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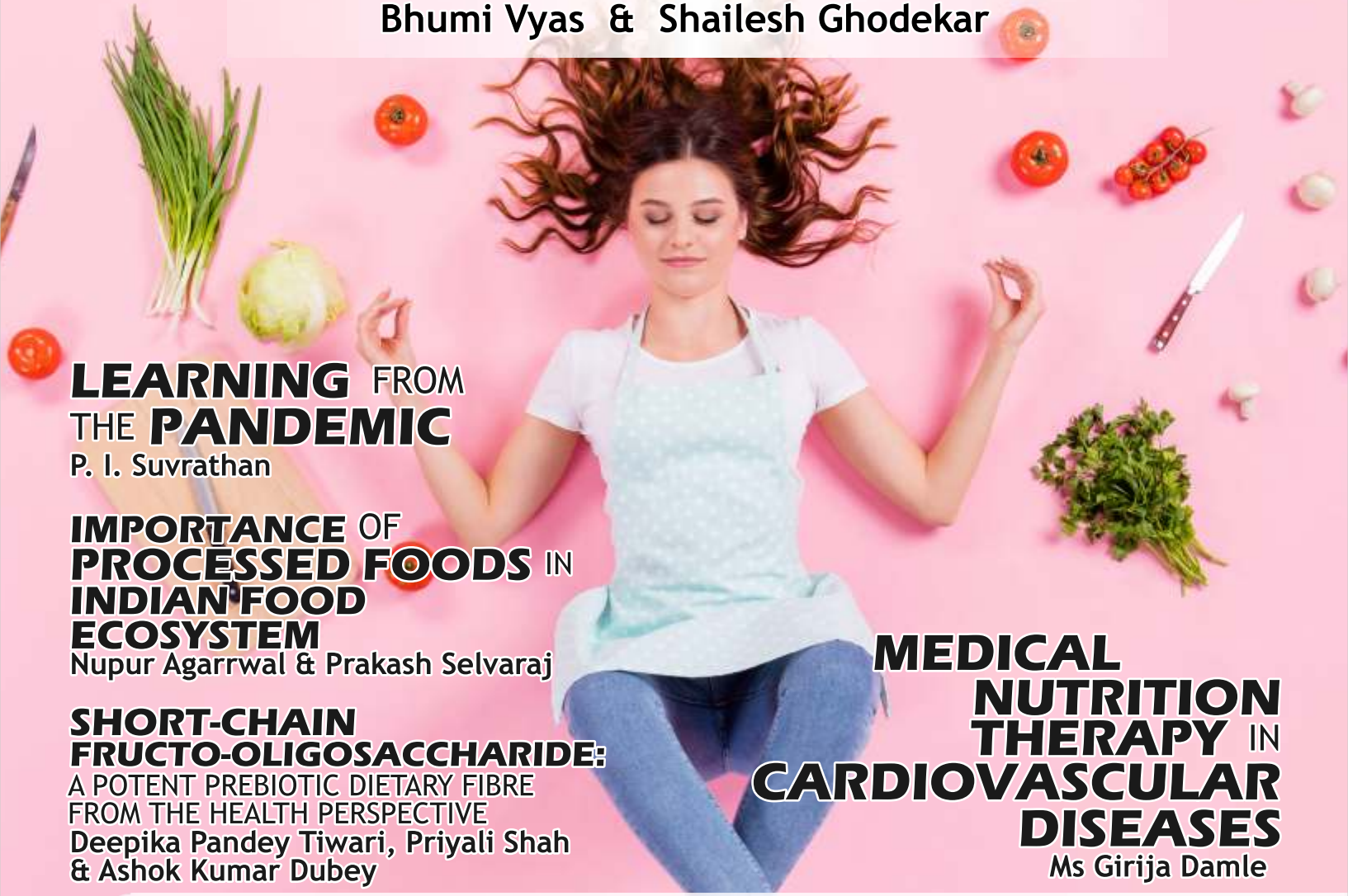
FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN JUL 2021

THE FOOD MOOD ANALOGY - NUTRITIONAL PSYCHIATRY

Bhumi Vyas & Shailesh Ghodekar



LEARNING FROM THE PANDEMIC

P. I. Suvrathan

IMPORTANCE OF PROCESSED FOODS IN INDIAN FOOD ECOSYSTEM

Nupur Agarrwal & Prakash Selvaraj

SHORT-CHAIN FRUCTO-OLIGOSACCHARIDE: A POTENT PREBIOTIC DIETARY FIBRE FROM THE HEALTH PERSPECTIVE

Deepika Pandey Tiwari, Priyali Shah & Ashok Kumar Dubey

MEDICAL NUTRITION THERAPY IN CARDIOVASCULAR DISEASES

Ms Girija Damle

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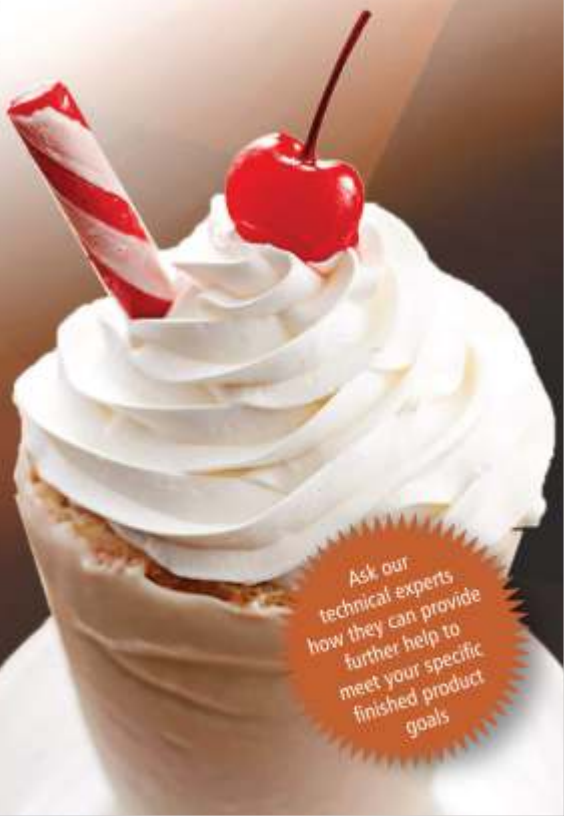

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PFNDAI Bulletin JUL 2021
PFNDAI FOOD, NUTRITION & SAFETY MAGAZINE

INDEX

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EDITORIAL

A few decades ago in the market there were only a few types of papads. Many papads were prepared by people at home. It all varied from different communities as they had their specialities. There were also regional differences that prepared them in their traditional ways.

These differences were in ingredients. Some used rice flour in addition to udad and some used potato flour while some others used corn flour. These gave differences in texture, appearance and crunchiness. People also had many flavours incorporated by adding some spices like garlic, black pepper and other materials that would provide nice differences in flavour.

The reason for using different ingredients was not to cheat. It was also not because they did not have the main ingredients enough. This is done to provide something different. People want something new. They like to see different colour, shape, texture, appearance, taste and flavour.

Later they started international flavours and ingredients when globalisation opened our markets so we were exposed to new tastes and cuisines. So cheese, barbeque, peri peri etc. started coming in the market.

People were also conscious of their health and weight, so there were offerings that contained dietary fibre and healthy oils and fats and of course baked or low fat.

This is not just in papads but one can see similar explosion of varieties in many different products such as biscuits, chikkis, breads, ice creams, yogurt and a large number of savouries and sweets. It is just the human nature to want something different, as people get a little tired of the same old food.

When there is a standardised product, that is not enough for people. They are not against standard product but they also want variety. Developer uses ingenuity to prepare something different that catches the fancy of the consumer. Thus the new product becomes popular. It is not always that a variation works. It is the innovation that makes it happen so the new product is better in some aspect than the original.

Variation or new version is different from the original. It is not necessarily made to circumvent the provisions of the standard for the product but to prepare something different that would attract the attention of the buyer.

Human mind is extremely resourceful and can come up with many innovative ideas to break the monotony of the common food products. We cannot make all the products standardised and it is not necessary to do so.

Standardisation is very essential for the purpose of safety. Such things as moisture content and acidity among other things in certain products are maintained for safety sake, to avoid growth of microbes. However, if the proprietary product is safe then there should not be any objection. Innovation should always be encouraged.

Prof Jagadish Pai,
Executive Director,
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THE FOOD MOOD ANALOGY - NUTRITIONAL PSYCHIATRY

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There is a saying in Sanskrit that states

अन्नमयंहीसोम्यमनः

which means

"As you eat, so you think"

Science is now proving this fact through evidence based research and this field of study is known as Nutritional psychiatry.

According to the World Health Organization, more than 300 million people worldwide suffer from depression and mood disorder. It's the world's leading cause of disability. The emerging field of nutritional psychiatry is supported by numerous studies that expand the understanding of the relationship between nutrition and mental health.

Mental health conditions are caused by inflammation in the brain , which ultimately causes our brain cells to die. This inflammatory response starts in our gut and is associated with a lack of nutrients from our food such as magnesium, omega-3 fatty acids, probiotics, vitamins and minerals that are all essential for the optimum functioning of our bodies.

In terms of nutritional psychiatry, we are learning through research that the food we eat impacts how we feel emotionally for example, stomach releases juices when hunger strikes even before one eats. This connection goes both ways. A troubled intestine can send signals to the brain, just as a troubled brain can send signals to the gut. Therefore, a person's stomach or intestinal distress can be the cause or the product of anxiety, stress, or depression.

Discovering the connection:

Have you ever wondered what we eat how it affects our brain?

The two organs are anatomically and biochemically connected, anatomically there is a nerve that connects our gut and brain the Vagus nerve and sends signals in both directions.

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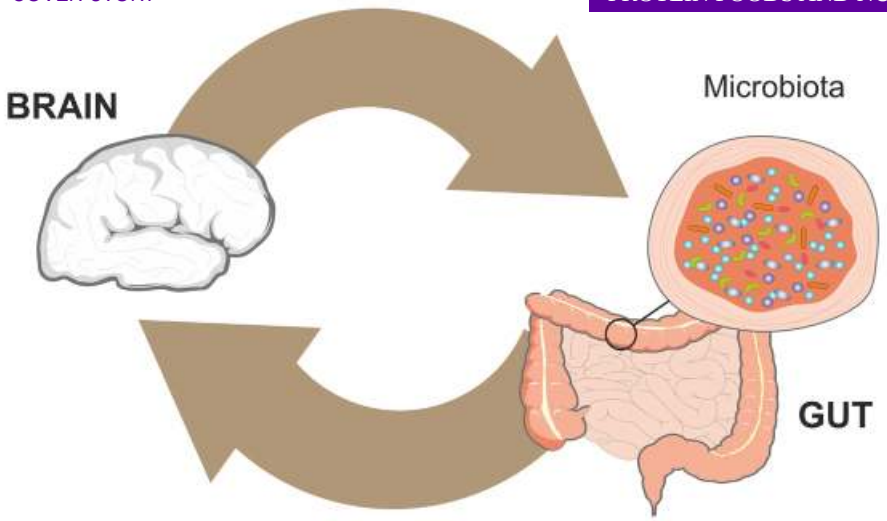
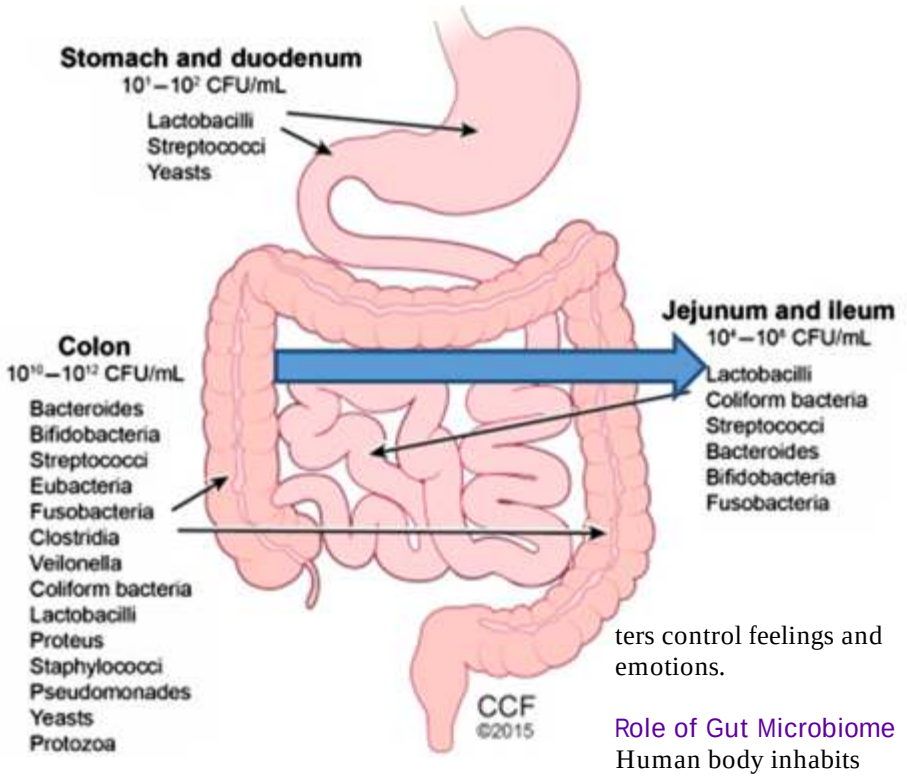




Communication between the gut and brain is known as Gut-Brain axis. This Gut brain axis forms the basis of understanding the role of diet in mental wellbeing. Signals transmission along the gut brain axis happens due to chemical messengers known as "neurotransmitters" These neurotransmitters are produced in brain by neurons and in the gut by the microbes present in gut microbiome. Neurotransmitters control feelings and emotions.

Role of Gut Microbiome

Human body inhabits microorganisms anywhere between 10 trillion and 100 trillion microbial cells in a symbiotic relationship; estimates may vary. Majority population of microbes resides in gut and is known as Gut microbiome.

Gut microbiome co-evolves as an individual grows and diversifies with different types of microbial species. This microbial diversity is impacted by factors such as way of birth and infant feeding method, exposure to stress, environment, diet, medications, stage of lifecycle, and comorbid diseases.

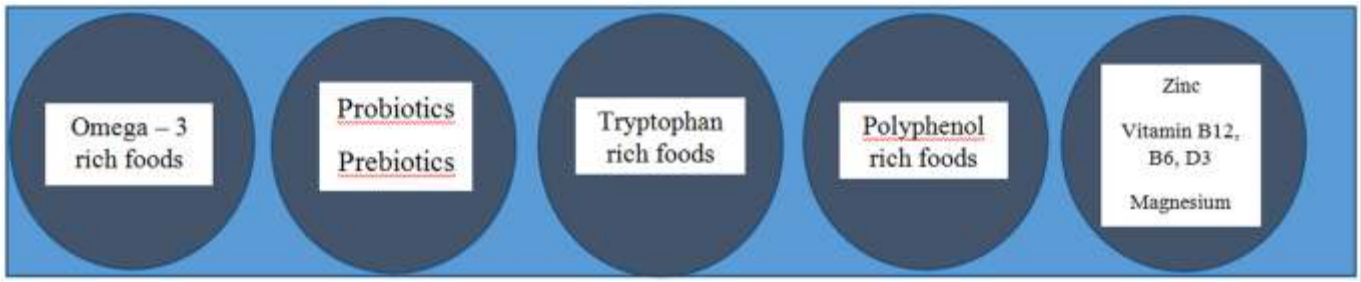
Diet directly affects the diversity of your gut microbes. Gut microbiome plays an important role in nutrient and mineral absorption, synthesis of enzymes, vitamins and amino acids, and production of chemicals, short-chain fatty acids (SCFAs).

Gut microbiome affects brain health by producing some key neurotransmitters and other chemicals.

The neurotransmitter Serotonin which is also known as happy hormone is produced in gut by microbes; largest proportion of serotonin comes from gut microbes. Serotonin helps regulate sleep and appetite, mediate moods and inhibits pain. Another important neurotransmitter produced by microbes in gut is gamma-amino butyric acid (GABA), which helps control feelings of fear and anxiety. Studies have proven that consumption of probiotics improves GABA production and reduces anxiety. These neurotransmitters through neurons in gut lining sends signal to the brain guiding emotions and mental wellbeing.

Your gut-brain axis is also connected through the immune system. Gut and gut microbes play an important role in your immune system and inflammation.

Foods Beneficial for Gut – Brain axis



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If your immune system is switched on for too long, it can lead to inflammation, which is associated with a number of brain disorders like depression and Alzheimer's disease. Lipo-polysaccharide (LPS) is an inflammatory toxin made by certain bacteria. It can cause inflammation if too much of it passes from the gut into the blood. This can happen when the gut barrier becomes leaky, which allows bacteria and LPS to cross over into the blood. Inflammation and high LPS in the blood have been associated with a number of brain disorders including severe depression, dementia and schizophrenia.

Gut bacteria affect brain health, so changing your gut bacteria may improve your brain health. This can be achieved by altering the diet and nutrients intake.

Food for thought

A few groups of foods are specifically beneficial for the gut-brain axis. On the other hand, inflammatory foods are tied to higher depression risk. Research has long indicated that a typical inflammatory Western diet, which includes sugary drinks, refined grains, fried food, processed meat, high-fat diary, and sweets, is associated with an increased risk of depression. A 2020 study, published in the International Journal of Environmental Research and Public Health, outlines several positive and negative associations between diet and depression.

Anti-inflammatory fats, including omega-3s from foods like wild salmon, and monounsaturated fat from avocado and extra virgin olive oil, are also tied to a reduced depression risk, as well as lower blood markers for inflammation. Omega-3 fatty acids are critical for the development and function of the central nervous system – and a lack has been associated with low mood, cognitive decline and poor comprehension.

Some probiotic the beneficial bacteria have been shown to improve symptoms of stress, anxiety and depression. Prebiotics, which are typically fibres that are fermented by your gut bacteria, may also affect brain health.
Food supplements such as zinc, magnesium, omega 3, and vitamins B and D3 can help improve people's mood, relieve anxiety and depression and improve the mental capacity of people with Alzheimer's disease.

Magnesium is one of most important minerals for optimal health, yet many people are lacking in it. One study found that a daily magnesium citrate supplement led to a significant improvement in depression and anxiety, regardless of age, gender or severity of depression. Improvement did not continue when the supplement was stopped.

Magnesium is found in pulses (beans, lentils, peas, and chickpeas), avocado, nuts, seeds, whole grains, and dark chocolate. You will also find folate in pulses, in addition to leafy greens, raw beets, citrus, asparagus, and broccoli. Zinc-rich foods include oysters, baked beans, pumpkin seeds, and cashews. Vitamin D is in salmon, sardines, eggs, and mushrooms exposed to UV light, although a supplement is typically required to achieve a healthy blood level of this nutrient. B12 is in animal-based foods and fortified nutritional yeast, and B6 is in chickpeas, potatoes, sweet potatoes, bananas, salmon, and tuna.

A high adherence to dietary advice for depression has been shown to significantly reduce the risk of developing depressive symptoms—including closely following a Mediterranean diet. This eating pattern is rich in vegetables, fruits, fish, nuts, pulses, and olive oil while severely limiting processed foods. In some populations, simply eating more fruits and vegetables has resulted in a 19%–23% improvement in mental health.

Conclusion

One can now agree that Gut Feeling does exist and the food mood analogy is responsible for it. Science is showing us that a healthy diet may have an impact on mental health. The impact that food has on mood and other aspects of mental illness is being researched. Nutritional psychiatry is developing into a real opportunity for clinical intervention for patients who suffer from depression and anxiety field of nutritional psychiatry is finding there are many consequences and correlations between not only what you eat, how you feel, and how you ultimately behave, but also the kinds of bacteria that live in your gut.

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Choosing comfort food for gut brain axis can help deal with stress and keep your emotional barometer levels in check. Improving your diet for better mental health offers positive outcomes, including potential weight loss, and improvements in immune function, blood sugar, cholesterol, blood pressure, and insomnia.

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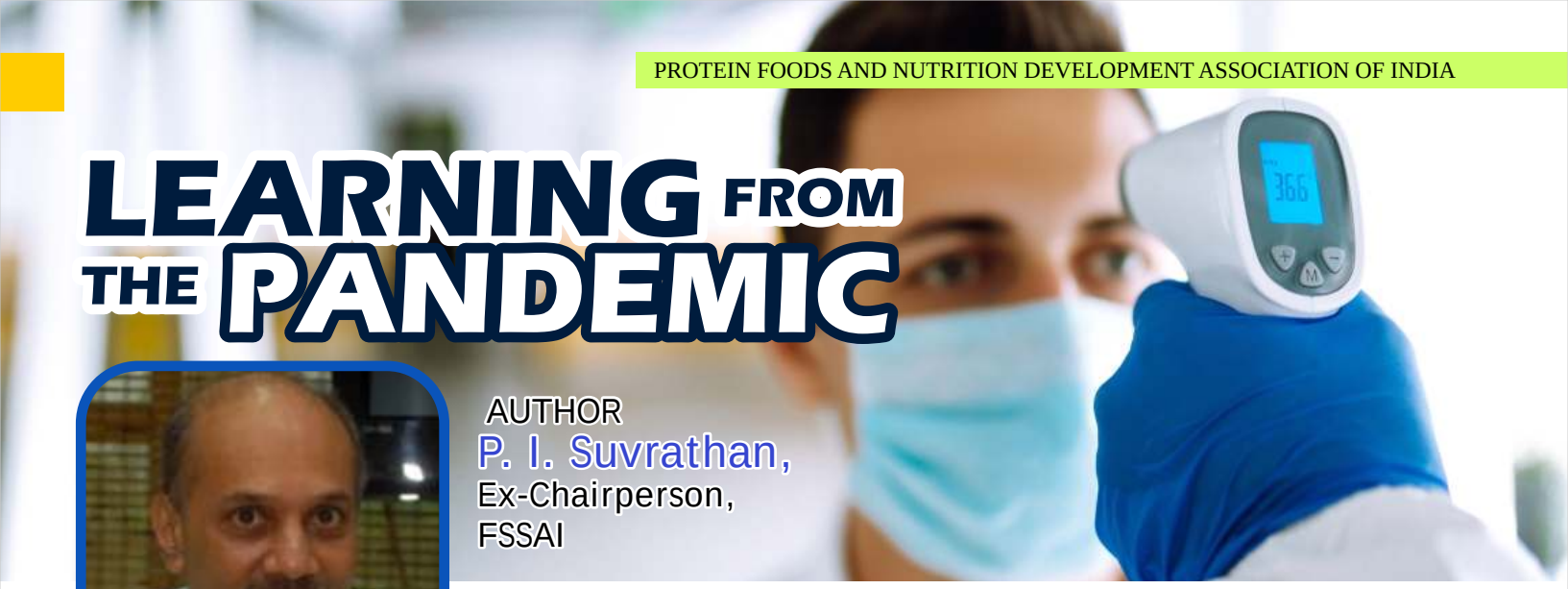

LEARNING FROM THE PANDEMIC

AUTHOR
P. I. Suvrathan,
Ex-Chairperson,
FSSAI

The energies of the nation are now focussed on fighting the Covid pandemic. While absorbed in fighting Covid it is important to ask whether there are other potential emerging disasters which are escaping our attention and which could pose an even greater danger to our society and to our lives from unexpected directions.

It is clear that our susceptibility to diseases, which have their origin in unsafe water and air, has been aggravated by the pandemic, resulting in high mortality and debility. This highlights the need to put in place a food safety surveillance mechanism that will catch and stop at the earliest a future pandemic due to loopholes in our current health and food safety surveillance systems. WHO has in its recent report on the sources of the current Covid pandemic flagged "potential food transmission risks" as one of the causative factors.

With our open borders and interconnected trade systems, a food hazard originating in far off countries can reach our borders within less than 24 hours unless we have a foolproof system to detect such pathogens and hazards.

Biological hazards have serious and immediate consequences on sizeable populations. Our current efforts to monitor and control disease outbreaks can, with suitable refinements, help in building a reliable food safety surveillance system in the country. This can anticipate a potential wave of food safety hazards, which has already been identified by experts as the next frontier of health hazards to look out for.

Advanced countries already have surveillance and monitoring systems in place, which can identify at the earliest the origin and spread of food hazards, narrow down the exact pathogen and the source of its origin as well as its impact on human health. Denmark has in place an ongoing surveillance system which tracks critical pathogens like E. coli, Salmonella and Listeria with a real time warning built in for all concerned agencies.

Pulsenet in the USA is a national molecular sub-typing network that has a chain of laboratories both at the federal and state govt level which continuously takes samples of food items, processed and unprocessed, and tests for their safety. At any specific moment, this enables the tracking of the risk levels due to a variety of health hazards and pathogens and suggests the most effective steps to address them.

There are groups of epidemiologists, pathologists, microbiologists, chemists and other health professionals who help in analysing samples in real time and flag hazards. Each disease outbreak is analysed and lessons built into mitigation strategies. Well-established traceability systems enable the quick identification of the sources of such hazards and help in initiating corrective measures.

We already have a basic network of labs and health institutions, generating sector wise data from all over the country on morbidity, pathogens and epidemiological status, which mostly lie unused. Most of this data is based on a passive reporting of incidents, caught only when they occur. Only continuous monitoring can track the movement of disease hazard levels.

We also have valuable, unutilised data emerging from the agricultural sector on the use of chemicals and pesticides, which is another potential source of hazards currently not tracked by laboratories nationwide because they are not equipped to do so. The limited morbidity data available with our medical institutions are not readily available for planning responses to disease outbreaks.

Lack of data on unclean air and water and their effect on health prevents us from becoming aware of the seriousness of these life and death issues and craft a suitable national response.

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We need to establish a network of data collection and analysis centres for microbial, chemical and other contamination levels in food and potability of water in all major cities and towns of the country. These should be linked to labs with adequate facilities and to scientific institutions, which can analyse them and flag critical issues.

The Food Safety and Standards Act currently does not regulate the safety of drinking water unless it is bottled. Many countries have dedicated agencies and stringent laws in place to protect the water catchments, which provide drinking water to their populations.

At the national level these efforts need to be integrated with health data so that they can be monitored over longer periods of time instead of being buffeted by political priorities.

For this to happen, regulations related public health issues such as safe food, water and mitigation of diseases should be structurally similar in their scientific temper, technological capability and management.

What can provide such a focus is the establishment of risk and science-based laws for clean air and water at the national level, which enable monitoring of pollution levels for air, and water.

These laws should lay down targets for safety levels in all parts of the country and penalties if these targets are not met. This alone can lead to dramatic reductions in pollution levels, which countries such as the USA, Denmark and Canada have been able to achieve.

There has reportedly been a decline of 74% in lead and 82% in carbon monoxide levels, leaving the air 77% cleaner after the implementation of the Clean Air Act in the USA.

The Environmental Protection Agency has been tasked and adequately funded to implement the act. Another area, which has been identified by the UN agencies, which has the potential for large-scale human distress is the deliberate contamination of water bodies.

Nothing more useful and critical can flow from our present Covid troubles than a framework to regulate the cleanliness of our air and water, both of which have the potential to impact and cripple human lives. With the pan-Indian integration of the economy and rising interstate goods movements, the chances of much larger health incidents are increasing.

Perhaps one of the most compelling consequences of the Covid pandemic would be to underline the need for a foolproof disease surveillance, monitoring and recovery system and the revamping of the health infrastructure this implies.

When we are at it, it would be prudent to keep in mind the above factors which are closely related and which could be the next source of a pandemic.

To have a Clean Air and Water Act in place and a surveillance mechanism for diseases including food borne diseases, we need to build a consensus and look at best practices elsewhere.

The time to start is now, when we are slowly coming to grips with how to handle a pandemic. The pandemic gives us an opportunity to put in place a systemic change in the way our environment and ways of life encourage the emergence of health hazards.

Covid has taught us the importance of understanding and living safely with other organisms in the environment. Building a reliable disease and food safety surveillance system in the country would be the first step towards this goal.

(Author was the first Chairperson of the Food Safety and Standards Authority of India.)

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IMPORTANCE OF PROCESSED FOODS IN INDIAN FOOD ECOSYSTEM

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PROCESSED FOODS - WHY THEY ARE IMPORTANT

Food processing in very simple terms means transforming foods from their raw nature to edible & tasteful form that would provide interesting variety in our daily diets. Without food processing it would not be possible to sustain the needs of 1.39 billion Indians including modern urban populations, and the choice of foods would be limited by seasonality, geographical locations, choices based on accessibility, affordability & sustainability along with the issues of price and convenience. These processing techniques also reduce post-harvest losses significantly in agro-commodities and thereby contributing to the betterment of farmers. Prevention of food wastage is now seen as one of the biggest controllable factors to increase food availability. Thus, processed foods play a very important role by contributing to both food security (ensuring that sufficient food is available) and nutrition security (ensuring that food quality meets human nutrient needs).

If we look at our day to day lives, when we prepare meal or snacks at home for our family, we actually process food by washing, grinding, boiling, frying etc. Even conventional food processing techniques such as microwave cooking are being used by many households. In fact, technically all foods undergo some form of processing before they are ready to consume safely. Some foods are even dangerous if eaten without proper processing such as milk, which needs to be pasteurised to remove harmful bacteria.

Food which we consume, provides us nutrients that are important for our physical growth and development, maintenance of normal body functionand overall health. Requirements of essential nutrients vary with age, gender, physiological status and physical activity. Dietary intakes lower or higher than the body requirements can lead to undernutrition or overnutrition respectively. An adequate diet, providing all nutrients, is needed throughout our lives. The nutrients must be obtained through a judicious choice and combination of a variety of foodstuffs from different food groups (cereals, milk, fruits, vegetables & oil) that may be processed or unprocessed as required to convert the same to edible & palatable form.

Nutritious food has to be combined with regular physical activity to maintain proper health. As per WHO, adults should do at least 150–300 minutes of moderate-intensity aerobic physical activity or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate and vigorous-intensity activity throughout the week. Children aged 5-17 years must do at least 60 minutes of daily physical activity. Thus, nutritious food along with physical exercise is must to sustain healthy lives.

Recent report by ICMR “What India Eats!” clearly stated that only 5% rural & 18% urban consumed food groups which are good source of protein. There is also indication

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that Indians have low consumption of fruits, vegetables, milk, legumes & nuts. NFHS-5 also reveals that there is increased malnutrition among children & more Indians are obese and anemic. These figures also point at the fact that we have to work together and develop such processed foods that can fulfill the needs of the growing population & are more nutritious. We also need to educate people about the need of portion control and importance of physical activity.

Food processing has been used for centuries in order to preserve foods, or simply to make foods edible. Our ancestors used salt, oil & sugar in fruits, to make pickles and added herbs and spices to improve the flavour of foods. However, these days food processing is misunderstood and alleged to be mostly associated with fried foods, sugary items, canned meat etc. The consumption of these products and associated health outcome have led many to assume that all processed foods are unhealthy, and seem to ignore the concepts of Variety, Balance & Moderation. which is essential to maintain in order to have a healthy diet and a healthier lifestyle.

MAKING NUTRITIOUS PROCESSED FOODS

Today, one of the common factors which is being associated with all processed foods is that their consumption has to be minimised completely but the effects of food processing on nutrition are so varied that they cannot be generalized under any one category.

Processing techniques

High heat treatment depletes the nutrients while some like fermentation enhance the same. Processing methods like freezing can preserve nutrients once the food is harvested from fields. In fact sometimes, fresh is not necessarily better than frozen, since frozen foods are usually processed soon after picking whereas fresh foods may spend days in transport and storage (both in the store and at home) before being consumed. If not stored properly, the transit can lead to deterioration of nutrients & overall food quality. If one cannot shop often, frozen produce may be more nutritious than fresh. Similarly, raw beans are inedible and the simple process of heating (e.g. boiling) renders them edible by destroying or inactivating specific anti-nutritional factors they contain.

The process of boiling vegetables does lead to losses of vitamin C but it can also release certain beneficial bioactive compounds such as beta-carotene in carrots, which would otherwise be less available during digestion because the heating breaks down the plant cell walls. Roasting is yet another way of making food palatable with less oil like roasted seeds, pulses, corn etc. Waterless cooking, pressure-cooking, steaming, stir-frying and microwaving are some other methods, which are least destructive of nutrients.

Products obtained through extrusion technology like pasta, vermicelli are source of protein & very low in fat, which when boiled with water & added vegetables can be a complete nutritious meal in itself. Extrusion technology may also be used to make meat analogues, which are made using plant proteins ("textured vegetable protein") and can be good source of protein for vegans. Retort processing is yet another technology, to make ready to eat products and results in retention of nutrients, improved product taste, longer shelf-life without any chemical preservatives and provides flexibility to consumers to just heat and eat. This enables locking Freshness - an intelligent delivery system from factory to shelves.

Processing techniques have also enabled to isolate functional ingredients like bio-actives, polyphenols, complex fibre, etc. with utmost safety so as to deliver the intended function for the target population in an effective manner. New techniques of Preservation like High Pressure Processing (HPP), Pulsed electric fields (PEF) etc. cause less harm to nutrients, thus improving the product quality without disturbing flavour, appearance, and nutrition. This had been used for various purposes, including to increase food quality and food safety.

Certain packaging methods also help to maintain the shelf life of products especially which are highly perishable, without addition of additives e.g. Tetra packaging, which allows for storage & shelf stability of fruit juices & Milk without any preservatives.

In addition, the advancements in agricultural practices like infection resistant varieties, improving soil nutrient (precision agriculture and production of healthy ingredients) and growing climate resilient crops can also be used to enhance the availability of nutritious food to consumers.

Enrichment/Fortification

In a country like India, huge focus is being laid on fortification across food products in order to provide servings of fortified foods especially rich in key micronutrients like Iron, Iodine, Vit A, Zinc etc. As per NFHS-5,Anaemia among women and children continues to be a cause of concern.

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More than half of the children and women are anaemic in 13 of the 22 States/UTs. National Nutrition Survey report in 2019, stated that 28% adolescents (10-19 years), 24% children (5-9 years) and 41 % kids (0-5 years) were anaemic. The report also indicated at Vitamin A, B12, Folic acid, Zinc and Vitamin D deficiencies in these different age groups.

FSSAI Fortified Food program (+F) is also an important initiative and supports value addition of vital nutrients. This is yet another way by which nutrients can be added back to processed foods which are either lost during the processing or those who have lesser nutritional value by their nature.

Fortified atta, milk, salt, seasonings, juices are some of the examples with which widespread nutrient availability of nutrients can be made for the population and eradicate some common deficiencies which otherwise cannot be just fulfilled with food in nature. Some processed and fortified foods provide important nutrients that may not otherwise be obtained in a busy household or one that has a limited food budget. Example fortified salt is one of the examples in India which have reached widespread households in India.

Processed foods act as a better vehicle for fortification as quality, stability and bioavailability can be controlled. For example, Biscuit is a widely consumed low-cost processed convenience food as it requires no additional preparation, easy to use at home or even during travel, easily being available in large number of variety of shapes, size, taste, packs and appeals to all age groups. They have a good shelf life at ambient temperature. Many key supplementation trials and studies have proven the benefit of nutrients provided through processed food matrix.

Certain processed foods are also almost life saver like infant formulas, which provide for the nutrition to a new born baby when the mother is not able to feed the child. Similarly, foods for special medical purposes like those for cancer, kidney patients, diabetic individuals, foods for those born with inborn errors of metabolism, gluten allergy are processed in a special manner and made with specific ingredients, to provide for nutrition for those that are not able to ingest normal foods or fulfil all nutritional needs with the daily food available.

Other category of processed and special formulated food is Meal replacement, which are required to treat those who are suffering with severe obesity and need low calorie and high in nutrition food to fulfil their daily needs.

Healthy ingredients choices

As we all know food is consumed for various purposes- joy, taste, nutrition and it is important to always find ways to incorporate value added ingredients like whole grains, seeds, fruits, nuts, vegetables etcto enhance its nutritional value, wherever possible. Examples include whole grain breads made with seed when enjoyed with salads can be a healthful breakfast option. Other options are products like poha, upma, pasta, vermicelli, broken wheat (dalia), corn flakes, multigrain flours, hung curd dips, oats dalia; oats idli, puffed quinoa, ragi flakes, etc.

Food products like 100% juice made with fruit & vegetables can also be source of nutrients as part of our daily nutrition. Yoghurts and flavoured milks are other good options to choose, which can be natural source of calcium & protein. In fact, fruit yoghurts can act as your daily desserts!

Frozen foods like tikki, kebabs can be made with the goodness of beetroot, chickpea, beans, paneer, veggies like spinach, carrots etc. These can be nutritious snacking alternatives, which can be baked and eaten as part of balanced diet. Another example of processed food is Pizza, which can be made nutritious & healthy with whole wheat flour, tomato sauce, veggies like broccoli, onion, corn, eggplant, spinach along with added herbs like basis, oregano.

Organic ingredients like milk, fruits & vegetables, cereal, oil can be other healthy ingredient choices that can be used to enhance the overall nutritional property of processed foods. The traditional ingredients such as Tulsi, Ginger, Ashwagandha etc. with reported usage in Ayurveda practices are also being explored. These are used in many processed foods so as to provide the consumers with additional health benefits. One can also enjoy the convenience of processed foods along with customization at home like enjoying noodles, pastas, soups with loads of added vegetables, eating high fibre whole wheat bread with sprouted pulses and legumes etc.

At last but not the least, the most essential part of the conversation is to focus on including products to make an overall healthy diet and it should always be balanced along with portion control & physical activity to enjoy the benefits processed foods offer. We should always keep in mind that we should plan and eat a balanced diet with all food groups. Different food products like snacks, ice creams, chocolates, including traditional sweets etc can still be part of balanced diet, if we focus on portion control and are involved in regular physical activity in our day to day life.

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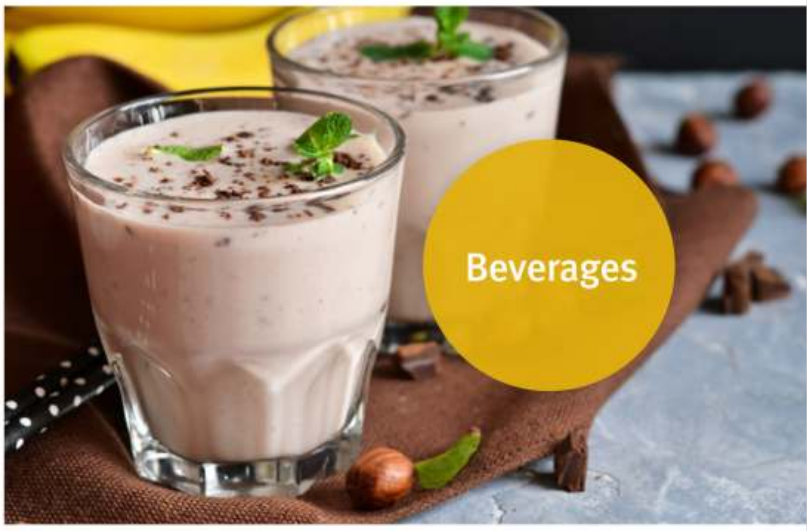

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SHORT-CHAIN FRUCTO-OLIGOSACCHARIDE: A POTENT PREBIOTIC DIETARY FIBRE FROM THE HEALTH PERSPECTIVE



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Background

Under the hypernym "Fructans" various non-digestible oligosaccharides exist, such as fructo-oligosaccharide (FOS), Oligofructose (OF) and Inulin. These molecules are linear chains of fructose units, held together by β(2-1) bonding, and end up with a terminal glucose moiety in FOS and terminal glucose/fructose in OF or Inulin, respectively.

These oligosaccharides have proven to be potential prebiotic dietary fibres which find its application in arenas like food, gut health supplement and animal feed. Process innovation has immensely added value in the synthesis of various kinds of fructan like short chain (sc) FOS, branched chain (bc) FOS and long chain (lc) inulin. These molecules differ in the degree of polymerization (DP) of fructose which ranges from 2-60, with a DP of 2-5 in sc-FOS, 8-12 for OF, 2-60 in inulin and ~25 in lc-inulin. Fructans with varied DP are fermented in different colon compartments resulting in gut microflora modulation favouring the beneficial bacteria. This in turn leads to short chain fatty acid (SCFA) production by microbes and thereby reduction in the intestinal pH. In this article, we focus on in-vivo and in-vitro studies on sc-FOS as a potent prebiotic fibre and its effect on alteration in gut microbes and related health benefits imparted in humans.

Introduction

Human intestine's ability to ferment a wide range of non-digestible oligosaccharides (NDOs) present in the diet is widely established. The individual's gut microbiome plays a crucial role for this process (https://doi.org/10.1017/s0007114510003363). These NDOs include prebiotic dietary fibres such as fructo-oligosaccharide (FOS), Galacto-oligosaccharide (GOS),Xylo-oligosaccharides (XOS) andIsomalto-oligosaccharide (IMO) which have been studied for their prebiotic effect (https://doi.org/10.1093/jn/125.6.1401; https://doi.org/10.1007/s11947-013-1221-6).

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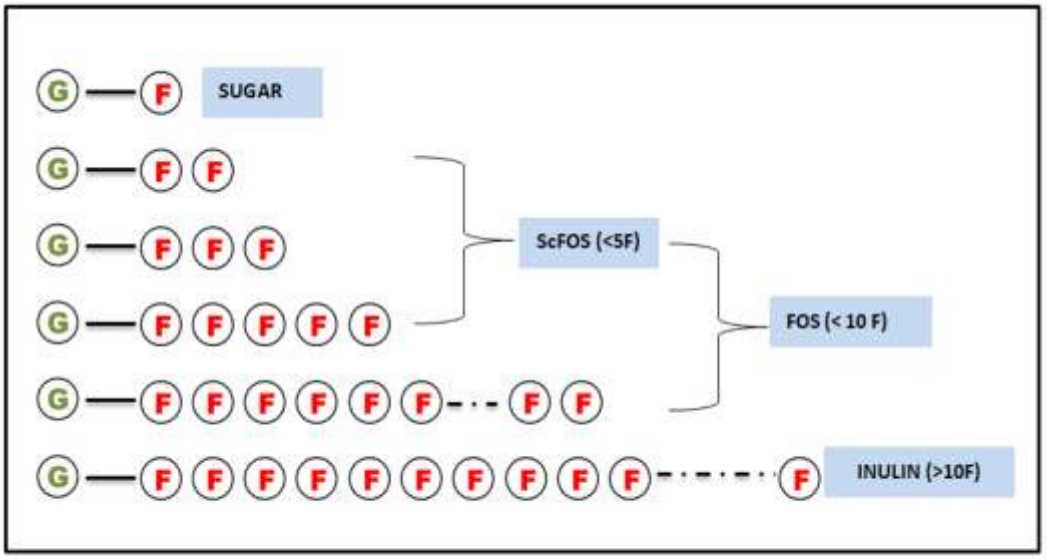
The term 'prebiotic effects' refers to selective alterations in gut microbiome composition and its related physiological effects both in-vivo and in-vitrostudies.

Today, the insights on prebiotic effects primarily holdtrue for two types of molecules namely inulin-type fructans (ITFs) and GOS (https://doi.org/10.1017/s0007114510003363). FOS is found naturally in many plant varieties like garlic, asparagus, banana, artichoke, onion, chicory. Sc-FOS, is one such fructan which is a soluble prebiotic dietary fibre produced through fermentation or enzymatic process.

Sc-FOS is a mixture of tri-saccharide (GF2), tetra-saccharide (GF3) and pentasaccharide(GF4) of glucose (G) and fructose (F). Terminal glucose is attached to fructose through α (1-2) linkage and fructose molecules are linked to each other with β (2-1) linkage (Fig. 1). These are oligomers of fructose(Fn) with one terminal glucose (G) moiety found at the non-reducing end of the chain. The general formula could be GFn wherein the 'n' is the number of fructose moieties and it may range between 2 and 4 (https://doi.org/10.1007/s11947-013-1221-6; https://doi.org/10.3390/nu5041417).

FOS impacts the microbial diversity in the gut that harbors millions of bacteria and its supplementation has been associated with increase in the content of beneficial bacteria in the gut which includes mostly the members of the genera Bifidobacterium and Lactobacillus (Williamset al 1994; Bouhniket al 1999) and a decrease in pathogenic bacterial load (https://doi.org/10.1016/j.febslet.2014.03.035).It has been studied through in-vitro (Palframanet al2003; Vulevic et al2004) and in-vivo studies (https://doi.org/10.1017/s0007114510003363).The increased growth of these organisms results in production of lactate and short chain fatty acids (SCFAs) such as acetic acid, propionic acid, butyric acid and the immediate effect of accumulation of these acids in the gut is reduction in luminal pH, which by itself would inhibit the growth of many pathogenic bacteria (https://doi.org/10.3389/fmicb.2016.00185). Produced lactate can also be converted to acetate, propionate and butyrate through the process of cross-feeding. Butyrate is the favoured fuel consumed by coloncytes and emerges out essentially as the tight junction protein regulator in the gut. SCFAs are potentially involved in the glucose homeostasis as well, as at the liver site, butyrate and acetate are lipogenic and propionate is gluconeogenic. Acetate is associated with reduction of free fatty acid. Increased plasma acetate level is indicated to be inversely associated to plasma insulin levels (https://doi.org/10.1080/19490976.2015.1134082). Additionally, the pathogens growth is inhibited through the crowding out effect i.e. the dominant growth of the beneficial bacteria preventing the binding of pathogens to the intestinal wall (https://doi.org/10.1093/ajcn/71.6.1682s).



Polymer length of Sugar, Fructo-oligosaccharides and Inulin

The importance of sc-FOS in the human nutrition can be understood by comprehending its capability as a dietary fibre from the perspective of gut health and general well-being and the underlying mechanism.

Human intervention studies

Sc-FOS has shown to increase faecal Bifidobacteria in healthy adult volunteers consuming their usual diet. 40 healthy individuals were administered 2 doses of sc-FOS for a period of 7 days into 5 subgroups (0g, 2.5g, 5g, 10g, 20g). As a result, Bifidobacteria counts were significantly greater in groups with FOS intake of 10 and 20 compared to the groups consuming 0g and 2.5g ($p< 0.05$) at the end of the study. As a known effect of consuming fibres, increased flatus was significantly more recurrent in subjects with the 20g sc-FOS intake than those with the intake of 0g, 2.5g or 5g ($p<0.05$).

In this study, 10 g/d sc-FOS was found as an optimal and well-tolerated dose which significantly increased fecal Bifidobacteria in healthy volunteers consuming their usual diet (Bouhnik et al 1999). Few other studies also reported similar outcomes using dose range of 2.5-10g per day for 7 days with significant bifidogenic properties ($p<0.05$) exhibiting a significant correlation in sc-FOS's dose dependent increase of faecal bifidobacteria counts at the end of the invention period ($p<0.001$) (https://doi.org/10.1080/01635589609514459;https://doi.org/10.1093/ajcn/80.6.1658;https://dx.doi.org/10.1186%2F1475-2891-5-8). A dose of 8g/d sc-FOS for 4 weeks, has helped in significantly increasing the faecal Bifidobacteria count in elderly healthy subjects as well (9.17±0.17 log cfu/g vs 8.52 ± 0.26 log cfu/g; $p<0.05$ in sc-FOS and basal period respectively) (https://dx.doi.org/10.1186%2F1475-2891-6-42). Sc-FOS administration at a daily intake of 5g to the patients with minor functional bowel disorder decreased the digestive disorder symptoms to 43.6% as observed ($p=0.026$) compared to the placebo. The results suggested that sc-FOS, if consumed regularly may improve digestive discomfort and quality of life in populations without any treatment (https://doi.org/10.1017/s000711450779894x). Full term infants (0 – 7 days old; n=61), receiving milk-based formula feed supplemented with 4g/L sc-FOS, have been shown to have significant increase in the bifidobacteria count (sc-FOS 8*106±4*107CFU/g faeces vs control -149*105±7*107 CFU/g faeces, $p=0.08$) (https://doi.org/10.3177/jnsv.60.167).

In another randomized, placebo-controlled, double-blind, dose-response relationship study, effect of varied levels of FOS, on gut microbiota and its time-based dynamics was studied in 80 participants. FOS intervention was provided at three dosage levels (2.5, 5, and 10 g /day) and placebo arm (Maltodextrin) at 10 g/day.Sc-FOS consumption, also at higher dosage could increase the relative abundance of operational taxonomic units (OTU) which belonged to Bifidobacteria and Lactobacillus, compared to placebo. During the sc-FOS intervention period, bacterial diversity was increased however its withdrawal decreased the same. Sc-FOS demonstrated a significantly positive result on butyrate-producing bacteria such as Oscillospira, Ruminococcus and Faecalibacterium. The study suggested that, increased bacterial diversity mediated by sc-FOS, a soluble dietary fibre may strengthen beneficial functions to the host (Tandon et al 2019).

Apart from gut health and mineral absorption, sc-FOS is also talked about its ability to attenuate postprandial glycemia. In a study conducted, a three phase, acute, randomized, cross-over, clinical trial among 25 healthy subjects (ClinicalTrials.gov: NCT03755232) to compare the acute glycemic and insulinemic response of Fossence (a short chain fructo-oligosaccharide), when administered alone or when added or substituted into a carbohydrate challenge.It was observed that Fossence did not increase the insulin levels and postprandial glucose. When Fossence was consumed alone, it did not increase postprandial glucose and insulin levels that suggested it is resistant to breakdown. When Fossence was added to a carbohydrate load, no increase in postprandial glucose or insulin levels wasobserved whereas 30% substitution of glycemic carbohydrate by Fossence significantly reduced postprandial glucose and insulin levels **(Fig. 2)**.

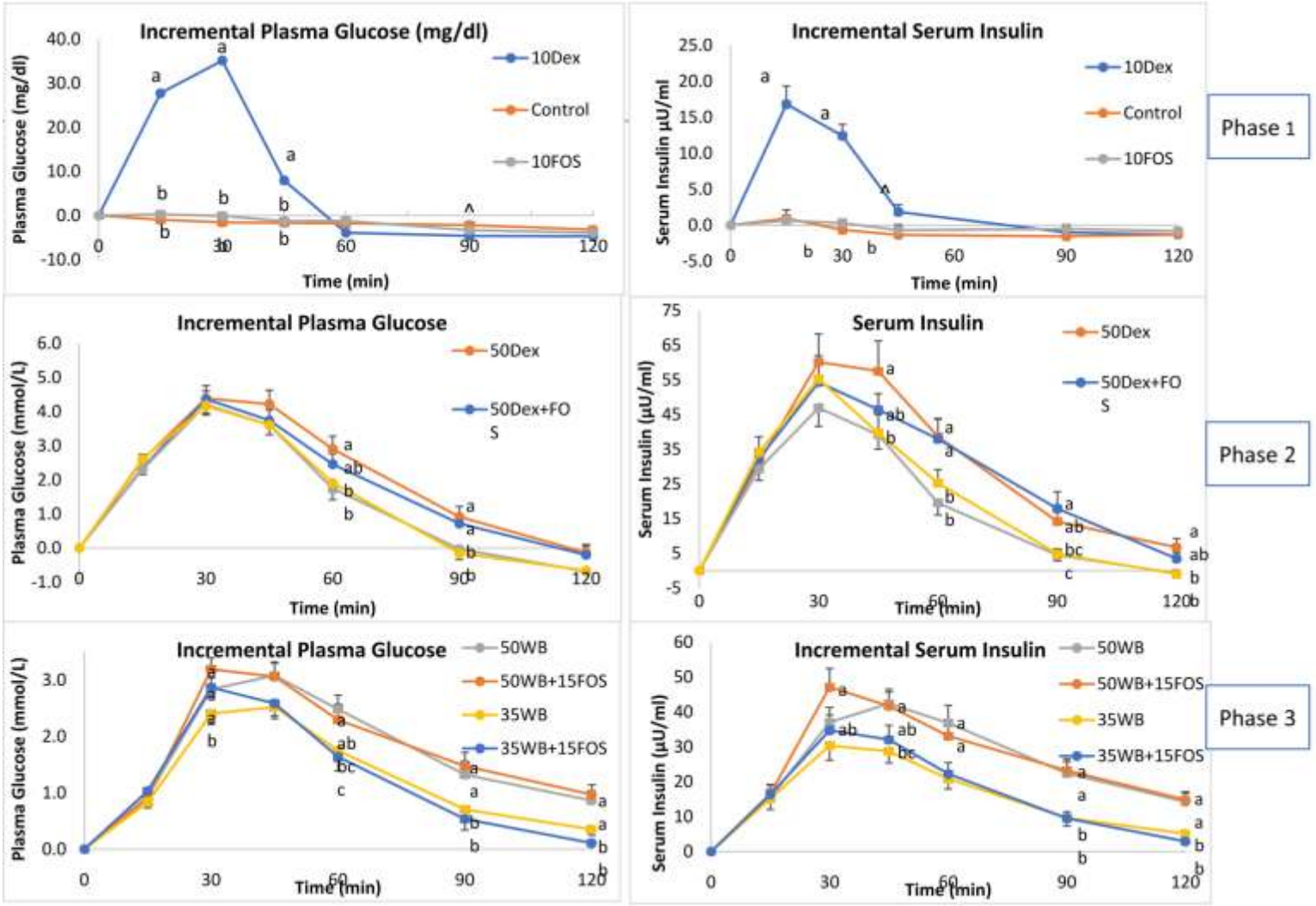


Figure 2: Effect of Fossence on incremental plasma glucose and incremental serum insulin in the three phases of the study. WB = White Bread; Dex = dextrose; FOS = Fossence; Details of Phase 1: 10Dex=10g dextrose, 10FOS=10g FOS, control= water;Details of Phase 2: 50Dex= 50g dextrose; 35Dex= 35g dextrose;15 FOS= 15g FOS; and details of Phase 3:50WB50= 51.9g available carbohydrate from white bread; 35WB= 35.1g available carbohydrate from white bread; 15FOS= 15g FOS). Values are means ± SEM for n = 25 subjects. Different letter superscripts means data points differ by Tukey's test, $p < 0.05$. D = significant main effect of Dose (35g differs from 50g) by ANOVA, $p < 0.05$ (Adopted from Shah et al 2021).

As it is known that Fossence has a sweet taste, and given the observation that sugar substitution can support in managing postprandial glucose and insulin levels, it may be advised to individuals on restricted sugar intake (Shah et al2021).

Sc-FOS may help in mineral solubilisation and preclinical studies have suggested that FOS exhibit positive skeletal effects. In a crossover trial where 14 adolescent girls (12–14 years) with low calcium intake were givensc-FOS or placebo (10g sc-FOSor maltodextrin for 36 days: 8 days daily post which intermittently till 28 days), a short term (but no long-term) effects improvement in mineral absorption, was observed. On the 8th and 36th day, true magnesium and calcium absorption was calculated in urine. Sc-FOS increased magnesium absorption by 18% after 36 days (and not after the initial 8 days), however, sc-FOS could not change calcium absorption (https://doi.org/10.1016/j.nutres.2009.03.005).

Effect of sc-FOS on Vitamin D synthesis, an in-silico theory

Vitamin D, a fat soluble vitamin, found in 2 forms: vitamin D3 (Cholecalciferol), and the plant-derived form, vitamin D2 (Ergocalciferol). It is generated in the skin, when 7-dehydrocholesterol interacts with ultraviolet (UV B) rays in sunlight. Vitamin D3 is also found in the foods of animal origin such as fatty fish (e.g., salmon, mackerel and tuna), cod liver oil, milk, etc. Vitamin D2 is found in vegetal sources like sun-exposed yeast and mushrooms.

Unfortunately, most dietary sources are not sufficiently rich in their vitamin D content, leading to Vitamin D deficiency (serum vit D <20 ng/ml) at large (40% to 99% prevalence).Vitamin D deficiencies in populations at large are quite notable. Also, in these unprecedented times of Covid19 and the preventive measures of staying at home, the exposure to sunlight becomes a question. Considering that individuals not taking Vitamin D supplements, its availability among them would also become restricted.

Vitamin D has its pivotal role in immunity as it activates macrophages and synthesizes antimicrobial peptides through immune and epithelial cells, which is essential to eradicate bacterial or viral infections such as influenza, which is often linked to vitamin D deficiency. Vitamin D can reduce risk of respiratory tract infections and the mechanism includes inducing cathelicidins and defensins (anti-microbial peptides) that can lower viral replication rates and reduce concentrations of pro-inflammatory cytokines.

Prebiotics for Vitamin D biosynthesis

Reduction in provitamin D3 (7-dehydrocholesterol, 7-DHC) is an important cause of vitamin D3 deficiency. Vitamin D supplementation, food fortification, and use of probiotics are some approaches to reduce vitamin D3 deficiency. Relation between the prebiotic supplementation and Vitamin D3biosyntheis through flux balance analysis (FBA) simulations using co-metabolism models comprising human host and a commensal bacterium (Faecalibacteriumprausnitzii or Bacteroidesthetaiotamicron) indicated the increased flux of 7-DHC with sc-FOS or inulin supplementation. Nearly, 2-fold upturn in flux compared to the baseline wasseen. Lactate, pyruvate, and acetate produced by the bacteria modulates the7-DHC biosynthesis in a dose dependent response. The simulation noticeably indicated that a prebiotic intervention may support a role in positively improving vitamin D levels in individuals exposed to sunlight. However, as this a model, the hypothesis needs to be studied in well-planned clinical studies to validate the same (Gokhale and Bhaduri 2019).

Animal study

From the immunity perspective, sc-FOS in the animal studies have shown toelevate the expression of polymeric Ig receptor in the small and large colon. This in turn, plays a role in transporting colonic IgA to the mucosal surface and adds to higher levels of secretory IgA in digestive substances during sc-FOS ingestion (Nakamuraet al.2004). Other studies in insulin-resistant rats, have displayed effectiveness in preventing lipid disorders postasc-FOS-containing food and decreased liver fatty acid synthase action (https://doi.org/10.1093/jn/128.8.1283). Nevertheless, effects of FOS on plasma lipids are still inconsistentin humans (Giacco et al. 2004).As till now studies have not talked about FOS's influence on the bone loss and peak bone mass (PBM) that is triggered by estrogen deficiency, hence a study was carried out in rats (ovary intact (sham) and ovariectomized (OVX) rats) to check the effect of Fossenceon the same. Sc-FOS (1.85 g/kg dose, for 12 weeks, equivalent to human converted dose (16 g/day) did not show any effect on body composition, weight body, and energy metabolism of sham and OVX rats. Sc-FOS had no effect on urinary or serum calcium/phosphorus values and absorption of calcium, however in the sham group a rising trend was observed. Compared to control, sham and OVX rats with sc-FOS arm demonstrated improved skeletal parameters. Sc-FOS was able to increase the serum levels of butyrate, known for its osteogenic property. This study demonstrated, for the first time that sc-FOS, at a dose equivalent in the humans, when used in rats can improve the PBM and have protective effects against bone loss induced by estrogen deficiency by selectively enhancement of new bone development. This outcome also suggests the role of butyrate in the said action (Porwal et al 2020).

Conclusion

Sc-FOS is an extensively studied soluble prebiotic fibre from the food and research angle. However, we have tried to present here its story from a perspective which firstly, confirms its role as a potent prebiotic fibre for human wellbeing through gut. Evidence has newer dimensions of general wellbeing through enhancing Vitamin D levels in humans. Its sweet taste and other physiological properties make it a suitable molecule to be used in various foods and beverages. Overall, consumption of sc-FOS brings in the element of fibre intake,and its fermentation in the proximal colon thatexert prebiotic effects by supporting growth of beneficial gut microbes and SCFA production that leads to human wellbeing.

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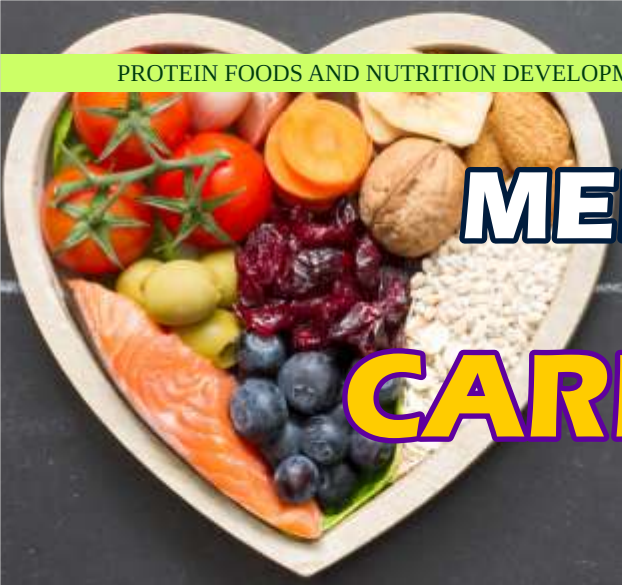


MEDICAL NUTRITION THERAPY IN CARDIOVASCULAR DISEASES

AUTHOR

Ms. Girija Damle,
Dietitian, PFNDAI

Recently, the focus of both, national and international public health programs has somewhat shifted from a sharp focus on infectious diseases like malaria and HIV to non-communicable diseases like diabetes, obesity, cardiovascular disorders (CVDs), etc. This shift is as a result of the increasing incidence and risk of lifestyle disorders due to poor eating habits, sedentary lifestyles, stress, and lack of sleep. A decade ago CVDs were associated with individuals at least above 45 years of age, but today those as young as 25 years may suffer from a heart attack.

Cardiovascular diseases that arise as a result of a poor lifestyle, range from hypertension (high blood pressure), coronary artery diseases, cardiomyopathy, arrhythmia, peripheral artery disease, to congestive heart failure and cardiac arrest. These diseases affect the functioning of the heart by increasing the load on the heart muscles. The mechanisms could include a block in the blood flow in the blood vessels, stiffening the walls of the blood vessels, compromised pumping capacity of the heart muscles, etc. This leads to symptoms such as palpitation, breathlessness, chest pain, dizziness, numbness, and tingling of the hands and feet, and fatigue.

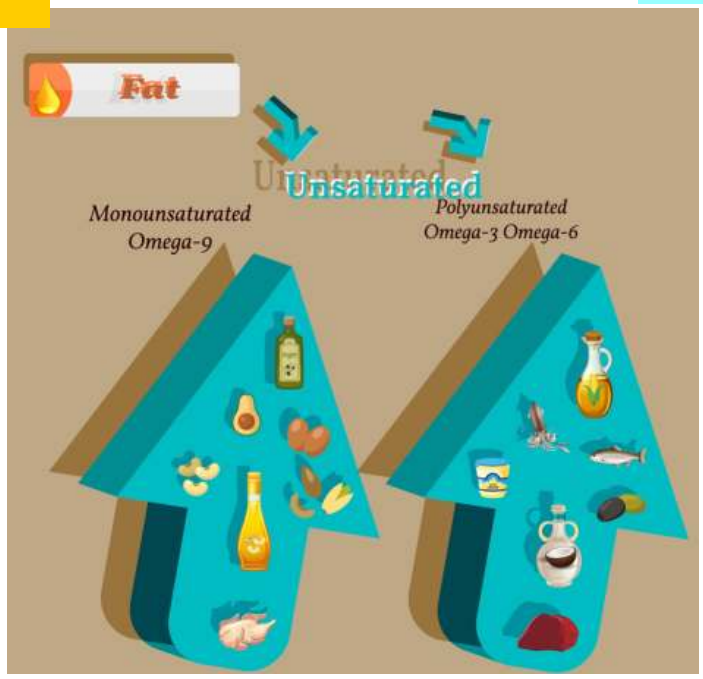
Some medical tests that can diagnose CVDs include blood pressure assessment, Electro-cardio-gram (ECG), serum cholesterol, serum triglycerides, inflammatory markers (C reactive protein, homocysteine, IL-6, etc), Echocardiogram, etc.

The treatment or management of CVDs requires a holistic approach that includes medicines, diet, exercise, sleep, and management of stress and mental health. Medical Nutrition Therapy (MNT), as the name suggests is the consumption of food such that it has some therapeutic effects. MNT can be supplementary to surgery, medicines, physiotherapy, etc, or can be the primary therapy in cases where the disease has not progressed very far or simply to reduce the risk of the disease. MNT aims to not only normalize the biochemical parameters or manage symptoms, but also tries to treat the root cause of the disease.

Some of the goals of the MNT for CVDs are:
1. To reduce and maintain the levels of blood lipids-cholesterol, triglycerides, and other biochemical parameters.
2. To prevent plaque formation in the arteries.
3. To reduce and maintain blood pressure in the normal range.
4. Prevent progression of the disease.
5. To improve quality of life.

Diets like the Mediterranean diet, DASH diet, etc were specially designed to manage heart diseases. Not only these but institutions like the American Heart Association (AHA), also recommend similar guidelines. Fortunately, none of them are highly restrictive or require you to consume difficult-to-access foods. Here are some aspects of your diet and lifestyle that need to be addressed.

Saturated fatty acids: Most guidelines, including AHA, recommend consuming no more than 7% of dietary fat from saturated fatty acid sources. These majorly include animal foods like butter, red meat, lard, full-fat dairy, etc. Ghee, however, seems to be an exception.



It is made of 65% saturated and 35% unsaturated fatty acids. Oleic acid, which is a major unsaturated fatty acid found in ghee is known to lower bad cholesterol (LDL) without lowering the good cholesterol (HDL) (Khosla & Khosla1, 2017). So is the case with coconut oil and eggs. Although both are sources of saturated fat, the ratio of different fatty acids and the presence of other essential nutrients do not seem to pose serious effects on the heart. Having said that, even ghee, coconut, or eggs should not exceed the 7% target for saturated fatty acid consumption. 1 tsp of ghee and 1 egg every day are regarded as safe to consume for most individuals. It is however best to consult a qualified dietitian before incorporating these into the diet because every individual's body is different and personalization is the essence of MNT.

Trans Fatty Acids: These are formed as a result of the hydrogenation of oils and are recommended to be completely eliminated from the diet. Margarine, Vanaspati ghee, etc are sources of trans fatty acids. They are used to make snack items like biscuits, nankhatai, namkeen, and mawa cakes, and desserts like ghevar, chocolates, ladoos, most bakery products, etc. Your Sandwichwala also most likely uses margarine instead of butter to cut down the cost price. Trans fats are known to increase bad cholesterol reduce the good cholesterol in the blood and increase inflammation, thus increasing the risk for serious CVDs.

MUFA and PUFA: MUFA or monounsaturated fatty acids are known to increase good cholesterol and reduce the bad cholesterol levels in the blood. They also exhibit anti-oxidant properties, thus reducing the disease-related inflammation in the body. PUFA (polyunsaturated fatty acids), on the other hand, reduce the bad cholesterol, but also reduce the good cholesterol levels in the blood. Two types of PUFAs, namely omega 3 and omega 6 fatty acids have the most nutritional significance and are categorized as essential fatty acids among others. Excess intake of some PUFAs (especially omega 6) may create a pro-oxidant environment in the body, thus increasing inflammation.

Sources of MUFA	Sources of PUFA
Oils- Olive oil, Sunflower oil, Safflower oil, Corn oil, Soybean oil, Canola oil, Peanut (Groundnut) oil, Mustard oil	Omega 6: Oils-Peanut oil, Corn oil, Soybean oil, Sunflower oil, Safflower oil, Foods-Soybean, Maize, Almonds, Peanuts
Foods- Peanuts, Hazelnuts, Almonds, Butter, Ghee	Omega 3: Oils- Canola oil, Linseed oil Foods- Salmon, Tuna, Cod, Walnuts, Flax seeds

Omega 3 fatty acids have extensively been studied as therapeutic agents for CVDs and show promising results. They not only correct biochemical parameters but also prevent the formation of plaque (blockage) in the blood vessels, thus reducing the risk for atherosclerotic CVDs.

Fiber: AHA, the DASH diet and, the Mediterranean diet, all emphasize increased intake of fruits and vegetables. The Indian and USA's MyPlate models recommend filling at least half the plate with fruits and vegetables. Along with fruits and vegetables, whole grains, pulses, legumes, and nuts also provide fibre. The type of fibre from these sources varies based on the solubility in water (soluble and insoluble fibre). Adequate fibre intake protects against and manages heart diseases by regulating appetite, reducing blood cholesterol levels, and improving gut health.

Fluid: Staying hydrated is essential for not only CVD patients or those at risk, but for everyone. The fluid in our body is present majorly in the blood that is continuously pumped by the heart. In some CVDs like congestive heart failure, fluids are restricted to avoid excess load on the heart. For such patients, not only water but fluids coming from dal, soups, juices, sherbets, and buttermilk is also closely monitored and need to fit into the daily fluid allowance. Sucking on ice chips or pieces of frozen fruit can help to manage thirst when on fluid restriction.

Sodium: It is a very important electrolyte in the blood, but an excess can cause issues like high blood pressure and water retention. A restriction of 2300-2000mg per day of sodium or 5g (approx. 1 tsp) salt per day is usually advised in the early stages of CVDs and as a preventive measure.

Restrictions with an allowance of as low as 800mg/day of sodium may be required in advanced stages, especially hypertension. The intake of not only the table salt added to food but also from packaged foods, pickles, papads, preserved fish, etc needs to be monitored. Use of adjuncts (alternatives) like lemon juice, tamarind (not preserved in salt), amchur powder, fresh tomato puree, dried herbs, and mint leaves may be used to replace salt wherever possible.

Sugar: Sugar not only elevates blood glucose levels and affects metabolic health, but is also known to increase inflammation in the body. All forms of sugar including and not restricted to white sugar, brown sugar, raw sugar, honey, jaggery, maple syrup, molasses, and agave syrup have similar effects with slight variations. Consuming a less refined form of sugar like jaggery or raw sugar is always advisable but a restriction similar to white sugar needs to be imposed. For prevention of CVDs, one should aim at no more than 2-3 tsp of total sugar per day including table sugar and sugar added to beverages, packaged foods, chocolates, yogurts, etc.

Protein: Increasing protein intake, especially from plant sources or lean meat and low-fat dairy is known to have cardio-protective effects, helps manage weight and reduce blood pressure. One should aim to consume at least one to two servings of protein-rich foods with every meal and at least 1 serving with snacks.

Carbohydrates: This macronutrient has somehow been portrayed as the villain when it comes to eating healthy. But carbohydrates from cereals, roots, pulses, dairy, fruits, and vegetables are a much-required source of energy for the muscles and the brain. Adequate intake of carbohydrates is also necessary to spare the proteins for life-sustaining functions like muscle building, enzyme, and hormone synthesis, building immunity, repairing wounds, etc. Refined carbohydrates like white bread, white pasta, refined wheat flour (maida), etc in large amounts are known to affect metabolic health and even lead to weight gain. But whole grains and millets like whole wheat, jowar, bajra, foxtail millet, barn millet, and oats are a good source of fibre and are loaded with vitamins and minerals. Replacing refined foods with whole grains and millets is a good way to consume the required energy, fibre, and nutrients.

Weight Management: Weight loss of 5-10% of the present weight is known to greatly improve metabolic health and reduce the risk of CVDs and other lifestyle disorders. Even for CVD patients, it is advised to take steps to manage their weight for better recovery and quality of life. However, weight loss from fat loss is desirable. Excess loss of muscle mass can be detrimental to health and should be actively prevented.

Micronutrients: Calcium, Vitamin D, Magnesium, and Potassium are found to have positive effects on heart health. Thus including foods or supplements with the advice of a doctor or qualified dietitian is recommended.

Physical activity: As the name suggests cardiovascular exercises such as cycling, jogging, swimming, brisk walking etc help in strengthening and improving the functional capacity of the heart and the circulatory system as a whole. Resistance exercises help to improve muscle strength, endurance, and metabolic health. Pranayam also helps to improve lung capacity and regulate blood flow in the body. These exercises are excellent to reduce the risk of CVDs, but CVD patients should perform any physical activity under the supervision of a physiotherapist or a qualified physical trainer.

Smoking and Alcohol: It is advised to refrain from smoking or consuming alcohol to not only CVD patients but also to the general population. It is recommended to consume no more than 2 drinks/day for men and 1 drink per day for women. Smoking and excess alcohol intake increase blood pressure, increase oxidative stress in the body, and adversely affect heart health.

Some superfoods that are known to be good for heart health are walnuts, garlic, amla, beetroot, fish, oats, green leafy vegetables, berries, etc.

The heart plays a very important role to maintain bodily functions. Prevention of CVDs should be our goal for a good quality of life. Management of CVDs requires sustainable efforts to improve lifestyle and food choices. A healthy heart is a boon and should be dearly protected.

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REGULATORY ROUND UP

By
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Dear Readers

Please find below FSSAI notifications, advisories, orders, etc since the last round up. FSSAI's latest salvo proposing changes in the licensing process of, ever contentious, proprietary foods could throw a few serious challenges to the FBOs. Please read on.

FSSAI has put up a consultation paper on the licensing process of Proprietary Foods (PF) and has sought comments from the stakeholders. PF are those foods which do not have standards of identity (SOI) but contain ingredients which are either standardized or permitted in any standard food under the Food Safety and Standards Regulations.

The consultation paper opines that FBOs are circumventing the requirements of a standard food by taking the PF route. According to FSSAI, this is undesirable because the quality of PF is not assessable as they do not have vertical standards. The paper gives an example of a food containing Honey and Ashwagandha.

This combination is not standardized under FSSR and the product is categorized as a PF. The problem for FSSAI is that the vertical standards of honey is not applicable in this case. It is obvious that an individual ingredient loses its identity once it is compounded with others.

To overcome the above "conundrum", the draft consultation paper proposes to intensify the scrutiny during the grant of license for PF. This scrutiny, according to the paper, may include review of the product by the Central Licensing Officers (CLO) to check whether it has been categorized as PF to bypass the vertical standards. The CLO may refuse to give license under the PF category (with justifications) or grant the license with conditions which would be printed on the license.

It is very apparent that this move will involve a prolonged back and forthwith the authorities resulting in a huge delay. Again, one cannot envisage the conditions that maybe imposed by CLO while granting the license for a PF. The conditions may be such that it could alter the product descriptions, market plans, etc and that too just prior to launch of the product/s.

The present clause 2.12.1 of FSS (Food Products Standards and Food Additives) Regulation 2011 clearly states that "Provided that any deviation in quality parameters of a standardised food, as specified in the Food Safety and Standards Regulations made under the Food Safety and Standards Act, 2006 shall not qualify the resultant product as a proprietary food". This provision in the existing regulation is available to CLO to prevent standard food being categorized as PF, as feared by FSSAI.

FOOD SAFETY AND STANDARDS AUTHORITY OF INDIA

The authority must also ask a question to themselves– Why are FBOs taking the route of PF? It is simply because many times the vertical requirements of standard foods, are restrictive with non-essential quality parameters. For example – FSSR specifies acidity requirement for vegetable sauces other than Tomato as 1.0% minimum. Acidity is related to pH and hence food-safety. If an FBO wishes to formulate a vegetable sauce with an acidity less than 1% (and ensure food safety during storage and distribution), FSSAI will not permit the product to be described as vegetable sauce.

So, the FBO has no choice but to take the PF route if the acidity cannot be matched. It is such conditions imposed by the standard that is at the heart of the problem.

The proposed move will severely restrict innovation. It is a well-known fact that it is impossible to set vertical standards in foods as there are infinite number of permutations and combinations of available food ingredients. Simple traditional South Indian product like "Sambhar" varies in different South Indian states and within a state,region to region,in terms dhal content, spices, etc. Imagine the situation in case of Indian traditional sweets and savouries. The vertical standards were possibly set in the yester years, when the food processing industry was at the nascent stage and awareness among the consumers was low.

The above argument is not against setting standards for PF. The submission is not to burden PF with SOI which will restrict innovation. SOI is essential for certain critical products like Infant Formula. In other cases, FSSAI should focus on the safety aspects. FSS (Contaminants, Toxins and Residues) Regulation 2011 has residual food categories like "Other Foods", "Foods not specified" which are fully applicable to PF. Horizontal microbial standards for different categories can be established for which presently there are no standards. Requirements of FSS (Labelling and Display) Regulation, 2020 and FSS (Advertising and Claim) Regulation, 2018, which are equally applicable to PF, will safeguard the consumer's interest.

Establishing vertical standards for food products would be an

endless exercise and many regulatory bodies have stopped it. FSSAI should focus on establishing horizontal safety standards for PF and on its compliance. FSSAI must facilitate the progress of Indian food industry which plays an important role in making India "Atmanirbhar". Stakeholders are requested to send in their comments in the prescribed format.

FSSAI has issued a directive on the categorization and licensing of Indian traditional sweets and savouries. The directive describes and categorizes the Indian traditional products in a very broad way so that it does not impinge on innovations. The classification is based on characterizing raw material in the product like milk, cereals, pulses, nuts, fruits and vegetables, etc. These products are classified under standard foods and hence the licensing process is simpler. The document also lists the permitted additives in different categories. A great boon for traditional sweet and savoury manufacturers.

Amendments are proposed in the recently introduced FSS (Labelling and Display) Regulation, 2020. The amendments are made operational from 17.11.2021. Some of the notable changes are

• Exemption conditions for the declaration of saturated and trans fat has been redefined
• Minimum height of letters and numerals have been changed to industry's benefit
• Products with expiry dates of more than 3 months can be declared in dd/mm/yy form.
• Many changes in the mandatory declaration in case of products with high intense sweeteners and polyols (Schedule II).

FSSAI has notified the adoption of RDA 2020 issued by ICMR. The notification summarizes the RDA values of nutrients and also includes the values for nutrients like Vitamin K , Vitamin E, Amino acids which are not in the final list. RDA 2020 is made applicable with immediate effect but RDA established in 2010 can be continued to be used till 01 July 2023. The notification warns that the tolerable upper limits mentioned in the document for nutrients is only for information purpose and not for use by the FBO.

A new category of food called "Ayurveda Aahar" has been introduced. Ayurveda Aahar is defined as a food which has been prepared by the methods described in Ayurvedic books. It may contain botanicals permitted in Schedule IV of the Health Supplement and other permitted additives. The ayurvedic ingredients might not be a part of our daily diet and their ad libitum consumption could pose safety challenges. Wonder whether the regulation would overlap with ayurvedic drugs!

FSSAI's clarification on the testing of bi annual testing of safety parameters. The six monthly requirement is based on April to September (1st six month) and October to March as the 2nd six month. The gap between the two analyses should be minimum 3 months. If the first 6 monthly analysis is done in September then the next six monthly can be done only in January.

In case of Lemon Juice the minimum acidity level has been amended to 3.5% minimum

The definition of coconut water has been widened to include water from matured coconut without expressing the coconut meat.

Enforcement date for FSS (Infant Nutrition) Regulation 2020 has been extended to 01 April 2022.

Timeline for compliance with the Processing aid regulation, notified on 09 October 2020, has been extended to 01 January 2022.

FSSAI has urged for the faster import clearance of crude edible oil and pulses.

Deadline for cattle feed manufactures to get their products certified by BIS has been extended to 01 Jan 2021.

FSSAI, through a notification, has approved a long list of processing aids in different foods and food categories. The list includes enzymes derived from genetically modified organisms.

In case of Lemon Juice the minimum acidity level has been amended to 3.5% minimum

FSSAI has stipulated that premises of Central License holders can be inspected only Central License officers.
The state food safety officers may support the central officers during the inspection.

FSSAI proposes to revise the testing fees for different laboratories

A procedure has been notified to revive the rejected online application for licensing or registration.

RESEARCH IN HEALTH & NUTRITION

Vegetarians have healthier levels of disease markers than meat-eaters

May 9, 2021 Science Daily

Biomarkers can have bad and good health effects, promoting or preventing cancer, cardiovascular and age-related diseases, and other chronic conditions, and have been widely used to assess the effect of diets on health. However, evidence of the metabolic benefits associated with being vegetarian is unclear.

To understand whether dietary choice can make a difference to the levels of disease markers in blood and urine, researchers from the University of Glasgow did a cross-sectional study analysing data from 177,723 healthy participants (aged 37-73 years) in the UK Biobank study, who reported no major changes in diet over the last five years.

Participants were categorised as either vegetarian (do not eat red meat, poultry or fish; 4,111 participants) or meat-eaters (166,516 participants) according to their self-reported diet.

The researchers examined the association with 19 blood and urine biomarkers related to diabetes, cardiovascular diseases, cancer, liver, bone and joint health, and kidney function.

Even after accounting for potentially influential factors including age, sex, education, ethnicity, obesity, smoking, and alcohol intake, the analysis found that compared to meat-eaters, vegetarians had significantly lower levels of 13 biomarkers, including: total cholesterol; low-density lipoprotein (LDL) cholesterol -- the so-called 'bad cholesterol; apolipoprotein A (linked to cardiovascular disease), apolipoprotein B (linked to cardiovascular disease); gamma-glutamyl transferase (GGT) and alanine aminotransferase (AST) -- liver function markers indicating inflammation or damage to cells; insulin-like growth factor (IGF-1; a hormone that encourages the growth and proliferation of cancer cells); urate; total protein; and creatinine (marker of worsening kidney function).

However, vegetarians also had lower levels of beneficial biomarkers including high-density lipoprotein 'good' (HDL) cholesterol, and vitamin D and calcium (linked to bone and joint health). In addition, they had significantly higher level of fats (triglycerides) in the blood and cystatin-C (suggesting a poorer kidney condition).

No link was found for blood sugar levels (HbA1c), systolic blood pressure, aspartate aminotransferase (AST; a marker of damage to liver cells) or C-reactive protein (CRP; inflammatory marker).

"Our findings offer real food for thought," says Dr Carlos Celis-Morales from the University of Glasgow, UK, who led the research. "As well as not eating red and processed meat which have been linked to heart diseases and some cancers, people who follow a vegetarian diet tend to consume more vegetables, fruits, and nuts which contain more nutrients, fibre, and other potentially beneficial compounds. These nutritional differences may help explain why vegetarians appear to have lower levels of disease biomarkers that can lead to cell damage and chronic disease."

The authors point out that although their study was large, it was observational, so no conclusions can be drawn about direct cause and effect. They also note several limitations including that they only tested biomarker samples once for each participant, and it is possible that biomarkers might fluctuate depending on factors unrelated to diet, such as existing diseases and unmeasured lifestyle factors.

They also note that were reliant on participants to report their dietary intake using food frequency questionnaires, which is not always reliable.

Your stomach may be the secret to fighting obesity

May 4, 2021
Science Daily

Scientists believe a stomach-specific protein plays a major role in the progression of obesity, according to new research in Scientific Reports.

The study co-authored by an Indiana University School of Medicine researcher, could help with development of therapeutics that would help individuals struggling with achieving and maintaining weight loss.

Researchers focused on Gastrokine-1 (GKN1) -- a protein produced exclusively and abundantly in the stomach. Previous research has suggested GKN1 is resistant to digestion, allowing it to pass into the intestine and interact with microbes in the gut. In the Scientific Reports study, researchers show that inhibiting GKN1 produced significant differences in weight and levels of body fat in comparison to when the protein was expressed.

"While diet and exercise are critical to maintaining a healthy weight, some individuals struggle with weight loss -- even in cases of bariatric surgery, maintaining weight loss can be a challenge," said David Boone, PhD, associate professor of microbiology and immunology at IU School of Medicine, an adjunct professor in the Department of Biology at the University of Notre Dame and a co-author of the study.

"These results are an example of how a better understanding of the gut microbiome and the physiological aspects of obesity -- how our bodies regulate metabolism and accumulate body fat -- could help inform new therapies."

Data from the Centers for Disease Control show adult obesity rates have increased to 42.4 percent in the United States. In addition to increasing an individual's risk of stroke, diabetes, certain cancers and other health issues, obesity can also increase the risk of severe illness due to COVID-19. Boone and his team conducted a microbiome analysis of mouse models with and without the GKN1 protein expressed. Researchers measured food intake, caloric extraction, blood sugar, insulin and triglyceride levels.

They used magnetic resonance imagining to monitor body composition. The team also calculated energy expenditure and observed inflammation levels. Models without GKN1 weighed less and had lower levels of total body fat and higher percentages of lean mass -- despite consuming the same amount of food.

When put on a high-fat diet, models without GKN1 showed a resistance to weight gain, increased body fat and hepatic inflammation, which can lead to liver disease. Researchers also found no evidence of adverse effects such as cancer, diabetes, loss of appetite, malabsorption or inflammation -- and results were consistent in male and female models.

While more research is needed to determine the efficacy of blocking GKN1 to prevent obesity, researchers said if proved as a viable solution, such therapies could reduce the burden on health care systems and help improve quality of life for patients.

People at high genetic risk for colorectal cancer benefit more from lifestyle changes

May 15, 2021 Science Daily

Analyzing data from participants in the UK Biobank, the researchers estimated that maintaining a healthy lifestyle was associated with a nearly 40% reduction in colorectal cancer risk among those with a high genetic risk of developing the disease.

The percentage dropped to only about 25% among people at a low genetic risk for this cancer. People with a high genetic risk and an unhealthy lifestyle were more than three times as likely to be diagnosed with colorectal cancer than those with a low genetic risk and a healthy lifestyle.

"Results from this study could be useful to design personalized prevention strategies for colorectal cancer prevention," said Wei Zheng, MD, PhD, MPH, Anne Potter Wilson Professor of Medicine and associate director for Population Sciences Research at Vanderbilt-Ingram Cancer Center (VICC).

In the analysis, lifestyle scores of unhealthy, intermediate and healthy were determined according to waist-to-hip ratio, physical activity, sedentary time, processed and red meat intake, vegetable and fruit intake, alcohol consumption and tobacco use.

Polygenic risk scores are used to measure genetic susceptibility to colorectal cancer.

Vanderbilt researchers constructed polygenic risk scores using genetic variants associated with colorectal cancer risk identified in recent large genetic studies including more than 120,000 study participants. They also constructed polygenetic risk scores for several other common cancers in research that was published last year in JNCI Cancer Spectrum.

The recently published study in The American Journal of Clinical Nutrition is one of the few that quantifies potential interactions of overall lifestyle with genetic susceptibility to colorectal cancer.

Contrasting DHA studies spark debate on omega 3 supplementation benefits

18 May 2021 Nutrition Insight

The debate over omega 3's health benefits has been reignited by new research from the Intermountain Healthcare Heart Institute (IHHI) in Salt Lake City, US. It found higher EPA blood levels alone lowered the risk of major cardiac events and death in patients, but DHA blunted the cardiovascular benefits of EPA. Higher DHA levels at any level of EPA worsened health outcomes.

"Based on these and other findings, we can still tell our patients to eat omega 3 rich foods, but we should not be recommending them in pill form as supplements or even as EPA and DHA-combined prescription products," says the study's principal investigator Viet Le, IHHI cardiovascular physician assistant. Simultaneously, however, a study published in Lancet stresses early preterm births may be "dramatically decreased" with DHA supplements. A dose of 1000 mg was more effective for pregnant women with low DHA levels than the 200 mg found in some prenatal supplements. "The dramatic decrease in early preterm birth with DHA supplementation will improve short- and long-term outcomes for children, families and society in a cost-effective fashion," says co-author Dr. Carl Weiner, professor of obstetrics and gynecology at the University of Kansas School of Medicine.

Omega 3s raise concerns

The IHHI study was presented this week at the 2021 American College of Cardiology's Scientific Session. Researchers identified 987 patients who underwent their first documented coronary angiographic study at Intermountain Healthcare between 1994 and 2012. They then tracked those patients for ten years, looking for major cardiac adverse events, including heart attack, stroke, heart failure requiring hospitalization or death. The researchers found patients with the highest levels of EPA had a reduced risk of major heart events. When evaluating how EPA and DHA affect one another, they found that higher DHA blunts the benefit of EPA. In particular, they also found that those patients with higher levels of DHA than EPA were more at risk for heart problems.

"Our findings show that not all omega 3s are alike. EPA and DHA combined together, as they often are in supplements, may void the benefits that patients and their doctors hope to achieve," says Le. A study from late last year also suggested EPA and DHA play separate roles in conveying health benefits.

DHA beneficial for pregnant patients

In the US study on DHA, women who received the higher dose had fewer early preterm births overall. However, participants with low DHA levels at enrolment had half the rate of premature preterm birth – 2 percent compared to 4.1 percent – when they were given a supplement of 1000 mg compared with those given a 200 mg supplement during the last half of pregnancy.

For women who began the study with high DHA levels, many of whom were already taking prenatal DHA, the rate of early preterm birth was 1.3 percent and there was no benefit of the higher dose.

"We knew from our previous work that US women eat very little food sources of DHA. We thought a higher dose might be needed to boost intake," says co-lead study author Dr. Christina Valentine, neonatologist and RD at the University of Cincinnati.

Because preterm birth is associated with negative outcomes and high healthcare costs, having an option for women to prevent preterm birth reliably and inexpensively is significant, the study supports.

Previous findings

The omega 3 sector is in the mature industry growth phase, meaning omega 3 supplements have become a household name in infant nutrition, cognition and heart health. The debate on the safety and efficacy of omega 3s, however, is not new.

A study just last month revealed an association between omega 3 supplements and an increased likelihood of developing atrial fibrillation. Industry experts emphasized the safety of omega 3 supplements to NutritionInsight, arguing that the benefits outweigh the risks.

Le from the IHHI study states omega 3 advice for heart health is "pervasive," but previous studies "don't back this up for every single omega 3."

At last year's American Heart Association's Scientific Sessions, several omega 3 studies casted doubt on the ingredient's potential in supporting heart health. For example, fish oil-based medication, known as omega 3 carboxylic acids, did not decrease the risk of cardiac events compared to a placebo.

At the 2019 American Heart Association's Scientific Sessions, two studies further shed light on omega 3 supplementation uncertainties. In one paper, researchers found no link between higher omega 3 levels and an increased risk of prostate cancer. Another found a link between higher plasma omega 3 levels and severe heart disease. Le was also involved in both aforementioned 2019 studies.

At the time, he stated: "While a seeming association between higher plasma omega 3 levels and the findings of severe heart disease upon initial angiogram might raise alarms that omega 3 isn't beneficial, the patients did live to see a doctor and get diagnosed."

By Anni Schleicher

Food for your mood: High intake of fruits and vegetables linked with less stress, study reveals

18 May 2021 Nutrition Insight

An Edith Cowan University (ECU) study has found that a diet rich in fruits and vegetables is associated with stress levels 10 percent lower than diets with low intake. The study "solidifies the link" between mental well-being and diets rich in fruits and vegetables, asserts Simone Radavelli-Bagatini, lead researcher and PhD candidate from ECU Institute for Nutrition Research.

"We found that people who have higher fruit and veggie intakes are less stressed than those with lower intakes, which suggests diet plays a key role in mental well-being." ECU researchers observed the relation between fruit and vegetable intake and stress levels in 8,600 Australians aged between 25 and 91 years old. The participants were in the Australian Diabetes, Obesity and Lifestyle (AusDiab) Study from the Baker Heart and Diabetes Institute.

The data shows that people who ate 470 g of fruit and vegetables daily had 10 percent lower stress levels as compared to those who consumed less than 230 g.

Mood is a growing concern

As mental health conditions increase globally, there has been a higher demand for holistic nutrition. In Australia, one in every two persons will experience a mental health issue in their lifespan.

One in ten people globally live with a mental health disorder. There is a rising correlation between stress and long-term health conditions, Radavelli-Bagatini notes.

"Long-term and unmanaged stress can lead to a range of health problems including heart disease, diabetes, depression and anxiety, so we need to find ways to prevent and possibly alleviate mental health problems in the future."

Although it is unclear which mechanisms are behind the influence of fruits and vegetables on stress, the findings suggest it could be antioxidants present in the food that elevate mood. "Vegetables and fruits contain important nutrients such as vitamins, minerals, flavonoids and carotenoids that can reduce inflammation and oxidative stress, and therefore improve mental well-being," she says.

"Inflammation and oxidative stress in the body are recognized factors that can lead to increased stress, anxiety and lower mood."

By Nicole Kerr

Probiotics linked to fewer respiratory symptoms in obese middle-aged adults

14 May 2021 Nutrition Insight

Daily probiotic use was associated with fewer upper respiratory symptoms in overweight and older people in a new Gut Microbes-published study. Reducing the risk of respiratory infection by putting bacteria in the gut is "not necessarily the most intuitive idea," says lead researcher Dr. Benjamin Mullish, clinical lecturer in the division of digestive diseases at Imperial College London, UK.

"But it's further evidence that the gut microbiome has a complex relationship with our various organ systems. It doesn't just affect how our gut works or how our liver works; it affects aspects of how our whole body works."

Strongest effect in middle-aged, obese adults

Researchers re-analyzed detailed daily diaries of 220 patients who participated in an earlier double-blind placebo-controlled study on probiotics and weight loss. The study authors then reviewed the entries for common upper respiratory infection (URTI) symptoms, including cough, sore throat and wheezing. They found that participants who took a combination of Lactobacillus and Bifidobacterium probiotics during the six-month study had a 27 percent lower overall incidence of URTI symptoms than the placebo group. The effect was largest among participants who were aged 45 years or older, as well as those with obesity.

Obese adults are at higher risk for respiratory infections. Previous research has shown that probiotics reduce URTI in healthy adults and children, but the research maintains little data exists on this vulnerable population of older, overweight and obese adults.

Goes both ways?

The findings suggest the probiotic combination may also have a potential role in stabilizing or preventing changes in gut microbiome composition in response to an URTI. Probiotics are considered overall safe and well tolerated, the study affirms, and relatively limited alternative therapeutic options currently exist to prevent URTIs – including COVID-19.

"As such, we feel that a compelling case exists for further randomized studies to prospectively explore the potential impact of probiotics on the prevention of respiratory infections," states the study. Further research is encouraged to delineate mechanisms by which probiotic bacteria impact the gut-lung axis.

Gut-lung axis prominence

The study findings add to growing interest in the bidirectionality of the gut-lung axis. "It's not just the gut sending out signals that affect how the lungs work. It works in both directions. It adds to the story that changes in the gut microbiome can affect large aspects of our health," says Mullish.

Shedding further light on the bilateral relationship, a study supported by AB-Biotics in March found COVID-19 patients who consumed the company's probiotics once a day for a month saw "significant" impacts on remission rate, duration of symptoms and viral load.

By Anni Schleicher

Mixed tree nuts may support weight loss and improve satiety, finds UCLA study

05 May 2021 Nutrition Insight

Including mixed tree nuts in weight management programs can result in significant weight loss and improved satiety, according to a new study from the University of California, Los Angeles (UCLA). Moreover, a mixture of tree nuts might be "superior" to the consumption of one type of tree nut, the Nutrients-published research found.

"Tree nuts – almonds, Brazil nuts, cashews, hazelnuts, macadamias, pecans, pine nuts, pistachios and walnuts – are all a great source of protein, healthy fats and fibre," explains lead researcher Dr. Zhaoping Li, professor of medicine and chief of the clinical nutrition division at UCLA. "This makes them so satiating and may be a major reason why we saw less weight gain in the tree nut group during weight maintenance," she notes.

The UCLA researchers estimate most people get around 25 percent of their calories each day from snacks and a large proportion come from desserts, sugar-sweetened beverages, sweets and salty snacks. "By replacing just one of those snacks with 1.5 ounces of tree nuts may result in a positive impact on weight and overall health," states Li.

Mixed tree nuts increase satiety

Researchers from UCLA compared 95 overweight or obese men and women, aged 30 to 68 years, who consumed either 1.5 ounces of mixed tree nuts or a pretzel snack. Both snacks provided the same number of calories, as part of a hypocaloric weight loss diet – 500 calories less than resting metabolic rate – over 12 weeks. This was followed by an isocaloric weight maintenance program for an additional 12 weeks.

The study authors maintain no significant difference in weight loss was observed between the nut and pretzel snack groups. However, tree nuts were associated with increased satiety, decreased heart rate and increased serum oleic acid during weight maintenance.

Moreover, there was a significantly higher dropout rate in the pretzel group (36 percent) compared to the tree nut group (13 percent) in spite of matching retention efforts. The researchers suggest eating tree nut snacks increases satiety due to a decrease in appetite-related hormones ghrelin and leptin, as well as tree nuts' increased energy density.

Getting weight under control

Weight management is a major concern among consumers, as obesity is one of the most common non-communicable diseases. Efforts to curb its adverse health effects are rising, both from industry and public health organizations, especially in light of the COVID-19 pandemic.

In fact, risk of death from COVID-19 is ten times higher in countries where over half the population is classified as overweight, according to a report released by The World Obesity Federation.

By Anni Schleicher

Exercise, healthy diet in midlife may prevent serious health conditions in senior years

March 31, 2021 Science Daily

Following a routine of regular physical activity combined with a diet including fruits, vegetables and other healthy foods may be key to middle-aged adults achieving optimal cardiometabolic health later in life, according to new research using data from the Framingham Heart Study published today in the Journal of the American Heart Association, an open access journal of the American Heart Association.

Cardiometabolic health risk factors include the metabolic syndrome, a cluster of disorders such as excess fat around the waist, insulin resistance and high blood pressure. Presence of the metabolic syndrome may increase the risk of developing heart disease, stroke and Type 2 diabetes.

Researchers noted it has been unclear whether adherence to both the U.S. Department of Health and Human Services' 2018 Physical Activity Guidelines for Americans and their 2015-2020 Dietary Guidelines for Americans -- as opposed to only one of the two -- in midlife confers the most favorable cardiometabolic health outcomes later in life. The physical activity guidelines recommend that adults achieve at least 150 minutes of moderate or 75 minutes of vigorous physical activity per week, such as walking or swimming. The dietary guidelines, which were updated in January 2021, offer suggestions for healthy eating patterns, nutritional targets and dietary limits.

In an analysis of data from participants of the Framingham Heart Study, which began more than 70 years ago in Framingham, Massachusetts, investigators examined data from 2,379 adults ages 18 and older and their adherence to the two guidelines. They observed that meeting a combination of the two recommendations during midlife was associated with lower odds of metabolic syndrome and developing serious health conditions as participants aged in their senior years in 2016-2019 examinations.

"Health care professionals could use these findings to further promote and emphasize to their patients the benefits of a healthy diet and a regular exercise schedule to avoid the development of numerous chronic health conditions in the present and in later life," said corresponding author Vanessa Xanthakis, Ph.D., FAHA, assistant professor of medicine and biostatistics in the Section of Preventive Medicine and Epidemiology at Boston University School of Medicine in Boston. "The earlier people make these lifestyle changes, the more likely they will be to lower their risk of cardiovascular-associated diseases later in life."

Study participants were selected from the third generation of the Framingham Heart Study. Participants (average age 47, 54% women) were examined between 2008 and 2011. Researchers evaluated physical activity using a specialized device known as an omnidirectional accelerometer. The device, which tracks sedentary and physical activity, was worn on the participant's hip for eight days.

Researchers also collected dietary information from food frequency questionnaires to measure the kinds and levels of food and nutrients consumed.

In this investigation, researchers observed that among all participants, 28% met recommendations of both the physical activity and dietary guidelines, while 47% achieved the recommendations in only one of the guidelines. Researchers also observed that:

- participants who followed the physical activity recommendations alone had 51% lower odds of metabolic syndrome;
- participants who adhered to the dietary guidelines alone had 33% lower odds; and
- participants who followed both guidelines had 65% lower odds of developing metabolic syndrome.

"It is noteworthy that we observed a dose-response association of adherence to diet and physical activity guidelines with risk of cardiometabolic disease later in life," Xanthakis said. "Participants who met the physical activity guidelines had progressively lower risk of cardiometabolic disease as they increased adherence to the dietary guidelines."

All study participants were white adults, therefore, the findings cannot be generalized to people in other racial or ethnic groups. Additional studies with a multiethnic participant sample are needed, researchers said.

FOOD SCIENCE & INDUSTRY NEWS

Beta-sitosterol: Researchers patent plant sterol for anxiety relief

25 May 2021 Nutrition Insight

Beta-sitosterol, a natural food sterol traditionally known to reduce cholesterol levels, has acutely reduced anxiety in a mouse study from the Weizmann Institute of Science, Israel. The plant-derived substance was found to produce this effect both independently and in synergic combination with fluoxetine, an antidepressant known under the brand name Prozac.

Dr. Nicolas Panayotis from Weizmann's Department of Biomolecular Sciences applied for a patent with co-author Professor Michael Fainzilber, aiming to license beta-sitosterol to industrial and pharmaceutical companies interested in anxiety-related disorders. However, Panayotis adds it is "too early" to disclose any information on potential partners.

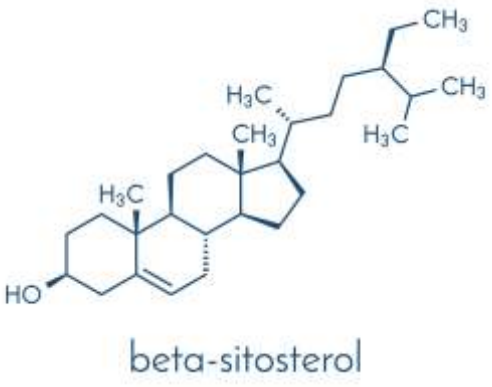
A need for naturality Published in Cell Reports Medicine, the study highlights currently available treatments for anxiety and stress-related disorders rely heavily on the pharmacological modulation of hormones and neurotransmitter systems. "The suboptimal efficacy and side-effect profiles of current anxiolytics have motivated a search for new targets and drug candidates in this area," state the authors. Panayotis flags an "urgent need" to find or develop drugs with little or no side effects, which could be tolerated over long periods of treatment.

Fifty-seven percent of consumers perceive natural products to be safer than synthetic or artificial products, according to the market researcher,

while 60 percent said they were better for the environment. Notably, the most common positioning for food, drinks and supplements launched with natural ingredients in 2020 was No Preservatives and Additives – found in nearly a fifth of these launches.

Respecting "good anxiety" The Weizmann Institute of Science highlights that anxiety is "not always a bad thing." In evolutionary terms, anxiety makes the body physically alert to potential threats, which is "critical for survival." However, developing anti-anxiety drugs is challenging because the circuits for anxiety in the brain are closely related to those responsible for memory, awareness and other functions vital for handling danger.

In a series of behavioural experiments, mice given beta-sitosterol showed much less anxiety than the controls. They were, for example, less fearful than the controls when placed in an illuminated enclosure. Here, they dared to walk into its brightly lit centre, whereas regular mice were careful to stay on the darker periphery, avoiding the stress of the bright light.



beta-sitosterol

Moreover, the mice receiving beta-sitosterol did not exhibit any of the side effects that might be expected from anti-anxiety medications – their locomotion was not impaired and they did not refrain from exploring novel stimuli.

When combined, beta-sitosterol and fluoxetine synergistically reduced the anxiety of mice at lower doses, compared with the doses needed to produce the same effect when they were administered separately.

By Anni Schleicher

Infant nutrition diversifies to address demands

18 May 2021 Nutrition Insight

The infant nutrition space is becoming more specialized, with conditions like allergies and anxiety driving diversified options. Experts from Fonterra, Lallemand Health Solutions, Vaneeghen, Arla Foods Ingredients and Chr. Hansen speak to NutritionInsight about trending topics in this space, including China's potential and the role of probiotics.

"Personalization and changes in regulations challenge the status quo and will impact the next generation of infant nutrition products," predicts Pactli Alexis Cabanetos, business development manager at Vaneeghen.

Daniel Hovel Hansen, head of infant, children and women's health at Chr. Hansen, also observes a trend toward further specialization and specific targeting of infant formula. Today's "diverse" infant formula category offers a range of products targeting specific health benefits that are relevant to individual consumer segments.

Besides allergies, some examples include infant formulas targeting colic, pre-term infants, brain development, gas and indigestion. Organic and plant-based varieties are also emerging.

"We absolutely expect this trend of specialization to continue as scientific research expands the industry's and consumers' awareness of the nuances of infant nutrition," he continues.

"The range of premium formulas with differentiated ingredients is broad and continues to grow as parents have specific formulas they can choose for particular diseases, like iron deficiency and iron deficiency anemia (IDA)," adds Cabanetos.

These conditions have a prevalence of up to 20 percent and 9 percent respectively in Europe and can impact cognitive development, the immune system and even growth.

Overcoming allergies

Allergies and gastrointestinal problems are among the most common reasons parents switch formulas, and they are increasingly common, according to Jakob Madsen Pedersen, head of global sales at Arla Foods Ingredients' pediatric business unit.

He states that around 7 percent of babies now have a cow's milk allergy, while up to 30 percent of formula-fed infants often experience gastrointestinal discomfort. This is driving demand for ingredients such as milk protein hydrolysates, which offer benefits for allergy management and the reduction of feeding-related discomfort.

"For example, studies have found a reduced risk of atopic dermatitis in infants fed hydrolyzed infant formulas compared with those fed on formulas based on intact proteins," details Pedersen.

Chinese potential

Rina van Hekezen, technical account manager at Fonterra, notes that the possible allergy of babies probably also impacts the increasing demand for goat's milk, mainly in China.

Pedersen also points out that China is the largest emerging market for formula for particular medical purposes. This increases the need for clinically proven formulas to cope with allergy management and issues relating to pre-term birth.

"Specialized formulas for the management of metabolic disorders are also now being developed and sold by both local and overseas players. We're seeing a lot of innovation in carbohydrate, fat, and whey ingredient solutions for these products," he says.

However, this development takes time as the specialty formula market is often governed by historical and local clinical practices, and product registration procedures are more pharma-like, Pedersen continues.

A rising middle class

Van Hekezen also emphasizes the market for premium and super-premium infant formula, specifically in China, the world's biggest formula market.

"An important driver for changes in formulations is the legislation in Europe and very recently in China. In Europe, it has become more difficult to differentiate infant formulas due to tight regulations," she states.

Pedersen also observes that middle-class expansion is fuelling Chinese demand for premium products, and 57 percent of young mothers now consider organic a "highly important food attribute." One of the main categories driving recent growth in the country's organic market is baby food and formula.

'Making fish like making bread': BlueNalu on the hunt for optimal Asian launch pad for cell-cultured seafood products

By Pearly Neo 17-May-2021-Food Navigator Asia

United States-based cell-cultured seafood firm BlueNalu is on the hunt for the optimal launch pad in Asia to launch its cell-cultured seafood products, and is currently analysing markets in terms of regulations to potential to consumer demand.

BlueNalu's main focus is on finned fish, and has developed cell-lines from eight different species. It is focusing on just four – Bluefin tuna, red snapper, mahi-mahi and red amberjack – in terms of more commercial work at the moment, but CEO Lou Cooperhouse assured us that this is just the beginning.

"The model we are working on is to overcome the seafood industry's current bottleneck which is a restricted supply and only being able to sell what it catches," Cooperhouse told FoodNavigator-Asia.

"What we want to do is be able to sell what people want and be demand-driven instead of supply-restricted – in that sense, based on the type of fish that consumers ask for, even if the species goes on a watch-list or becomes unsustainable to fish for any reason, this won't be a problem for us and we can just produce the fish based on the cell line on demand, like how one would make bread.

"So we're looking at eventually having a solid understanding of the entire finned fish category, which makes up a large part of global seafood demand due to overfishing and contamination."

For its initial commercialisation and launch both in the US and Asia, BlueNalu will in turn be focusing closely on two types of fish: Bluefin tuna and mahi-mahi.

"Mahi-mahi is lean and used in many applications and always cooked, whereas bluefin tuna is fatty and mostly consumed raw as a sashimi – so these two can allow us to showcase our breadth of expertise in this area, e.g. using muscle cells to make the mahi-mahi fillets but bluefin tuna muscle and fat cells to make the sashimi," said Cooperhouse.

"It is a very long development cycle to establish a stable cell line then move this to product development then to work in bioreactors [so we're starting with these first]."

BlueNalu also recently signed partnership agreements with F&B heavyweights Mitsubishi Corporation and Thai Union, which Cooperhouse said is a key step in helping the company work out its holistic entry -strategy to Asia.

"According to data coming out of the UNFAO, the future of seafood consumption is going to be all about Asia," he said.

"The population will increase here and the demand will increase here – but what is not going to increase but will decrease is the supply of seafood, and that's where we come in.

"So these new collaborations will allow us to really understand the marketplace in Asia, in Japan via the Mitsubishi Corporation and in Singapore and its surrounding markets like Malaysia, Thailand, Vietnam, China and so on via Thai Union, so as to figure out our market strategy. "We need to look at Asia very holistically as the demographics and interests are really varied from different seafood types to different formats, and the regulations are also very different, for example Singapore already has a regulatory framework in place for cell-cultured foods."

When asked what BlueNalu is eyeing Singapore as its first market in Asia as a launch pad into the region, he said that this depends on a multitude of factors.

"We are really trying hard to identify the logical place to start in the region with optimal conditions and optimal partners, so these collaborations are a toe in the water per se for us to tap on our partners to better understand the consumer base and where we can make the greatest difference," Cooperhouse told us.

"That said, one of the major factors we are looking for in Asia is somewhere where there is a regulatory framework already in place or at least imminent for cell-cultured foods, so that's definitely something to consider.

"So we're not sure just yet whether Singapore will be the place for our first release but we definitely hope to have a physical facility there at some point – and all in all, although we're setting our first factory up in California first, the plan is for the second facility to be located in Asia."

Thai Union Global Innovation Director Dr Tunyawat Kasemsuwan told FoodNavigator-Asia that the group's investment in cell-cultured firms like BlueNalu is a measure of forward planning, as cell-cultured meat and seafood is likely to be the future.

"Today is all about alternative proteins like plant-based protein which can be rolled out quickly, and insect proteins which can be used from feed to food – but looking forward, cell-cultured [meat and seafood] is what can address protein needs without harvesting from animals,'" he said.

"Thai Union knows that we need variety to manage our portfolio well in terms of risk and cost [and cell-cultured firms like BlueNalu] is a way of doing that."

Thai Union also participated in BlueNalu's previous financing round and is an investor in the firm.

Price parity

Working with higher value forms of seafood like fillets and sashimi gives BlueNalu an edge in terms of reaching price parity, but according to Cooperhouse, true cost and price drops are on the way in for the industry.

"We certainly have an advantage working with high-value, low-volume forms of seafood as compared to firms working with low-value, higher-volume products like nuggets or fishcakes as price parity is easier to reach, but I am confident that further economies of scale are on the way," he said.

"This is especially so as the industry moves from pharma grade to food grade materials – right now especially for mammalian cell cultures a lot of the materials used are pharma grade and very expensive and can't apply for food consumption long-term.

"Food is a business requiring higher volumes and lower costs, so eventually the industry must move to food grade materials, e.g. GRAS-approved materials for food safety and allergen controls – this will likely mean working with food and not pharma suppliers, the ADMs and Cargills of the world setting up large-scale businesses in this area instead of the Mercks – and this will make a real difference to costs.

"I'm confident in the price parity scenario happening more generally as the supply chain switches from the pharma to the food model and for us, we've already lowered costs dramatically and are now building our first large-scale factory and when we hit capacity and critical mass/volumes, costs will also be lowered further.

COVID-19 and grocery shopping: Frozen foods and alcohol come out on top in APAC amidst pandemic

By Pearly Neo 05-May-2021- Food Navigator Asia

Frozen foods and alcohol have found favour with APAC consumers amidst the COVID-19 pandemic, garnering huge leaps in growth across various countries in the region amid lockdowns and tightening economics.

Several food categories saw growth in sales – especially with many consumers panic-buying and stockpiling at one point – but none more so than frozen foods.

"Frozen foods have seen the biggest jump in popularity in APAC markets - especially Hong Kong, where 58% or nearly three in five [are] buying more of them," stated YouGov International FMCG Report 2021.

"In fact, APAC markets account for the top two 'increasers' on a global scale [which are] Hong Kong which grew58% and Singapore which grew 40%.

Even at the lower end of the scale, numbers tend hovered around the global average (29%) such as Australia with 29%."

That said, India registered as an outlier for the APAC region, with a -7% decrease, most likely due to the lack of and underdeveloped cold chain and logistics conditions in the country, no doubt now under even more pressure and strain with COVID-19 impacts dealing a further blow.

"A greater proportion of Indian consumers have decreased their consumption of frozen foods than in any other market featured in our study," said the authors.

The picture is very different though when it comes to the region's other big winner - alcohol.

Similar to frozen foods, alcohol also saw enormous growth in APAC throughout the pandemic, but dissimilar to frozen foods, the biggest grower here was India.

"[In terms of increased alcohol purchase and consumption], this was particularly high amongst Indian consumers at three in ten people (29%)," stated the report.

"This was followed closely behind by China at 27% whereas the lowest levels of consumption in the region were found in Indonesia – that said, those with increased alcohol intake still outnumbered those who did the opposite(16% vs. 11%)."

India's alcohol market is thriving despite consumption being banned in several states/Union Territories.

India also has strict regulations in place for zero-alcohol beers and these along with local excise policies have contributed to the country being the first ever to launch a 'super-mild beer' category (less than 3.5%ABV).

For all F&B categories and purchases, APAC also registered higher levels of intent and usage of digital platforms to make purchases, indicating a brighter future for online grocery shopping services in this region than other, more developed markets.

"The three largest nations in Asia by populations also have the most consumers planning to increase their use of these services – these are India (67%), China (64%) and Indonesia (63%)," said the report authors.

"Even in the Asian markets where intent is lower, more than half of the public (Singapore 53%; Hong Kong 53%)

still plan to do more online shopping and arrange more online deliveries.

"[This is all significantly more than in western markets such as the United States (34%), the United Kingdom (38%) or Germany (26%)."

As such, it makes sense for online shopping platforms such as Lazada and Shopee to have centred focus and operations in Asia, as this is where the greatest growth is to be expected based on these findings.

APAC consumers also indicated that after the crisis, shopping more sustainably will be a major area of focus in everyday shopping.

According to the report, 79% of Indonesians indicated they would buy more sustainable products when the pandemic is over, as did 65% of Chinese consumers, 53% of Singapore consumers and Hong Kong consumers, and 50% of Australian consumers.

Whilst the intentions are noble and positive, from a packaging perspective, it is worthwhile debating the feasibility of this in countries such as Indonesia, where the tropical climate has remained a continuous challenge towards the development of sustainable packaging, even for one of the world's largest F&B firms, Nestle.

In addition to this, many food firms have repeatedly emphasised the necessity of plastic to protect food products, and although much is being done to improve recycling systems, it is unlikely that major changes would have taken place at large scale by the end of the pandemic.

The likelihood of this happening in Australia is higher, with more recycling systems already in place and more technology already in the works to develop more sustainable packaging – but if Indonesian consumers truly want to shop more sustainably, more thought will need to be given to the packaging of the products purchased whether in grocery stores or online.

Double protection: Novel micro-particles and encapsulation protect lactoferrin from gastric digestion

By Tingmin Koe 19-May-2021- NutraIngredients Asia

The use of a new type of highly porous micro-particle and an encapsulation technology simultaneously has shown to increase the loading capacity of capsules for lactoferrin by more than 30 times, a group of researchers has found.

In vitro digestion tests showed that the method allows 65 per cent of the lactoferrin to be retained inside the capsule even after exposing it to gastric acid for two hours. This is because the highly porous micro-particle allows more lactoferrin to be loaded into the capsule template, while encapsulation can protect the lactoferrin from being degraded by gastric acids.

The study was conducted by researchers from Agency for Science, Technology, and Research (A*STAR), Ag Research, and Omya International and findings published in the Journal of Colloid and Interface Science. The highly porous micro-particle used in this study is surface-reacted calcium carbonate (SRCC) micro-particles developed using a proprietary technology developed by Switzerland firm Omya International.

As compared to the traditionally used vaterite micro-particles, also made from calcium carbonate, SRCC is more porous, which means that more bioactives can be loaded into the micro-particles. In this study, researchers assessed the efficiency of three types of SRCC micro-particles in terms of the amount of lactoferrin that can be loaded and retained in the particles, as compared to the less porous vaterite micro-particles.

Lactoferrin is used as the bioactive in this case because it has poor bioavailability in adults, because it will be broken down in the gastrointestinal system, in turn, nullifying many of its health benefits, such as reducing the incidence of common cold-related symptoms in women. "First, we absorb lactoferrin into the SRCC/vaterite template, and then we coated them with our proprietary

shell material which provides protection from gastric juices. "Then, after the capsules are formed, we will extract SRCC/vaterite out of the capsule, so that the capsule contains only lactoferrin," principal investigator Dr Maxim Kiryukhin told Nutraingredients-Asia.

"It may be beneficial to keep some residual amounts of calcium carbonate (in the form of SRCC or vaterite) inside the capsules, because it may provide additional protection if necessary, against the acidic gastric environment. "Calcium carbonate may act as a buffer, keeping the pH inside the capsules significantly higher than in the surrounding gastric acids," he added.

Out of the three SRCC micro-particles, one of them showed a superior lactoferrin loading capacity of 11.00wt % achieved in a single absorption step and 74 per cent retention efficiency after two cycles of washing the capsule with deionised water. The other two SRCC micro-particles showed a lactoferrin loading capacity of 10.73wt % and 8.85wt% and a retention efficiency of 69 per cent and 61 per cent respectively. On the other hand, vaterite micro-particles only showed a lactoferrin loading capacity of 3.81wt % and 21per cent retention efficiency.

Overall, the retention efficiency of the SRCC template was about 3.5 times higher than that of vaterite. "It was shown that the most important factors were the surface area of the powders (which ensures

effective lactoferrin adsorption) and VIP in the micro-particles (which additionally increase LC due to a 'sponge effect')," the researchers said. With a higher loading capacity, using SRCC micro-particles as capsule making template can also lead to a lighter capsule. "When using vaterite as a capsule making template, the percentage of capsule shell material required is significantly higher than SRCC. "The SRCC template allows a lighter capsule weight storing the same amount of active ingredient as the vaterite template," Dr Kiryukhin said. The weight difference between capsules made using SRCC and vaterite micro-particles can go up to 36times.

Beside a higher loading capacity, SRCC is also more superior than the vaterite template in terms of stability. "Vaterite is not a very good template for large scale production, because it is pretty much unstable and cannot be stored for a prolonged period of time." While this research looks at the use of SRCC for lactoferrin, he said that there could be a wide variety of active ingredients which could be loaded using this technology.

Food science potential: How fibre-rich formulations could minimise gut and kidney harm caused by processed foods

By Gary Scattergood
07-Apr-2021 – NutraIngredients Asia

Scientists have shown how chemical compounds found in highly processed foods play a role in chronic kidney disease, and are now turning their attention to new formulations and prebiotic ingredients that could help minimise the risk.

A recent study by Australia's Monash University has shown that a diet high in processed foods brings on leaky gut syndrome, which in turn increases the risk of kidney disease. In particular, the findings revealed that certain harmful chemical compounds called Advanced Glycation End Products (AGEs), triggered by a process called the Maillard reaction, switch on the body's danger signals leading to an inflammatory response and chronic kidney disease.

However, by introducing foods containing a specialised fibre – a prebiotic in the form of high-amylose maize starch type 2 (HAMS-R2) - the effects can be improved. These AGEs, found in heat treated or processed food is what gives browned, roasted, fried, grilled and baked foods its flavour and aroma.

They are common in potato chips, bread, bakery products, chocolate and confectionery, because they add flavour and lead to the palatability and sensory properties of food. Processed food consumption has long been associated with the risk of all-cause mortality, diabetes, hypertension, obesity, cancer and gastrointestinal diseases. However, understanding of the specific mechanisms by which processed foods impact human health is in its infancy.

This rodent-based study, published in Science Advances and led by Associate Professor Melinda Coughlan from Monash Central Clinical School, showed the inflammatory response could be switched off by introducing foods containing the high resistant starch fibre. The gut bacteria ferment the

fibre producing metabolites that are anti-inflammatory, restoring gut health and improving kidney health.

"Now that we have shown that it is certain chemical compounds found in highly processed foods that play a role in chronic kidney disease, we can look to make alternative food formulations or functional foods aimed at dampening the body's response," said Associate Professor Coughlan.

"Given the increasing interest in the effects of processed food on health, we believe that these findings represent an important step towards understanding and countering the detrimental features of the modern diet. Dietary change, as with most behaviour change, can be difficult to maintain long term, but by adding more foods high in resistant starch fibre and steaming and stewing cooking practices we can help dampen the harmful effects."

Writing in the journal Science Advances, they concluded: "Together, we provide evidence that chronic consumption of processed foods induces impaired intestinal barrier permeability and complement pathway activation and confers micro-vascular disease risk in rodents. Pharmacological inhibition of the pro-inflammatory C5a-C5aR1 axis prevents the deleterious effects of processed food intake.

Last, we illustrate that a gut targeted dietary intervention limits the negative influence of the modern, processed diet, providing a practical way for food products to be better formulated to limit health consequences."

REGULATORY NEWS

Many consumers misinterpret food date labels, yet use them with confidence

Consumer education is needed to increase understanding of food date labels according to a new study

May 6, 2021 Science Daily

Does it mean "spoiled -- throw it out," or "might not taste as good as it could anymore?" Food date labels (e.g., "Use By August 16") can play an important role in helping consumers make informed decisions about food, and ultimately prevent unsafe consumption and waste of food.

Researchers surveyed 2,607 adults in the United States to assess consumer understanding of the streamlined 2-date labeling system and explore the relative effectiveness of educational messages in increasing understanding.

"Our study showed that an overwhelming majority of consumers say that they use food date labels to make decisions about food and say they know what the labels mean," said Catherine Turvey, MPH, Department of Exercise and Nutrition Sciences, Milken Institute School of Public Health, The George Washington University, Washington, DC, USA. "Despite confidently using date labels, many consumers misinterpreted the labels and continued to misunderstand even after reading educational messaging that explained the labels' meaning."

Less than half (46 percent) of study respondents knew that the "BEST If Used By" label specifically indicates that food quality may deteriorate after the date on the label. Less than one-quarter (24 percent) of study respondents knew that the "USE By" label means that food is not safe to eat after the date on the label.

Researchers explored if framing the messages with values like saving money or avoiding waste, would impact the effectiveness of messages at increasing consumer understanding. None of the seven value frames tested was significantly more effective at increasing understanding than another, but all messages significantly increased consumer's general understanding of the labels.

After viewing educational messages, 37 percent of consumers still did not understand the specific meaning of the "BEST If Used By" label and 48 percent did not understand the specific meaning of the "USE By" label.

"Responses to the survey suggest that date labels are so familiar that some consumers believe they are boring, self-explanatory, or common sense despite misunderstanding the labels," said Ms. Turvey.

"Unwarranted confidence and the familiarity of date labels may make consumers less attentive to educational messaging that explains the food industry's labeling system."

Future communication campaigns will have to capture the attention of people who think they already know what date labels mean, find the information tedious, or are satisfied with a rough understanding of labels. Educating consumers about the meaning of the labels has growing implications for food waste and food safety as the 2-date labeling system becomes more widely adopted and gains support from non-profits and government institutions.

Danish approval of "probiotic" category term may signal pan-European adoption

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Following in the footsteps of Poland and the Netherlands, the term "probiotic" can now be used in Denmark as a mandatory category designation on dietary supplements. Industry experts speak to NutritionInsight about how this could mark a changing tide for European regulation and outline where there is room for further reform.

"We welcome the decision by the Danish government to allow the use of the term 'probiotics' on food supplement labels. This is yet another step in the right direction," says Linda Neckmar, vice president of commercial development, Human Health, Chr. Hansen, which is based in Denmark.

With an increasing number of EU Member States allowing the use of probiotic labels, Chr. Hansen hopes that the European Commission will change its current interpretation, which considers "probiotics" to be a health claim.

Kristine Koppelhus, director of scientific and public affairs of Sweden-based BioGaia, notes that food supplements are, by definition, products that are concentrated sources of nutrients or other substances. "They also have a nutritional or physiological effect, intended to supplement the normal diet and marketed in dosage form. Therefore, the Danish interpretation is very positive."

From the point of view of Dr. Margherita Patrucco, technical marketing manager of Italy-based Probiotical, probiotic manufacturers will no longer have to include vitamins in probiotic products for the sole purpose of providing information on the characteristics of the product. "Now labels can directly inform the consumer about probiotics, the main functional ingredient."

Unpacking Denmark's ruling

Denmark's new ruling states that

probiotic labelling can be used when the product contains live lactic acid bacteria or bifidobacteria. It is assumed that the term "probiotic" is used in such a way that it does not appear as a claim of the product.

Only the term "probiotic" may be used and not additional information such as "probiotic effect" or similar information that may be considered a health claim, which must comply with the rules of the claim. This category designation is considered as voluntary labelling information for common foods.

An indication of "contains probiotics" will be subject to the rules of the claims regulation. The term "probiotic" can therefore only be used on dietary supplements but not on other foods or food ingredients.

A pan-European approach?

Denmark has chosen to follow the Netherlands' and Poland's recent decisions to consider "probiotics" as a mandatory category term. In November, Spain also announced it would allow "probiotics" to be used on food and food supplement labelling.

"This clearly shows that there is a strong momentum for policymakers to support this labelling that makes it easier for consumers to make informed choices," argues Neckmar.

She believes the Danish decision will also help other European businesses to compete on an equal level on the EU market.

Currently, e-commerce products from the US and Asia are sold under the name of "probiotics," while several EU businesses still cannot use that denomination.

"That is also why the whole European probiotic industry is standing together on this journey toward a level playing field," Neckmar continues.

Koppelhus of BioGaia also is looking for this continental movement to lead to a more general, uniform and consumer-friendly European labelling of probiotics.

"We sincerely hope to see that the clear determination and communication in Denmark will have a positive effect on the ongoing discussion in Sweden and other European countries," she says.

In light of changing regulation across European countries, Antonio Martinez, vice president of probiotics at ADM, expects to see accelerated growth in the probiotics market.

Calls for further progress

"Keeping the interest of the consumer central, we will continue to discuss this issue with policymakers all over Europe. Our work is far from done. Neither in Denmark, where we wish to see 'probiotics' also on other food labels than food supplements labels," explains Neckmar.

Another consideration is the inclusion of other "biotic" substances, flags Martinez. "These are the subject of less recognition at this time, and are not included in the current labeling change."

Apart from mentioning the microorganism with genera, species and strain in the ingredient list, Koppelhus would also like to see further criteria implemented to allow "probiotic" to be used on supplement labels in a correct way.

"Probiotic strains should be sufficiently characterized, safe for the intended use, supported by at least one positive human clinical trial and alive in an efficacious dose throughout shelf life."

She states that only once all criteria are fulfilled, can the enlightened consumer make an informed choice. "The current drawback is that many consumers are still not educated enough to know what to look for.

Therefore, they can be misled by unethical companies seizing the opportunity of the probiotics hype."

By Katherine Durrell

FDA weighs up "healthy" symbol update on food packaging to curb US obesity rates

10 May 2021
Nutrition Insight

The US Food and Drug Administration (FDA) is considering issuing an update on the use of "healthy" nutrient content claims on food packaging. T

he agency plans to conduct preliminary quantitative research on viable on-pack symbols to distinguish these claims, which could be used in the future.

The potential update to define and create a "healthy" nutrient content claim symbol is part of the FDA's Nutrition Innovation Strategy (NIS) and can help address health inequities associated with some nutrition-related chronic diseases.

"Updating 'healthy' is part of an overall plan to enable consumers to easily and quickly make food choices consistent with public health recommendations," an FDA spokesperson tells NutritionInsight.

The updated nutrient content claim would be "consistent with current nutrition science and federal dietary guidelines," the spokesperson affirms.

"The FDA will conduct the research, analyze the results and then consider next steps. Any further actions would involve a public process to receive comments and input from stakeholders and the general public," they explain. Manufacturers will later be updated on when they may use the "healthy" nutrient content claim on food packages.

What's in a name?

Nutrient content claims are a labelling tool that characterizes the level of a nutrient in the food. These claims can help consumers quickly understand the general nutrition information listed on food packages. Examples of chronic diseases targeted by the FDA's NIS program are heart disease and cancer, which are among the leading causes of death and disability in the US.

The FDA affirms nearly one in three US adults have high blood pressure, a leading cause of heart disease and strokes. The rate of 40 percent of US adults who are obese rises to 70 percent when including overweight adults. Among children and adolescents, almost one in five are obese.

Naturality defined?

One of the goals of the NIS is to modernize on-pack claims. Not only do claims serve as quick signals for nutritional health benefits, but they also can encourage companies to reformulate products to improve their nutritional value for health claim eligibility.

Similarly, the FDA has also received requests for clarity on using the term "natural" in labelling. "Just like other claims made on products regulated by FDA, we believe the 'natural' claim must be true and based in science," states the agency.

A recent NutritionInsight roundtable revealed the challenges in defining the term "naturality." On-pack health claims have also been in the spotlight as a tool to boost brand engagement.

Meanwhile, an EU-supported project from last year researched how on-pack design and word choice influence consumer trust in health claims.

Previous health symbols

While the US lacks a uniform health symbol system, the Nutri-Score is gaining industry attention across Europe as more of the "traffic light" system's proponents are calling for its mandatory implementation.

Spain spearheaded the Nutri-Score rollout in early 2019, followed by France, Belgium and Switzerland and the Netherlands.

In March, hundreds of scientists demanded the European Commission to imminently adopt Nutri-Score as a harmonized and mandatory front-of-pack nutrition label. This came as a result from the COVID-19 pandemic deepening nutritional rifts, as highlighted by F&B industry heavyweights including Nestlé and Danone.

By Anni Schleicher

Defining postbiotics: ISAPP experts reach consensus on characteristics and differences to probiotics

06 May 2021 Nutrition Insight

Postbiotics are defined as "a preparation of inanimate microorganisms and their components that confers a health benefit on the host," according to a consensus reached by international experts. According to the definition, postbiotics may also include either whole microbial cells or components of the cells, as long as they have somehow been deliberately inactivated.

The group of experts, assembled by the International Scientific Association for Probiotics and Prebiotics (ISAPP), clarified the concept of postbiotics in a scientific paper, published in Nature Reviews Gastroenterology & Hepatology. This published definition is the latest in a series of international consensus definitions by ISAPP: probiotics, prebiotics, synbiotics, fermented foods and postbiotics.

"We believe postbiotic ingredients hold great potential and can bring health-supportive benefits to a wide range of foods, beverages and supplements," says participating expert, Dr. Justin Green, director of scientific affairs for Cargill Health Technologies (CHT).

Having an internationally recognized definition is an important step, especially as this emerging class of ingredients gains mainstream recognition, Green supports "Our hope is this common vocabulary and scientific framework sets the stage for greater research and product innovation into the postbiotic space, and we look forward to partnering with our customers and the industry at large on this journey."

Dead or alive?

The idea of deriving health benefits from live microorganisms, such as probiotics, is well known, but some non-living microorganisms – postbiotics – can have beneficial health effects.

However, even with an increasing number of scientific papers published on non-viable microbes for health, the postbiotic category is not well defined and different terms are used in different contexts, the researchers say.

Previously, the Pharmabiotic Research Institute (PRI), a Europe-based regulatory expertise centre for the development of LBPs, supported that as industry strides toward a better understanding of the gut microbiome, clear scientific and pharmaceutical standards are needed for live biotherapeutic products (LBPs).

Professor Seppo Salminen, lead author of the consensus paper, says the group of experts wanted to clarify that postbiotics are more complex than the common idea of "heat-killed probiotics."

"With this definition of postbiotics, we wanted to acknowledge that different live microorganisms respond to different methods of inactivation," says Salminen.

"Furthermore, we used the word 'inanimate' in favour of words such as 'killed' or 'inert' because the latter could suggest the products had no biological activity."

Link to probiotics

The authors emphasize that a postbiotic does not need to be derived from a probiotic. That is, scientists do not have to show that the live precursor microorganism itself has a health benefit before using it to create a postbiotic.

Mary Ellen Sanders, ISAPP's executive science officer, says this was a challenging definition to settle.

"There are some who think that any purified component from microbial growth should be considered to be a postbiotic. However, the panel clearly felt that purified, microbe-derived substances, for example, butyrate or any antibiotic, should just be called by their chemical names. We are confident we captured the essential elements of the postbiotic concept, allowing for many innovative products in this category in the years ahead," she supports.

Postbiotics have long been on the market in Japan, and fermented infant formulas with postbiotics are commercially available in South America, the Middle East and some European countries.

Given the scientific groundswell, postbiotic applications are likely to expand quickly, the experts predict.

"The definition will be a touchstone for scientists, both in academia and industry, as they work to develop products that benefit host health in new ways.

We hope this clarified definition will be embraced by all stakeholders, so that when the term "postbiotics" is used on a product, consumers will know what to expect," notes Sanders.

By Kristiana Lalou

India food fortification: No more processed foods to be added to voluntary fortification list for now – FSSAI

By Pearly Neo 01-Mar-2021- Food Navigator Asia

Bakery products, cereals and fruit juices will remain the only processed food products to have fortification standards set by the Food Safety and Standards Authority of India (FSSAI) in the near future, after the regulator confirmed it is not considering extending the list at present.

FSSAI recently released fortification standards for food firms producing cereal products, bakery products and fruit juices to adhere to when fortifying their products with nutrients ranging from vitamins to various minerals, but the agency has also stated that these will be the last processed items to get such standards for some time. "FSSAI is not looking at any other processed foods at present [for which to] make standards for food businesses to follow in case these want to fortify their products in these categories," FSSAI Food Fortification Resource Centre (FFRC) Director Inoshi Sharma told FoodNavigator-Asia.

"All standards for processed foods fall under the Food Safety and Standards (Fortification of Foods) First Amendment Regulations, 2020, [and in future] if more processed foods come to be under consideration for fortification again, these will likely fall under this particular regulation too."

Under the new standards, cereal products including breakfast cereals, pasta and noodles as well as bakery goods including bread, biscuits, rusks and buns have the major specified fortification levels of iron (1.4mg to 2.7mg per 100g), folic acid (8µg to 16 µg per 100g) and Vitamin B12 (0.08µg to 0.16µg per 100g); whereas fruit juices would be fortified with 6mg to 12mg of Vitamin C per 100ml.

Other optional micronutrients that cereal and bakery products can be fortified with include zinc, Vitamin A, and Vitamins B1, B2, B3 and B6.

The initial release of the standards was met with some confusion from food businesses over whether implementation was to be mandatory, and Sharma has clarified that at present the fortification of processed foods is unequivocally not compulsory. "There is no mandatory fortification of cereal products, bakery wares and fruit juices as of now - It is voluntary,[and] standards are just there [for those that] want to fortify their products," she said.

"We opened the draft notification for mandatory edible oil and milk fortification for public comment which closed on February 13, which is currently being looked into, [and currently] only iodised salt is mandatory. These will only apply to the organised sector. "In India's public food distribution systems, the fortification of rice, wheat and salt are already mandatory."

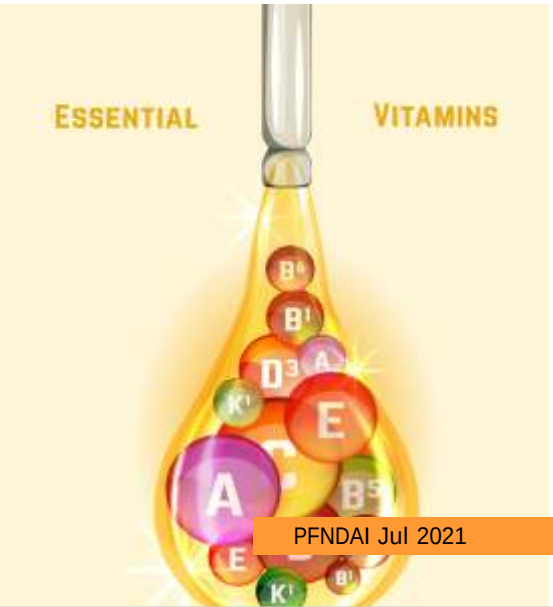
Sharma also stressed to us that all fortification standards FSSAI is discussing will strictly not apply to foods that are High in Fat, Sugar or Salt (HFSS) even if these fall under any of the processed food categories with available fortification standards. "The Regulations exclude all Processed Foods with High Fat, Salt, Sugar [even] if these fall within the cereal products, bakery products or fruit juice categories, or even if within the milk category," she said. "[This is because] fortified foods are considered healthier, and it would not feel right to promote HFSS foods as healthier even if they are fortified with nutrients."

That said, the definition of 'HFSS foods' appears to still be up in the air – FSSAI published a separate clarification notice saying that HFSS products would not be prevented from fortifying their products until this definition is confirmed.

"[Various stakeholders are seeking] clarification on the exclusion of HFSS foods from fortified processed foods[which were specified in sub-regulation (7) of the fortification regulations] as 'having the same meaning as specified under the Food Safety and Standards (Labelling and Display) Regulations, 2020," said FSSAI Compliance Strategy Executive Director Dr Shobit Jain in the notice.

"In view of this and considering the fact that HFSS Foods have not yet been defined and notified in [the labelling and display] regulations, it is hereby clarified that the compliance to sub-regulation (7) shall only come into effect once the HFSS foods are defined and notified."

This means that at present, any food manufacturer producing cereal products, bakery goods or fruit juices are still able to fortify their products according to FSSAI standards and be acknowledged as a fortified food, even if these contain high levels of salt, sugar or fat.



Quality control concerns: GAIN battling the consequences of COVID-19 on fortification in Bangladesh, India and Others

By Guan Yu Lim 20-May-2021-NutraIngredients Asia

Fortification programmes in Bangladesh, India and others have ample supply of fortified foods and a steady distribution network to reach its target populations amid the COVID-19 crisis, but the lack of quality assurance and control is concerning.

FoodNavigator-Asia spoke to experts from the Global Alliance for Improved Nutrition (GAIN), which carries out large-scale food fortification in all three countries. In India, food fortification projects have been taking place since 2011, fortifying wheat flour (iron, folic acid, vit B12), edible oils (vit A and D), milk (vit A and D), as well as salt (iodine and iron). In Pakistan, large-scale food fortification projects started in 2007, with wheat flour and oil. In Bangladesh, fortification centres around oil, salt and rice.

The global food supply chain experienced a massive disruption last year with many countries imposing restrictions. Tarun Vij, GAIN's country director of India, said food supply chains in the country were disrupted for about 60 days, mostly affecting availability of fresh foods such as fruits and vegetables. However, the fortification industry was largely spared, as restrictions on commodities like oil, salt and rice were relaxed. In addition, there were no shortages of micronutrient premixes so production of fortified foods was not hindered, according to Farrah Naz. This is essential since the purpose of fortified foods was to prevent malnutrition and nutrient deficiencies especially in key groups such as the vulnerable. However, the pandemic affected quality assurance and control.

According to Dr Ashek Mahfuz, GAIN's portfolio lead of the large scale food fortification in Bangladesh, inspectors could not physically visit the production facilities or refineries to monitor the production during lockdowns. They also could not collect samples to test at the laboratory. "There may be some unscrupulous businessman, using lesser amounts of fortified nutrients in the foods they produce." This meant it was impossible to verify whether the right amount of fortification was added. "You can't have online meetings for issues related to quality assurance. You have to train people on this, and these were the types of activities affected during the lockdown," Naz said.

Vij said they were working with the government and private food testing laboratories to boost the capacity of laboratories. "There should be adequate lab testing capacity to ensure that what the population is receiving is compliant to the standards laid out by the Government of India."

Food fortification is currently voluntary in India, but once it becomes mandatory, testing facilities have to keep up. GAIN is constantly expanding its outreach across the three countries. In India, its fortification work spans across 16 Indian states, with some 800 and 20 million people having access to fortified edible oil and milk daily. India recently issued a notification stating it was mandatory for edible oil and milk to be fortified in the country. "The Government is recognising the importance of fortification, even at a time of COVID," Vij said. He added: "For a country with a large population like India, and a severe micronutrient deficiency issue, fortification is the most cost-effective way."

In Bangladesh with a population of 160 million, about 50% of the population have access to fortified oil and salt, according to Mahfuz. It is mandatory that all edible oil (soybean, palm) are fortified with vitamin A, and salt with iodine. "The Bangladeshi Government is very motivated and supportive of any food fortification activities, which benefit the most vulnerable groups ."

Suck it up: Probiotic lozenges reduce pathogens, promote antibodies and good bacteria growth – study

By Tingmin Koe 10-May-2021-NutraIngredients Asia

Probiotic lozenges could be used as a functional food for promoting oral health, with a recent four-week human clinical study showing how daily intake of could reduce pathogens, promote good bacteria growth and increase the production of antibodies.

The human clinical trial took place in Taiwan, involving 50 healthy individuals in their 20s to 40s. They were randomly assigned into the placebo or the intervention group, where they had to take three probiotic lozenges or placebo each day for four weeks after going through dental cleaning.

The probiotic lozenges contain three probiotic strains, namely Lactobacillus salivarius subs salicinius AP-32,Lactobacillus paracasei ET-66 and Lactobacillus plantarum LPL28, which were isolated from the healthy gut, breast milk, and miso seasoning respectively. They are the proprietary strains of Bioflag Biotech, a Taiwan-based probiotic ingredient supplier and ODM/OEM company. The probiotic lozenges used in the research were also produced by the company.

Findings published in Oral Diseases showed that the pathogen Streptococcus mutans (S. mutans) had reduced in numbers, alongside an increase in the number of good bacteria Lactobacillus and Bifidobacterium, in subjects who took the probiotic lozenges. The antibody, immunoglobulin A (IgA), was also significantly higher in the saliva of subjects who took the lozenges. However, despite the improvements in microbiota, there was no reduction in plaque production.

“The plaque weights in the two groups were comparable, indicating that despite the decline of oral pathogens and bacteria in the oral cavity, probiotics did not inhibit the formation of plaque. “The oral lozenges containing probiotics may have effectively stimulated the secretion of extracellular matrix in the oral bacteria, thereby forming dental plaque and biofilms,” the researchers said.

Why these three?
The three probiotic strains were explored as strains for oral health as they had showed significantly strong antibacterial effects against oral pathogens, including S. mutans, P. gingivalis, F. nucleatum subsp. Polymorphum, and A. actinomycetem comitans. This is based on the comparison of 12 probiotic strains using a modified double-layer-agar co-incubation assay. The antibacterial scores of the 12 strains were then tabulated. The aforementioned three strains outperformed with an antibacterial score of 3, 2.8, and 2.6 for ET-66,LPL-28, and AP-32 respectively. Other strains recorded an average antibacterial score of 0 to 2.4. Intake of the probiotic lozenges significantly reduced the amount of pathogen found in the oral cavity. For instance, the amount of S. mutans had dropped by 45 per cent after two weeks and further down by 72per cent by the end of the study.

Total bacterial amount in the oral cavity, analysed using plate count agar, also showed significant reduction. “This suggests that probiotics produce metabolites to fight against oral pathogens and maintain the balance of the oral microbiota,” the researchers said. Intake of the lozenges also significantly promoted the growth of Lactobacillus and Bifidobacterium in the oral cavity as compared to the placebo group. The increase in Lactobacillus and Bifidobacterium populations was significant, with a p-value of less than0.005 and 0.01 by week four. “This suggests that a part of the probiotic strains in the oral lozenges had colonized in the oral cavity,” said the researchers.

Nonetheless, the researchers pointed out that further study would be required to assess whether consuming oral probiotic lozenges could affect oral microbiota in the long term. The antibody lgA increased continuously in the intervention group throughout the study and was found in higher amount than the placebo group. “The experimental results showed that the oral health products related to AP-32, ET-66, and LPL28 effectively increased the concentration of IgA in saliva and inhibited oral pathogens or neutralized toxins from oral pathogens. “However, whether the IgA specifically targets oral pathogenic bacteria, such as S. mutans, needs further study,” the researchers said. They also suggested that since probiotics stimulate saliva secretion, the increased production of saliva and antibodies may have contributed to the decline of oral pathogenic bacteria.

The lozenges intake also reduced the occurrence of mouth rupture and pustules caused by oral bacterial pathogens, based on a questionnaire answered by the subjects. For instance, the incidence of ruptured mouth or pustule formation was 0.04 ± 0.2 in subjects who took the lozenges, but higher at 0.52 ± 0.82 in the placebo group. As for intestinal health, incidence of stomach pain, gastro esophageal reflux was significantly reduced, alongside improvements in constipation. The incidence of constipation dropped from 0.33 ± 0.63 to 0.21 ± 0.41 by the end of the study in the intervention.

“Overall, our clinical study suggests that oral probiotic lozenges may enhance oral immunity, modulate oral microbiota, and improve oral health,” the researchers concluded.