour fermentation. Then, sugar and flavours are added, and the yogurt is packaged into polyethylene pouches for retail sale.

Dairy cooperatives, women's groups, and local entrepreneurs were among the first to embrace the Yoba for Life model. By June 2018, there were 116 production units making Yoba yogurt. A total of 704 people were employed in the value chain—from milk collection and production to distribution and sales.

Today, the Yoba for Life program can be found throughout East Africa, with several hundred production units operating across Uganda, Tanzania, Kenya, and Ethiopia. Yoba yogurt is also being integrated into school feeding programs. One study compared Ugandan children who participated in a school feeding program offering Yoba probiotic yogurt with children in the same region receiving milk instead. Results showed a significant reduction in incidence of common cold symptoms and skin infection symptoms in the probiotic yogurt group.

India allows imports of extra 550,000 tonnes of genetically modified soymeal

NEW DELHI, April 29 (Reuters)

India has allowed imports of an extra 550,000 tonnes of genetically modified (GM) soymeal, according to a government order seen by Reuters, to help the poultry industry reeling from a surge in local prices of the important animal feed. The shipments need to be imported before Sept. 30, according to the government order.

The government in August 2021 relaxed import rules to allow the first shipments of 1.2 million tonnes of GM soymeal to help the poultry industry after animal feed prices tripled in a year to a record high.

Traders managed to sign deals to import only about 650,000 tonnes of soymeal against the permitted 1.2 million before the deadline for overseas purchases expired on Oct. 31, 2021. Now, the government has allowed traders to import the remainder 550,000 tonnes of GM soymeal.

Late last year, the All India Poultry Breeders Association had asked the government to allow imports of 550,000 tonnes of the feedstuff. Opposing the permission to import more GM soymeal, the Soybean Processors Association of India said the government should not allow any lab-altered feedstuff, as the country does not let farmers grow any GM food products.

REGULATORY NEWS

Botanical Adulterants Prevention Program updates Ginkgo extract lab analysis guidance

12 May 2022 Nutrition Insight

The American Botanical Council's (ABC) Botanical Adulterants Prevention Program (BAPP) unveiled a new advisory for detecting the adulteration of Ginkgo biloba leaf extracts. The Laboratory Guidance Document (LGD) assesses the efficacy of 78 laboratory analysis methods used to verify the authenticity of Ginkgo leaf extract or detect alteration. The LGD was peer-reviewed by 30 US and international experts from governmental, academic and herbal dietary supplement industry backgrounds.

Author of the study, Dr. Stefan Gafner, informs: "Finding a suitable analytical method to authenticate ginkgo leaf extracts is time-consuming, at least in part, because of the large number of methods available in the peer-reviewed literature, national pharmacopeias and other official compendia." He continues that not many botanical ingredients have been subject to such a vast body of analytical work dedicated to quality control. We hope that this is where the ginkgo laboratory guidance document can be of value to the international medicinal plant community. Since it provides an overview of relevant, reliable, and fit-for-purpose methods in a single document."

In the US, ginkgo leaf extract is classified as a dietary supplement and has consistently placed among the top 25 best-selling herbal supplements. The ABC says the supplement won over US$33 million in sales in 2020 alone across the combined natural and mass-market channels.

The ABC says that almost 30 scientific publications have documented instances of the adulteration of ginkgo leaf extract ingredients and D2C products across the past two decades. Of the 501 samples involved in these studies, 242 (48%) were adulterated, according to criteria set out by the relevant authors. The findings indicate that adulteration may be rampant throughout industry.

The adulteration process reportedly usually involves adding in undeclared flavonol-rich substances or highly-purified flavonoids like quercetin or rutin to increase the extract content of flavonol glycosides to 24%.

This is the minimum amount specified on the labels of most commercial dietary supplements to meet the standardization requirements of the extract EGb761 manufactured by Dr. Willmar Schwabe GmbH & Co. KG. The ABC refers to this extract as the "most clinically tested ginkgo leaf extract in the world."

As rutin and quercetin are also present in ginkgo leaves, detecting adulteration in commercial ginkgo materials is often challenging. "Quality control tests relying on measuring solely quercetin, kaempferol, and isorhamnetin after hydrolysis are not sufficient to guarantee absence of adulteration," says the LGD. These adulterating substances usually come from lower-cost sources, often from extracts or purified fractions of Japanese sophora (Styphnolobium japonicum, or Sophora japonica) leaves and flowers.

Edited by Olivia Nelson

Consumers want packaged foods to carry-traffic light and warning labels for 'negative' nutrients

By Pearly Neo 02-May-2022-Food Navigator Asia

Chinese consumers have determined the traffic light labelling system as well as distinct warning labels highlighting 'negative' nutrients such as sugar, salt and saturated fat to be the most effective forms of front-of-pack labelling (FOPL), according to a new study.

The study was jointly conducted by multiple health and nutrition organisations in China including the Chinese Academy of Medical Sciences and Chinese Nutrition Society, as well as several population health research bodies in Australia including the University of Wollogong and University of Sydney.

The researchers performed a cross-sectional study using a questionnaire to survey 2,407 parents of students in primary and secondary schools across 72 schools in six Chinese provinces (Beijing, Jiangsu, Guangdong, Henan, Sichuan and Heilongjiang). The locations were selected to reflect the preferences of consumers across both urban and rural regions.

In the survey, the parents were also shown five FOPL formats: multiple traffic lights (MTL) which provides direct nutrition information and colour codes these according to content; Nutri-Score which uses colour coding and the letters A to E to summarise product healthfulness; Warning labels which denoted foods high in certain critical nutrients; Health logos which made recommendations without including specific information; and Guideline Daily Amount (GDA) labels, which only show information but do not specify or recommend regarding product healthfulness.

Participants were asked specific questions about which FOPL was found to be the most attractive to them, which provided the information they needed the most to make purchase choices, and which enabled them to make healthier food choices the most quickly.

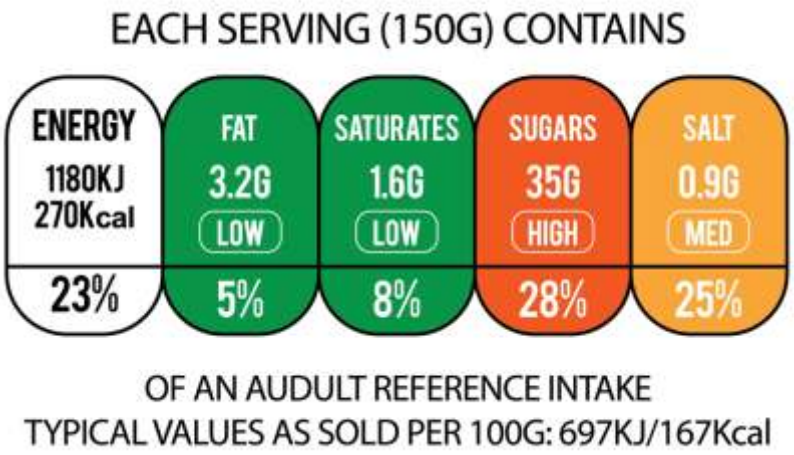
"When asked which FOPL format was seen as most attractive, the highest percentage (35.1%) of participants nominated MTL as their preference, followed by warning labels (21.9%)," said the study authors. "Health logos followed with 16.6%, then GDA at 13.8% whereas Nutri-Score ranked the lowest at 12.5%. Also of note was that parents from rural areas were more likely to prefer MTL (42.4% in rural vs 30.4% in urban) whereas parents from urban areas preferred warning labels (26.6% vs 14.8%).The MTL format was also seen as the one that provided the information needed most with 42.4% of parents selecting this followed by warning labels far behind at 19.3% - the other options all scored below 10%. In terms of the format enabling them to select healthier food the most quickly, MTL (33.5%) and warning labels (24.2%) again emerged triumphant

"This overwhelming preference for MTL is likely due to the fact that most consumers are not equipped to interpret [large amounts of nutritional information] due to factors such as low levels of nutrition knowledge and time pressure – [and previous studies have shown that] FOPL schemes with text and symbolic colour are easier to interpret than simply providing numeric information. Interestingly, overall households with lesser children had a tendency to a higher preference for warning labels– those with one child (26.1%) preferred these a lot more than those with two (19.7%) or three (14.9%)."

In addition to these, the participants were also surveyed on the nutrients which content they believed need to be highlighted and identified on the FOPL, as well as the types of prepackaged food products that were in most need of FOPL to help them make healthier food choices. "Sugar was the number one most preferred nutrient that the parents identified as needing to be identified on labels at an overwhelming 80.6%," the authors added. "This was followed by salt (80.6%), total fat (75.4%), energy (71.6%), carbohydrates (71.5%), saturated fat (65.4%),and trans fats (64.9%) – generally nutrients of which excessive consumption is known to have negative effects on health.As for pre-packaged food types, the participants highlighted baked products (63.7%), milk and dairy products(63.3%), sugar-sweetened beverages (61.4%), chocolate, candy and confectionery (60.3%), potato chips/crisps, and crispy rice (59.4%) and processed meat products (58.9%) as the top categories in China most in need of these FOPLs, with consumers often feeling confused when making healthier choices for these."

Notably, the highly-debated Nutri-Score FOPL scheme which is being utilised in France, Belgium, Switzerland, Germany and the Netherlands and even recommended by the World Health Organisation (WHO) emerged as the worst-performing scheme on all fronts in the eyes of Chinese consumers, being seen as the least attractive (12.5%), least informative (7.8%) and least able to help them make quick healthier choices (9.5%).

"From this, we can see that the results suggest that interpretive aids such as colour were viewed favourably by parents, but an oversimplified format like Nutri-Score risks excluding information that is desired by consumers and as a consequence being less desirable," said the authors.



FSSAI and MoA formulate regulations for 'Ayurveda Aahara' products

ET May 13, 2022 New Delhi

Ministry of Ayush and Food Safety & Standards Authority of India (FSSAI) under MoHFW, India's apex body for food regulation has formulated regulations of safety & quality standards for food products under 'Ayurveda Aahara' category.

This comprehensive initiative will ensure the manufacturing of quality Ayurveda food products and help in expanding the international market for Make-In-India products. The Ministry of Ayush is confident these regulations will further strengthen India's global positioning as a custodian of the Ayush system.

According to the regulation, manufacturing and marketing of 'Ayurveda Aahara' products will now adhere to strict Food Safety and Standards (Ayurveda Aahara) Regulations, 2022 rules and will be available in the market only after license/approval from FSSAI. A special logo has been created for "Ayurveda Aahara" category, which will enable easier identification and reinforce the quality in Ayurveda food products.

The Ministry of Ayush with an understanding that food safety and quality is a shared responsibility between manufacturers, and consumers and everyone has a role to play to ensure food we consume is safe and healthy.

This has been further strengthened after the resurgence of the COVID-19 pandemic brought the focus on food, nutrition, health, immunity and sustainability.

According to the regulations, all food prepared in accordance with the recipes/ingredients/processes described in the authoritative books of Ayurveda will be considered as "Ayurveda Aahara". Food recipes and ingredients for promoting health, specific physiological needs, and foods specified for consumption during or post specified diseases, and disorders referred as Pathya in Ayurved are covered under these regulations.

The labelling of 'Ayurveda Aahara' shall specify the intended purpose, the target consumer group, recommended duration of use and other specific requirements.

Health claims and disease risk reduction claims for the different categories of 'Ayurveda Aahara' and their approval process shall be in accordance with the requirements specified in regulations. However, 'Ayurveda Aahara' will not include Ayurvedic drugs or proprietary Ayurvedic medicines and medicinal products, cosmetics, narcotic or psychotropic substances and herbs.

Further, Ayurveda Aahara is also not recommended to young children below age 2 years.
'Ayurveda Aahara' needs prior approval, the same shall be in accordance with the Food Safety and Standards (Approval for Non-Specific Food and Food Ingredients) Regulation, 2017.
FSSAI shall constitute an Expert Committee under the Ministry of Ayush consisting of relevant experts including representatives of FSSAI for providing recommendations on approval of claims and products and the committee shall also empower to address concerns regarding registration or licensing or certification or laboratory accreditation or testing or quality issues related to "Ayurveda Aahara".

FSSAI Asks Swiggy and Zomato to Add Food Nutritional Info on Their Platforms

16 Jun'22 | By Jaspreet Kaur, Inc42

Food delivery platforms have to ensure that their business partners that run over 10 food outlets and have an annual gross revenue of over 20 Cr have applied for a central (food) license. Further, food aggregators will have to do menu labelling for the food they sell online. To enable menu labelling, the food regulatory body has commanded Swiggy and Zomato to upgrade their platforms. From July 1 onwards, food aggregators Swiggy and Zomato have to list the nutritional values and allergens of all food items to be sold from their platforms.

According to the Food Safety and Standards Authority of India's (FSSAI) order, online food aggregators have been also asked to ensure that their business partners (restaurant operators) that run over 10 food outlets and have annual revenue of more than INR 20 Cr have applied for a central (food) license.

Further the guidelines asked food aggregators to do the menu labelling for the food they sell online. Besides, they will also have to direct food establishments (restaurant operators) to show nutritional value such as calorie intake and allergen information on the food items that are listed on their platforms.

According to Mint, Arun Singhal, chief executive of FSSAI said, "The aim is to inform people about what kind of food they are ordering online and the kind of nutritional and allergen content (present in the food)."

At present, packaged food have labels that display nutritional information of the items. On the other hand, cooked food does not have such information. By enabling menu labelling on cooked food items, consumers will be able to make healthier choices, as per the FSSAI body. The media report quoted an FSSAI official saying that nutritional and allergen labelling of cooked food will vary from restaurant to restaurant. It will depend on the kind of food, how it is cooked and what kind of ingredients are being used. It will be customised.

To enable menu labelling, the food regulatory body has commanded foodtech giants, Swiggy and Zomato to upgrade their platforms so that food business operators can add information regarding the nutritional value of food that they sell.

The food regulatory body has also asked all regional directors to ensure that ecommerce food business aggregators (foodtech giants and food delivery platforms) are complying with the new regulations. In case, any ecommerce food business aggregators failing to adhere to the new norms, then an improvement notice will be issued to them. Despite this, if they fail to comply then their license will be cancelled.

FSSAI is a statutory body that is led by the Ministry of Health & Family Welfare. It was created under the Food Safety and Standards Act 2006, which consolidates statutes relating to food safety and regulation.

Earlier, the food regulator had directed ecommerce food platforms to take down non-dairy and plant-based products that are classified as dairy products and sold on the respective websites. The move impacted various D2C brands including Raw Pressery, Urban Platter and Goodmylk and FMCG players such as Hershey's and Amul.

India's pet food industry needs single nodal authority for better performance

FP Staff, July 10, 2022
09:54:23 IST

The COVID-19 pandemic has majorly impacted the pet food industry in India leading to a steep gap between the supply and demand. But now the industry is regaining its pace and is growing at a healthy rate. Things are getting back to normal, and the pet food industry is coping well in providing access to quality nutrient-based food for pets.

Firstpost spoke with Satinder Singh, General Manager (Managing Director) at Royal Canin, India about the Indian pet food industry and the effect of Covid-19 on the pet food industry. Edited excerpts:

Pet food industry witnessed a tailwind in the category due to a number of factors during COVID-19. Firstly, the number of pet adoptions, recorded a sharp increase as people were looking for companionship throughout the long months of seclusion during lockdowns, and realized pets are the best when it comes to companionship. During the initial phase of lockdowns, pet food was not listed in the "Essentials" category, which led to a disruption in the supplies of pet food. We addressed this problem quickly by working with the government authorities to ensure pet food was included in the “Essentials” category.

The regulatory framework for pet food with similar approach as human food is required to unlock the huge potential of pet food industry. The current challenges prevailing in the industry such as highly ambiguous regulatory environment, isolated government policies focusing on livestock and animal feed (cattle feed) specifically, absence of uniform regulatory framework, higher taxation on pet food, absence of single nodal authority and low awareness among pet owners, society and fraternity. The government is focused on Make in India but despite that 60-70 per cent pet food industry is still dependent on imports. We need to bring all the stakeholders together to create a conducive environment for growth of this industry.

India has 30 million cats and dogs as pets and about 60 million stray animals. There are many issues starting from basic knowledge to keep the pet, underdeveloped infrastructure and lack of quality services to keep a pet. Low awareness on the benefits of nutrition as the overall calorie conversion is very low at 5 per cent and affordability to get best nutrition and vet services is a concern for a large population. This means that even today pets are fed with home food predominantly.

On the supply side high import duties for imported products, shortages of quality ingredients for local manufactures and overall high taxation and the complex regulatory environment makes it challenging.

India has a lot of potential and the focus should be on building the foundation right by educating pet parents, elevating the vet and breeder industry, improving the physical reach of our products and build a stronger supply chain for long term.