

FOOD, NUTRITION & SAFETY MAGAZINE

PFNDAI

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Q&A

DECODED: UNCOVERING THE LESSER-KNOWN NUTRITIONAL FACTS

Ms Gayatri Dawda

**BEST PRACTICES FOR
MAKING CLAIMS**

Mr Ram Kumar & Mr Kiran Desai

**SENSORY EVALUATION OF
FOOD: EXPERTS USE IT TO
DETERMINE
SUPERIOR FOODS**

Prof Jagadish Pai

**DIET IN
OSTEOPOROSIS**

Ms Simran Dilip Vichare

**INFLUENCER MARKETING
IN THE FOOD SECTOR:
STRATEGIES
FOR SUCCESS**

Ms Dolly Soni

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CREATING AWARENESS ABOUT FOOD AND NUTRITION

Today with the digital and IT revolution, it is very easy to communicate. You can not only do good but also cause harm too very easily. Mark Twain said, "All you need in this life is ignorance and confidence, and then success is sure".

Today, there are many with half-baked knowledge but plenty of confidence, who are blogging and posting on various social media. They know that people like sensational information. Fake news is easy to spread if it is combined with sensation. People don't often try to verify and simply pass it on. Service providers don't take any responsibility so a lot of misinformation is spread around.

Therefore, the professionals from all areas must gather a little confidence and start creating awareness.

Food is critical for our survival and there are many involved in growing, harvesting and processing and bringing it to you in some form which either you can directly consume or cook and then consume. It may be fruit or vegetable; it may be grain or flour; it may be frozen meat or fish or it may be bread or biscuit. We all need them to be safe, nutritious and of high quality.

Because of change in lifestyle and urbanisation, people are depending more on packaged ingredients or food products. There are many manufacturers so claims are made about their products to get a better market share.

We have seen that science has always progressed much faster than the understanding of it by common people or consumers in this case. There have been developments in both nutritional science as well as food processing. This gives opportunity for both the educators as well as those with more confidence than knowledge to go to consumers with their side of story. As again Mark Twain said "A lie can travel half way around the world while the truth is putting on its shoes." In spite of this, it is very essential that those with qualifications must start creating awareness.

It is a slow process but we must try to have a credible platform. People would certainly take cognizance of qualifications and experience and accept the information provided by them as credible information. Educators are always respected everywhere by everyone. They should now take up this additional responsibility of not just teaching their students but also create awareness among the consumers. They may not be able to spend a lot of time as they are already busy teaching, conducting research and also publishing scientific papers. Whatever little time they can spare would be very valuable.

Prof Jagadish Pai,
Editor, PFNDAI



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FOOD FOR THOUGHT OR THOUGHT FOR FOOD



By **Dr Sesikeran. B, MD**
Former Director, National
Institute of Nutrition (ICMR)
Hon. Scientific Director, PFNDAI

It was common in earlier days for children to bring their parents to the cardiac emergency rooms for symptoms of heart attack but in recent times it seems to be the other way around where elderly parents are bringing their sons or occasionally daughters to the emergency rooms and desperately requesting the doctor to save their children from dying of heart attacks.

Over the years the age of first onset of a heart attack has been coming down. Post COVID the incidence of young people suddenly dying of heart attack or sudden cardiac death has increased and the age has further reduced.

It was assumed that this could be due to the COVID vaccine

effects but a recent ICMR study has clearly shown that it was not due to the vaccine but due to the COVID infection itself. Other publications also showed that, almost 6.9% of the people who had to be admitted and treated for acute COVID infections died within the next 12 months.

One lesson the world learnt during the pandemic was that the death following COVID or even the probability of serious complications and hospitalizations and the need for assisted ventilation was seen more often in patients who had a pre-existing disease like uncontrolled diabetes, high blood pressure, chronic respiratory disease, overweight and obesity, cardiac decompensation etc. Doctors while evaluating patients on initial admission used to have a cautious approach to patients with Co morbidities.

Clinical investigations showed that these patients in addition to these pre-existing problems

also had high levels of inflammatory markers like HS-CRP (High Sensitivity C-Reactive Protein), Fibrinogen, Pro calcitonin and Cytokines like TNF alpha, interleukins 1 etc and markers of potential thrombosis like D-dimer.

In the final analysis, any form of a chronic systemic inflammation due to any pre-existing disease had made matters worse in COVID-19 infection.

The same factor of systemic β inflammation along with COVID viral damage seems to be responsible for even young people to succumb to sudden cardiac death. COVID-19 infection in some individuals has caused a silent long lasting damage to the heart muscle due to several reasons like low oxygen saturation for long periods during the acute infection, inflammation in the heart muscle or myocarditis, damage to the inner lining of the blood vessels or endocarditis.





Cardio myopathies or damage to the heart muscle during the post viral phase may also affect the conducting system of the heart that maintains the heartbeat.

Sudden onset of cardiac arrhythmias(irregular beats) may also result in sudden death. This could have been the case in those who succumbed during vigorous physical workout in gyms when the demand on the heart was high which precipitated the heart to beat irregularly at phenomenally high rates which led to decrease blood supply to the heart and the brain and death of the person.

The warning signs could be a constant higher heart rate lasting for long periods even at rest, irregular heartbeats or missed beats occurring quite frequently particularly during physical activity, mild chest discomfort ,shortness of breath occurring frequently, rapid increase in heart rates on standing and a feeling of Light-headedness or brain fog occurring frequently. Under any of these circumstances one should consult a cardiologist and get a thorough

check done on all the risk parameters.

Since most of us are possibly in a post COVID phase, we are all at risk.

Reduction of chronic inflammation is possibly through the following measures

1. Reduce weight particularly the body fat since adipose tissue is a major source of inflammatory molecules
2. Mild to moderate but sustained physical activities is essential
3. If we intend to do vigorous physical activity we should do so after a cardiac screen as well as screening for inflammatory markers
4. A diet with plenty of fruits and vegetables since they are the best sources of antioxidants.
5. Avoid and stay away from unhealthy foods that are high in sugar, salt and saturated fat or excess calories
6. Control other pre-existing illnesses like diabetes and high



blood pressure

7. Always remain well hydrated
8. Do not ignore the small warning signs
9. Reduce salt intake particularly through snacks and foods from public catering
10. Remember that systemic inflammation was responsible for COVID-19 morbidity and mortality during the infection and even several months after infection

References

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2. Shukla et al ; The Lancet Regional Health -South east Asia,2022
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WE LIVE IN AN OBESOGENIC ENVIRONMENT.



AUTHOR
Dr Joseph I Lewis,
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PFNDAI

Consuming food at the dining table is no longer a family occasion. It is yielding to the many invitations to consume food elsewhere. One can now eat anywhere, from food stalls to airport lounges and shopping malls. Added to its ubiquitous presence, the shift to away-from-home consumption is emerging as a socioeconomic necessity. In a highly participative economy, staying at home to cook a meal deprives a second income. Over the years the daily supply of food calories is increasing.

According to a 2018 estimate, the daily energy intake for America and Europe is about 3000- 3400 kcal, Asia 2800 kcal and India 2553. Portion sizes are enlarging: gone are the days when “half plate” was a menu option. Hiding in plain sight is an obesogenic environment we have failed to recognise. The term ‘obesogenic environment’ refers to the role environmental factors play in determining both nutrition and physical activity. It shapes the way a population

lives.

Most often the reasons for weight gain and its consequences on health are limited to what an individual eats than how a population lives. Nutrition labelling and diet counselling focus on what we eat. This is one side of the weight gain story; there is yet another, largely ignored. Most people are active not from a healthy lifestyle but when their occupations demand it. According to an ICMR study over 90% of the population do no recreational physical activity. The same study (2014) notes that overall 392 million Indians are inactive implying a huge segment of the population is at risk for developing diabetes and other non-communicable diseases. Urban Indians are sitting too much. They spend over six hours daily on average on the internet, working, watching and gaming; often accompanied by nibbles, snacks and drinks. Walking to markets and returning with loaded bags of foodstuff has been replaced with home delivery. The increasing per capita kilometres in driving implies less physical activity and a role in obesity.

The energy balance equation states that excess calorie intake

over expenditure is stocked in fat cells. The consequence of excess energy is a risk factor for various health conditions. While much is being said about energy intake, there is hardly a whimper on its correlation to physical inactivity. Globally, 81% of adolescents aged 11 to 17 years were physically inactive (2016): WHO recommends at least 60 minutes of moderate to intense daily activity. Recognising a strong link between physical activity and major non-communicable diseases, members of the WHO agreed to a 15% relative reduction in physical inactivity by 2030. The National Institutes of Health describes the “built environment” as the vast array of buildings, roads, buses, shops, homes, parks and recreational areas that form the physical characteristics of a community. While the environment invites eating, it does not invite walking, jogging, or swimming. Recreational facility is not a significant factor in urban planning.

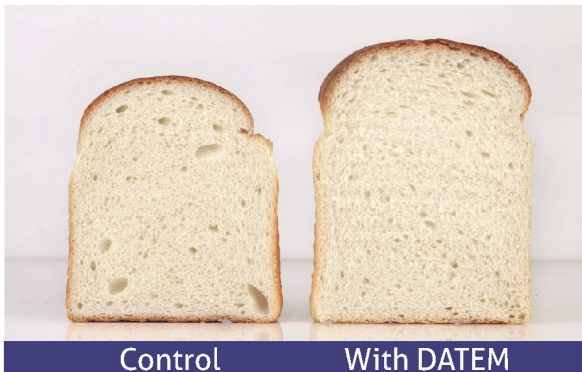
Neither public debate nor national policy considers the environment a risk factor in non-communicable diseases. The thinking that obesity is an individual issue is missing the wood for the trees.



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OATS DECODED: UNCOVERING THE LESSER-KNOWN NUTRITIONAL FACTS



AUTHOR

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Nutrition Executive,
Marico India

phytochemicals (Hu et al., 2023).

Wholegrain Recommendations
National and International health authorities including

the British Nutrition Foundation, Dietary Guidelines for Americans, WHO, FAO, Singapore Dietary Guidelines, Canada's Food Guide, DTU (National Food Institute, Denmark), German Nutrition Society, French National Nutrition & Health Program, ICMR and many others, recommend the consumption of whole grains as at least 50%

of total grain intake per day. (wholegrainscouncil.org).

Nutrition in Commonly consumed cereals

Cereal grains are vital global energy source, constituting 50% of total energy intake, especially in developing nations. Predominant cereals include rice, wheat, and corn. Oats, barley, rye, and millet consumption is increasing. Whole grains with bran, germ, and endosperm intact, retain essential nutrients as compared to refined grains, lacking fibre, B-Complex Vitamins, and minerals lost during milling. (mygov.in/campaigns/milllets)

Health Crisis in India

India grapples with a rising burden of chronic non-communicable diseases (NCDs), constituting 60% of annual deaths, reaching 5.87 million. This includes cardiovascular diseases, chronic respiratory issues, cancer, and diabetes. Triple burden of malnutrition compounds the challenge with undernutrition, micronutrient deficiencies (hidden hunger), and overnutrition (overweight and obesity) co-existing together. NCD surge links to suboptimal dietary choices, inadequate essential nutrients, and increased consumption of nutrient-deficient foods, along with a lack of physical activity (Miller et al., 2020). Epidemiological studies highlight the inverse correlation between wholegrain consumption and CVDs, emphasizing the rich nutritional profile of wholegrains, including dietary fibre, micronutrients, and



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Creative Visualization. [§]Based on Kantar Household Panel data.
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Table 1. Macronutrient profile of Cereal grains (per 100g)

S. No.	Cereal grain	Energy (kcal)	Carbohydrates (g)	Dietary fibre(g)	Soluble fibre(g)	Insoluble fibre(g)	Protein (g)	Fat (g)
1	Rice	356	78.2	2.8	0.8	2	7.9	0.5
2	Wheat	322	64.7	11.2	1.6	9.6	10.6	1.5
3	Corn	334	65	12.2	0.9	11.3	8.8	3.8
4	Oats	375	67.5	10	5	5	12.5	6.2
5	Barley	316	61.3	15.6	5.7	9.9	10.9	1.3

(Indian Food Composition Tables,2017 & USDA Nutrition database for Oats FDC ID: 368739)

Unique Components of Oats:

Listed below are detailed Nutrients in Oats that are responsible for clinically proven Health benefits.

1. Oat Starch

Oats exhibit unique starch composition, with approximately 60-65% in the endosperm.

Notably, oats have a distinct starch-protein association and β -glucan presence. Factors for slower release of glucose include:

- High resistant starch (29%)
- Low enzyme accessibility due to lesser branched amylopectin & higher amylose (25-29%)
- High lipids causing slower release of glucose
- Gut microbiota fermentation of RS in the colon modifies the glycaemic index. (Zhang et al., 2021)

2. Oat β -glucan

Oat grain contains a valuable soluble fibre called as β -glucan, which ranges from 3-8%.

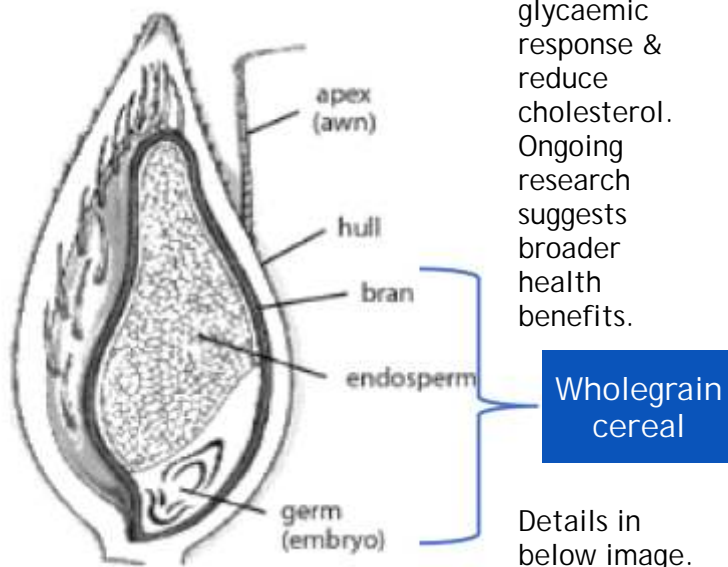
Wholegrain Oats Nutrition

According to the World Whole Grains Council, oat components, such as germ and bran, being tightly bound, resist removal during milling, ensuring that consumers receive Whole grains with preserved proportions of germ, bran, and endosperm similar to the original grain, regardless of the specific oat type chosen.

Health benefits of Oat consumption

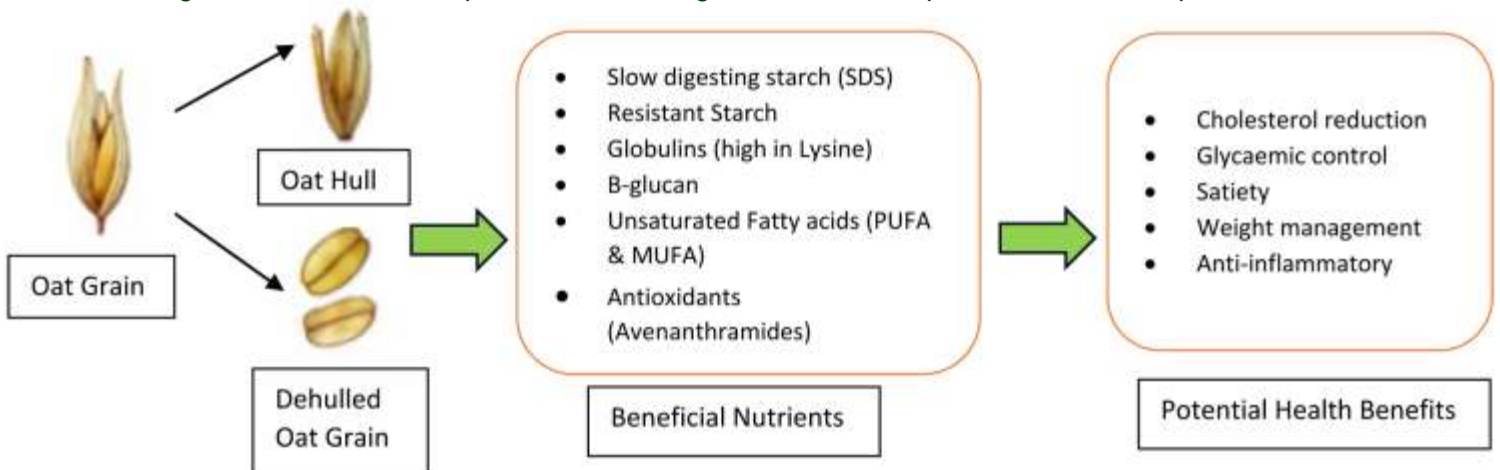
Oats, rich in nutrients, proven to aid in lowering glycaemic response & reduce cholesterol. Ongoing research suggests broader health benefits.

Figure 1. Oat grain structure



(Recreated from Butt et al.,2008)

Fig 2. Beneficial components of Oat grain & their reported health implications



(Recreated from Mao et al.,2021)



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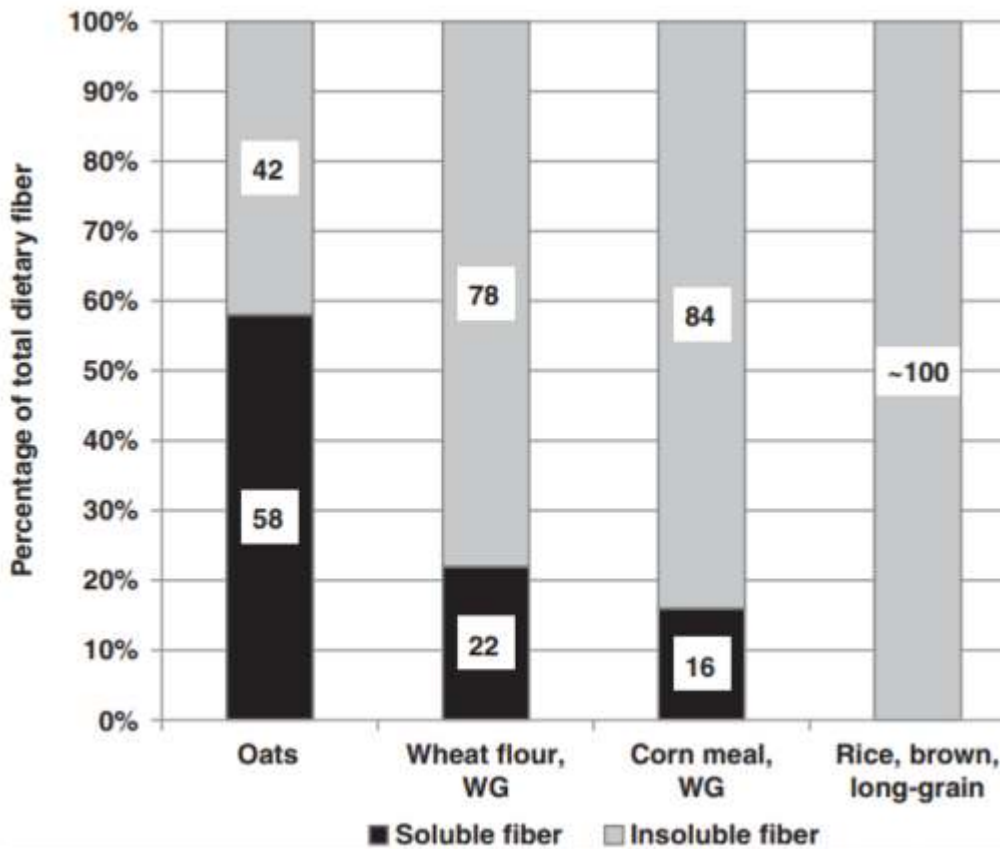
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β -glucan, especially (1-3) (1-4)- β -D-glucans is proven for therapeutic multidirectional benefits in NCD's. Oats contain the highest soluble to insoluble fibre ratio among cereals.

weight among cereals (65 to 3100×103 Da), it forms highly viscous gums upon water absorption, aiding in lowering cholesterol and improving glycaemic response (Advertising & Claims regulation, FSSAI, 2018).

Fig 3. Allocation of soluble & insoluble fibre in cereals



(Gulvady et al., 2014)

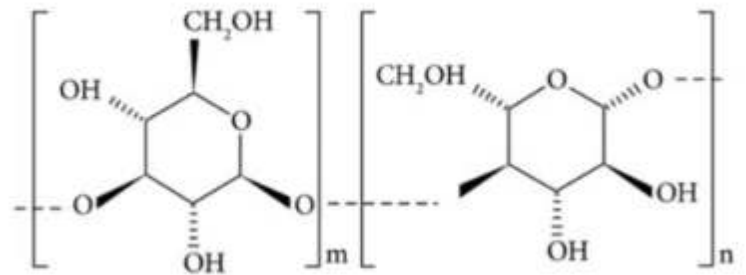
Soluble fibre exhibits greater efficacy in improving glycaemic response as well as mitigating the risk of CVD's as compared to insoluble fibre. (Mao et al., 2021) Oat β -glucan features long, unbranched chains with β -1,3-glycosidic (30%) and β -1,4-glycosidic (70%) bonds. Higher β -1,4-glycosidic bonds enhance gel state and water solubility. With the highest molecular

Barley and oats both contain β -glucan, but oats exhibit a higher soluble to total β -glucan ratio in their endosperm, enhancing gel-forming capacity and functional benefits. (Danuta et al., 2023)

3. Oat proteins

The protein content in oats ranges from 12-24%. Quality of protein is a crucial factor in

Fig. 4. Structure of Oat β -glucan



choosing a protein source. Protein quality is essentially the presence of essential amino acids (EAA) in the food along with the digestibility. While some foods may offer high protein content, their quality can be compromised if they lack essential AA's. Plant proteins are often incomplete proteins.

Research shows that consuming 100 g of oatmeal can cover the daily requirement for seven essential amino acids, with only sulphur amino acids and lysine being deficient.

Distinctive protein quality of Oats:

Prolamin is the major storage protein in most cereals including wheat. However, Prolamin has inferior protein quality as it lacks a major limiting amino acid, Lysine. Oats, to the contrary, have Globulins as major storage protein, which contain significant amounts of Lysine. Oats have the highest DIAAS score among commonly consumed cereals, which means it is one of the most effective protein sources to fulfil human requirements among cereals. (fao.org).



Table 2. DIAAS scores of commonly consumed cereals

Sr. No.	Commonly consumed Cereals	DIAAS
1	Oats	0.57
	Wheat	0.4
2	Corn	0.36
3	Rice	0.47

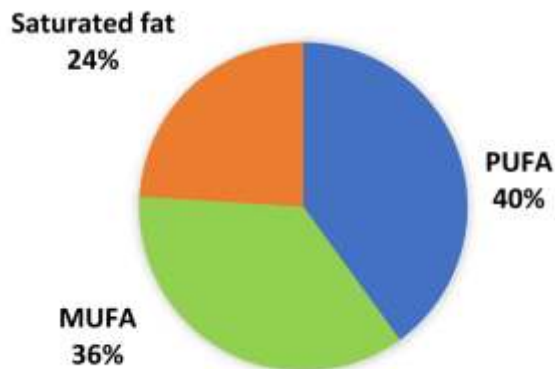
(Recreated from Herreman et al,2020)

Oat Lipids

Oats represent a notable source of fats, with concentrations ranging from 5-9%, which is the highest among all cereals. Endosperm contains nearly all of the fats.

Oats has a favourable fatty acid composition as compared to other cereals, with 75-80% unsaturated fatty acids, with higher amounts of Linoleic acid & less saturated fats. This composition is supports diet recommendations by Nutrition Authorities for healthy living. (Paudel et al,2021)

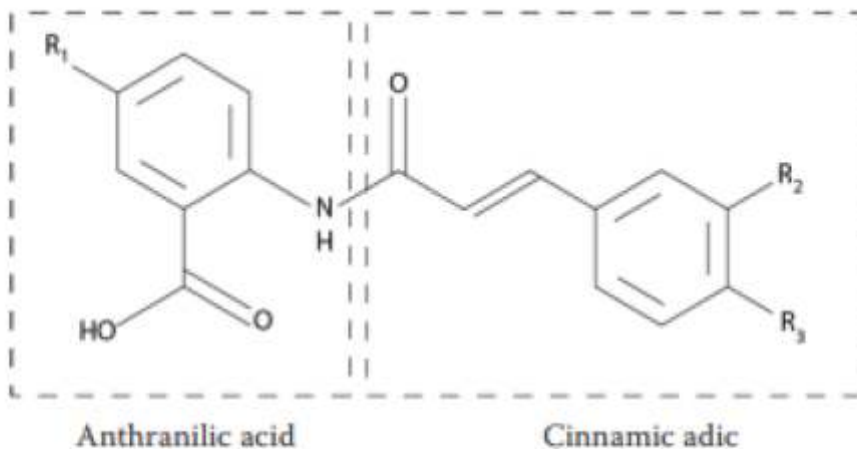
Fig 5. Fatty acid breakup of Oat lipids



(Recreated from Paudel et al,2021)

4. Oat Avenanthramides & other Bioactives

Oats exhibit greater anti-oxidant potential compared to wheat, attributed to the presence of avenanthramides, phenolic compounds, vitamin E, and phytic acid. Additionally, oat grains contain flavonoids and sterols.



Compound	R ₁	R ₂	R ₃	Anthranilic acid	Cinnamic acid
AVA-A	OH	H	OH	5-hydroxyanthranilic acid	<i>p</i> -coumaric acid
AVA-B	OH	OCH ₃	OH	5-hydroxyanthranilic acid	ferrulic acid
AVA-C	OH	OH	OH	5-hydroxyanthranilic acid	caffeic acid

Avenanthramides (AVAs)

Whole oats uniquely contain avenanthramides (AVAs), potent antioxidants crucial for heart health found typically in bran & sub aleurone layer. AVAs, with a range of 3 to 289 mg/kg, come in over 20 distinct forms, including A, B, and C. AVA-C, comprising a third of total AVAs, possess the highest antioxidant capacity.

Bioavailability of AVAs:

Administering oats enriched with 0.5 and 1g AVA resulted in increased plasma concentrations of AVA along with plasma Glutathione levels, indicating Oats possess potent antioxidant capacity. (Meydani et al.,2009).

AVAs represent amides of different hydroxycinnamic acids with Anthranilic acid. (Boz H,2015)

Table 3. B complex vitamins in commonly consumed cereals per 100g

Sr. No.	Vitamins (per 100g)	Oats	Wheat	Corn	Rice (White)	Rice (Brown)
1	Thiamine (mg)	0.8	0.5	0.4	0.1	0.4
2	Riboflavin (mg)	0.1	0.2	0.2	0.1	0.1
3	Niacin (mg)	1	4.9	3.6	1.6	5.1
4	Vitamin B6 (mg)	0.1	0.4	0.3	0.2	0.5
5	Folate (mcg)	56	44	25	8	20

(Recreated from Gulvady et al, 2014)

5. Oat Micronutrients

Micronutrients are vitamins & minerals that are required in small amounts, however, their role in normal functional of body systems is extremely crucial.

Vitamins: B-Complex vitamins are found in significant amounts in oats, which play a crucial role in energy metabolism & amino acid metabolism. 100g Oats contain highest Thiamine & Folate among commonly consumed cereals, that is, wheat, corn,

and rice. Oats is not a source of fat-soluble vitamins.

Minerals: Oats contain a higher mineral range as compared to other commonly consumed cereal ranging from 2-3%. Oats consumption improves the overall diet quality as it is one of the most nutrients dense cereal grains. (Gulvady et al, 2014).

Conclusion

Oats, known for unique soluble fibre β -glucan, micronutrients, and antioxidant

Avenanthramide, provide clinical benefits. Unlike maize, rice, or wheat, oats maintain their wholegrain integrity post-processing. Including oats in daily diets aligns with wholegrain recommendations, addressing hidden hunger and contributing to the recommended 30g daily fibre intake. Scientific evidence supports oats in lowering cholesterol and reducing risk of metabolic conditions, making them a valuable addition to diverse diets for enhanced overall health.

Table 4. Mineral content in common cereals per 100g

Sr. No.	Minerals (mg/100g)	Oats	Wheat	Corn	Rice (White)	Rice (Brown)
1	Calcium	54	34	6	28	23
2	Iron	4.7	3.6	3.4	0.8	1.5
3	Magnesium	177	137	127	25	143
4	Phosphorus	523	357	241	115	333
5	Potassium	429	363	287	115	223
6	Zinc	4	2.6	1.8	1.1	2
7	Copper	0.6	0.4	0.2	0.2	0.3
8	Manganese	5	4.1	0.5	1.1	3.7

(Recreated from Gulvady et al, 2014)

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*As per NielsenIQ Retail Intex data for period MAT Sep '23 for the India market in Muesli Sub-Segment of Breakfast Cereals.

Log on to <http://www.kelloggs.com/en-in/products/muesli.html> for details.



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BEST PRACTICES FOR MAKING CLAIMS

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Consumers are becoming increasingly interested in their diet and its relationship with health. They value the scientific information about food composition and nutrition. Consumers come across various claims that the food manufacturers & retailers make regarding their products. Companies need to strike a delicate balance between selecting strongest claim for their products and preserving consumer trust. Claims are intended to convey the benefits of food products and help the consumer to choose the right product.

Requirements and guidelines relating to food advertisements & claims have been provided under:

- FSS (Advertising and Claims) Regulation, 2018
- FSS (Labelling and Display) Regulations, 2020
- Advertising council of India (ASCI)

- Consumer Protection Act 2019

In general, the claims relating to foods can be broadly divided in to two types.

A. Non-standard claims-

These are the type of claims for which no criteria are established in the Food Safety and Standards (Advertising and Claims) Regulations, 2018 (FSS Regulations) but are expected to follow certain "guiding principles" as defined under law. Means generally Non-standard claims covers the statements beyond the claims specified in the FSS Regulations. These further can be classified as.:

1. Other nutrition claims:

These may include statements which are based on "generally accepted scientific evidence".

e.g. Calcium helps improve bone density.

2. Other DRR Claims: FBO require a prior approval from the Food Authority for reduction of disease risk (DRR) claims other than those defined under law.

B. Standard claims- These are the type of claims where the wording and/or conditions of claims are defined in the regulations. Nutrition Claims, Health Claims and Non-Addition claims defined under the Food Safety and Standards (Advertising and Claims) Regulations, 2018 (FSS Regulations) can be termed as Standard claims.

Further standard claims can be broadly classified as follows:

No.	Classification	Types of claims	Broad Summary	Example
1	Health Claims	Nutrient Content Claim	It describes amount of nutrients vis a vis the standard.	High in calcium
2		Nutrient Function claim	Describes the physiological role of a nutrient in the body and its contribution to normal bodily functions.	Calcium builds strong bones
3		Nutrient Comparative Claim	It compares the nutrient levels or energy value of two or more foods	More Calcium Than XX product.
4		Equivalence claim	It suggests that the products have same amount of [nutrient] as of reference food.	Our XXX product is equivalent to a glass of milk in terms of calcium.
5		Reduction of disease	It means significantly altering major risk factors, that are responsible for a disease or health related condition inspecific targets populations but not intended for diseases treatment.	Diets rich in calcium may help reduce the risk of osteoporosis.
6		Conditional Claims	1. food is by its nature high or low or free of a specific nutrient or 2. when adjectives such as "natural", "fresh", "pure", "original", "traditional", "Authentic", "Genuine", "Real", etc., used, shall be in accordance with conditions laid down in Schedule V	1. A naturally high calcium food. 2. Authentic Punjabi Taste
7	Non addition claims	Non-addition of sugar	No sugar has been added directly or indirectly	No Added Sugar
8		Non addition of salt	No salt has been added directly or indirectly	No Added Salt
9		Non-addition of additives	No additives have been added directly or indirectly	No Added Colour

Following are the various good practices to follow while making the claims which would help abide the guiding principles and the specified standards.

1. Clear Communication:

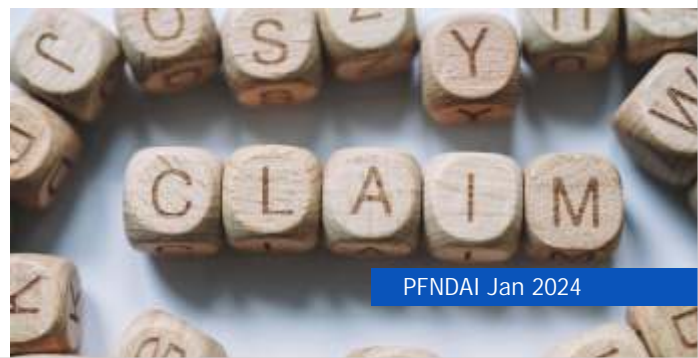
Consumers deserve understandable information about the claims made on food products. Use clear, concise language and avoid scientific jargon when communicating

your claims. Visual aids, such as infographics or charts, can further enhance comprehension for a broader audience.

2. Disclaimers:

Moreover, incorporating disclaimers where necessary is essential to provide context, limitations, or conditions under which the claim is valid. They serve as a

safeguard, preventing misinterpretation or misconceptions about the product's attributes or effects. Disclaimers should be visible, easily understandable to the consumer.



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perspectives, reducing the risk of oversight or misinterpretation.

7. Alignment with Scientific, Legal and global regulatory regime: Staying updated with

scientific advancements ensures that claim substantiation aligns with the latest research methodologies and standards. While it is paramount to adhere to national legislations requirements, making it align with international regulatory or scientific institute further strengthened the evidence.



8. Long-Term Monitoring and Follow-Up Studies:

Continuous monitoring and follow-up studies contribute significantly to substantiation. Long-term assessments validate the persistence of claimed benefits or characteristics over time. Repetitive observations and analyses ensure consistency and reliability beyond initial findings.

9. Adherence to Regulatory Guidelines:

Compliance with regulatory standards is

non-negotiable. Understanding and adhering to local, national, and international guidelines ensure claims meet legal requirements and industry standards. Regulatory bodies often require substantial evidence to support claims, necessitating repetitive substantiation to meet varying criteria.

10. Continuous

Improvement: Food science is a dynamic field. By implementing a culture of continuous improvement, you can ensure your claim substantiation process remains effective and adaptable. Encourage collaboration, feedback, and regular reviews to identify areas for improvement and optimize your approach.

Following are the various practices or things a one should avoid while making claims.

1. Exaggerated Marketing

Claims: Avoid making exaggerated claims that go beyond the scope of the scientific evidence. Overstating the benefits of a product may lead to consumer scepticism and erode trust if the actual outcomes do not align with the marketing messages.

3. Data Quality: The foundation of any sound claims rests on the quality of your data. Ensure your evidence comes from reputable, peer-reviewed scientific journals known for their rigorous methodology and transparent reporting.

4. Statistical Tools for Data Analysis: Utilizing statistical tools for data analysis adds a layer of quantitative validation to the substantiation process. Statistical analysis not only strengthens the claim but also provides a standardized method for interpreting results.

5. Documentation: Just as a recipe needs precise instructions, documenting your claim substantiation process is vital. This documentation should be a detailed record of every step, including chosen studies, data analysis, rationale for the claim, and any relevant communications with regulatory bodies.

6. Approval from Relevant Stakeholders: Before making a claim public, ensuring that other stakeholders within the company, such as legal, marketing, R&D teams, Nutrition team or any other-stakeholders is crucial. This ensures a comprehensive evaluation from various



2. Avoid Cherry-Picking

Data: Don't selectively present data that supports the claim while omitting contradictory or less favourable findings. Provide a balanced view of the research.

3. Neglecting Consumer

Understanding: Don't assume that consumers will interpret scientific data the same way as experts. Simplify complex scientific information into clear, consumer-friendly language to ensure that marketing messages are easily understood and resonate with the target audience.

4. Misleading Visual

Representations: Refrain from using visual aids or graphics that may mislead consumers about the significance or scope of scientific findings. Ensure that any visuals accurately represent the data and are not manipulated to create a false impression.

5. Ignoring Consumer

Feedback: Avoid disregarding feedback from consumers who

may have questions or concerns about the claims. Actively engage with consumers, address inquiries transparently, and use feedback as an opportunity to improve communication strategies.

6. Ignoring Confounding

Variables: Failing to account for confounding variables can compromise the validity of the data. Researchers should diligently identify and control for potential confounders in their studies.

7. Extrapolating Beyond

Study Parameters: Caution against extrapolating findings beyond the scope of the study. Claims should be directly supported by the specific conditions and parameters investigated in the research.

8. Steer Clear of Inadequate

Sample Sizes: Don't rely on small sample sizes that may not be representative of the

target population. Adequate sample sizes are crucial for statistical validity.

9. Avoid Rushing the Substantiation Process:

Don't rush through the claim substantiation process. Thoroughness and attention to detail are essential for producing sound and credible scientific evidence.

10. Do not ignore

restrictions- Certain food need to carry precautionary statements to ensure consumer safety and health. Do not assume that if some requirement is not mandated hence need not be declared. It would be better to declare the precautionary statements to restrict the consumption of food by targeted population only.



SENSORY EVALUATION OF FOOD: EXPERTS USE IT TO DETERMINE SUPERIOR FOODS

AUTHOR

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People like sweet mango with yellow orange colour, and they also like unripe mango (kairi) with its sour taste with salt. However, when the mango becomes overripe and decayed, they don't like it. All three stages of mango will have different colour, taste and smell and appearance.

They also will have different chemical composition that would give them different characteristics. Even in mango, there are many different varieties like Alphonso, Totapuri, Langra, Dasheri, Badami and Kesar etc. Some may like one more than the other because of their differences in colour, taste, flavour and texture etc. Even the Alphonso grown in different places, under different climatic conditions

and agricultural practices may have different characteristics. These may change further when the products like pulp, juice, murabba, jam etc. are prepared from them because of the effects of processing and other ingredients added to it.

Our mothers check if the fruits and vegetables or other ingredients while buying are of right quality by checking their colour, sniffing and pressing to see the hardness or softness. They gauge the suitability of these for whatever food they are planning to make. They will continue the same testing while cooking and if the seasoning or heating is enough or some adjustment is needed. This is traditional organoleptic testing. This has been converted into science by studying the effects of taste, aroma, colour, texture and

appearance etc. on our senses namely eye, nose, tongue, ear etc. Thus, sensory evaluation has been helping develop food products in industry and trained expert panellists evaluate the foods using their senses just like machines.

Applications of Sensory Evaluation

Probably early application of such evaluation was done by tea tasters and wine tasters. Tea and wine produced from produce grown in different seasons under different conditions would have different qualities and only the best would be selected by reputable companies who would employ experts for this. Also, some proprietary blends need different samples mixed in proper proportions to get the right blend which needs to be tested only by these expert tasters.



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However, the science of sensory evaluation became more prevalent in food industry where processors would have a sensory lab with trained experts who could tell the minute differences among very close samples, which probably most consumers would not be able to distinguish.

New product development exclusively uses this method to not only select the right ingredients but also the final products. It is also useful when one is developing a product similar or better than the market leader. Even the inhouse improvement of existing products can be done with this. When a variation of existing product is to be done with addition of new ingredient that may provide health or nutrient benefit, it can be tested by sensory evaluation of different varieties or amounts or combinations on the acceptability. This has been seen more recently when fortification of existing food products is done, especially with some nutraceuticals having strong and at time not-very-pleasant properties.

Sometimes, different machinery or factory or scale is to be tried, this method tells whether the original product characteristics are achieved or some adjustment is needed. This is also helpful in test-

marketing of products to gauge the consumer response. There are many more advantages of this technique in food industry.

Instrumental and Sensory Analysis

Some properties of foods such as colour and hardness could be analysed by instruments. There are instruments that evaluate the colour in a manner similar to human eye. However, it is simpler as a large number of colours are formed by mixing the few basic colours. Taste is also simpler as there are five basic tastes and substances can provide these tastes and can be evaluated by instrument. There are some differences in tastes sensation of different substances. Sweetness for example, has differences by sugars and by sweeteners.

Fragrance or aroma is not so simple. There is a large number of substances that provide odour sensation and their innumerable combinations will provide the sensations that are so complex that it is difficult to analyse by instruments. That was human nose is extremely superior to machines. Although there are differences in odour perception by individuals depending on age, gender, sensitivity and also health of individuals. In addition, environmental conditions can also affect perception. In spite of that human nose can detect odours, pleasant and unpleasant very efficiently. That is why, when we select fruits, after we check for colours and softness, we always smell to detect pleasant aroma of the ripe fruit. We also can detect

rancidity of fried foods by smelling. Thus, sensory evaluation in many instances far superior to instrument in testing foods.

Sensory Laboratory

Setting a lab for evaluating foods by senses needs a clean lab that is environmentally controlled for humidity, temperature and light so panellists are comfortable and are not affected by smells other than the test material. Colour may affect the testing of aroma so in that case, coloured lamps may be used to disguise the colour of food. When colours are evaluated, natural light may be used. When testing many odour samples, short break to breathe fresh air avoid odour fatigue. Lukewarm water may be used to rinse mouth to avoid taste lingering from previous sample. If panellists are highly trained, just five panellists are enough but for statistical analysis 20 to 30 would be desirable. In case of untrained consumer panellists, up to 50 would be satisfactory.

When choosing panellists, a mix of young and old is taken as younger persons have greater sensitivity while older people have better concentration. Smokers and those with cold have lesser sensitivity. Spicy food and those with lingering taste, perfumes and cosmetics may interfere with testing.



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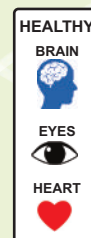
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Panellists are usually trained to recognise tastes, odours and aroma and are given exercises with other senses. They are also trained to recognise small differences and also detect the tastes and odours at very low concentration of substances. Thus these trained panellists can detect smell, colour and other differences in foods that are so minute that most consumers won't be able to, so when they approve a product, rarely ever the consumers reject it for a defect.

Different Sensory Properties of Foods

Panellists analyse the foods using their senses of taste, odour or aroma and other properties of foods to find out the differences or detect some uniqueness. There are four different tastes namely sweet, salty, sour and bitter while the types of odours can be a very large number and quite complex. We can smell the food by sniffing near or also while eating the volatiles may enter nasal cavity via throat. Not all volatile substances will have odour sensation. Some can be sensed at very low concentration while other need very high level. Although the number of different odours is very large, by practice odour memory can be improved and we can recognise familiar ones.

While eating food, we also sense colour, appearance,

temperature, pain, mouthfeel and sound. First sense that mostly notices food is eyes that see colour and appearance. Red apple or strawberry, yellow banana or mango etc. is

attractive. Of course, sometimes food being fried or coffee being brewed in kitchen will be noticed by us sitting in another room. We enjoy very cold ice cream or hot tea but not lukewarm ice cream or tea.

Spicy foods are appealing because of their pungency which causes pain sensation. Soft bread is enjoyable but hard sugar candies are preferred. Stickiness is liked of chocolates and some softer candies. Softness is not liked in wafers or chips or crackers which need to be crisp and should crackle then being eaten. Thus, their crackly sound is very enjoyable.

All these sensations make an impact together while we are eating the food making the eating sensation very enjoyable if the combination is right.

Sensory Analysis Tests

When panellists try to find out if there is a difference between two samples, various difference tests are used such as Paired Difference Test, Triangle Test or Duo-Trio Test.

In paired difference test, two samples e.g., apple juice with different amounts of added sugar may be given and asked to identify which one is sweeter. It can be done for aroma, texture or some other sensory property also.

Triangle test is most commonly used wherein out of three samples, two are identical and the third being different and panellist is asked identify the odd sample. This may be used when one is developing a product and among two this test tries to find which is superior.

In the Duo-Trio test, a combination of above tests, first a sample is given to test followed by two more samples and panellist is asked to identify among the latter two which is identical to first one.

Ranking test is done when several commercial samples are tested to find out which is the best among them. This may also be done in order to find out which concentration of sugar or salt or some spice may be used, using increasing amounts in each sample.

Flavours are combinations of taste and odour sensations together with other senses and profiles are used to see how different profiles match on a graphical chart. Flavour profiles are useful when comparing different coffees or some other products with complex flavours. Total flavour is broken down to see the impact of each component and comparing the profile to see similarities and differences between samples. This may help in blending different varieties to achieve a previously acceptable profile.



Finally

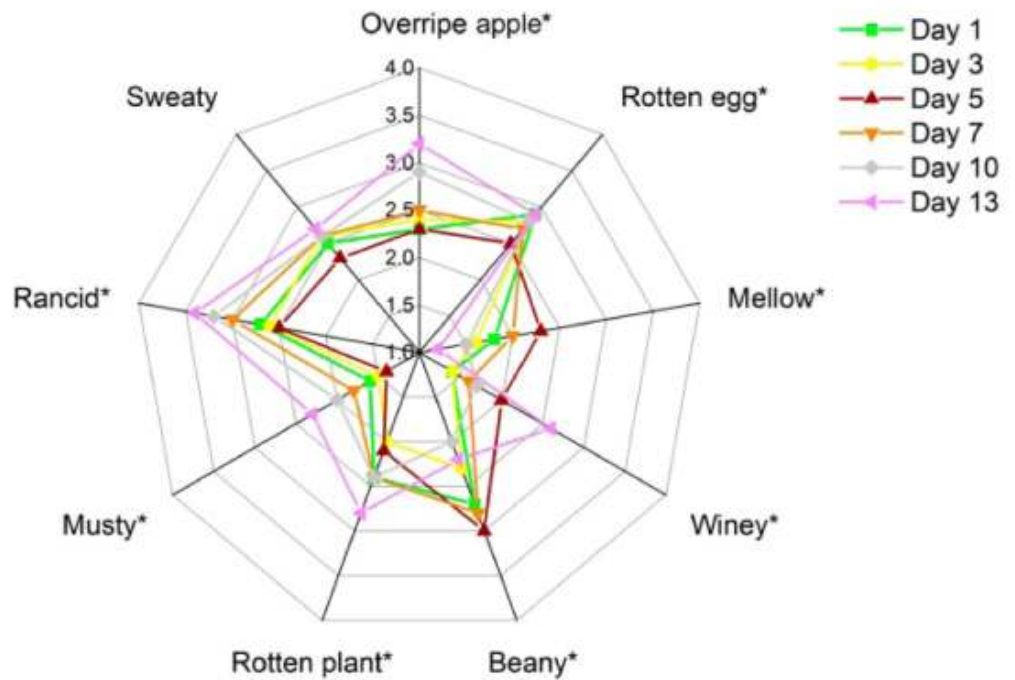
People don't just eat nutrients, and food means more to them than just some fuel to keep them going. They enjoy food and express that at various ceremonies and very happy occasions as well as an expression of affection. Thus, delicious food is very important and no machine has as yet been able to match the ability of human senses to distinguish good food from a delectable one.



Sensory evaluation has now become a science from what was a crude means to rate the food. This has become extremely useful in industry to develop a new food product or to improve upon an existing product. It is also used in research to study the effects of new ingredients on the flavour profile or on acceptability.

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DIET IN OSTEOPOROSIS



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Often, we neglect the signs given by our body and blame physical exertion or stress eventually, we end up losing our health. One such 'silent' disease is osteoporosis. One out of five people have osteoporosis in India (1). The prevalence is higher in women especially post-menopausal as well as elderly. However, not all elderly individuals have weak bones, and although it happens rarely, bone disease can also affect younger people.

Osteoporosis is marked by a reduction in bone strength, a rise in the possibility of fragility fractures, and a decline in bone mineral density. Each stage of life affects the body's requirement for calcium in relation to skeletal growth and remodelling. The two main

physiological processes are bone accretion during skeletal growth and the preservation of existing bone mass once growth is completed. Net calcium loss occurs in the body later in adulthood when bone resorption outweighs bone growth in the rate of occurrence (2).

But why are there age-dependent changes in bones?

- Aging leads to impaired bone function, increased fragility, and depletion of calcium stores. Cortical bone and trabecular struts weaken with age, often due to increases in cortical porosity, non-enzymatic collagen cross-links, and collagen content.
- Changes in bone shape and structure also occur with age, leading to decreased functional ability and increased stress and deformation, which can result in fractures.
- The decline in bone's mechanical function is influenced by changes in bone remodelling, including a decrease in the amount and rate of bone deposition.

- Age-related changes in gene expression, cellular function, and the ability to respond to stimuli also contribute to bone decline.
- Additionally, according to a study, with aging and after menopause, calcium absorption has been reported to decline on average by 0.21 percent per year after 40 years of age (3).

Talking about Osteoporosis, it is seen to come in a wide variety of different types (4): 1) **Primary osteoporosis**, has two types: distinguished in general by i) sex, the age at which fractures occur, and ii) the kinds of bone involved.

2) When a known medication like proton pump inhibitors (PPIs), thiazolidinediones (TZDs), anticonvulsants, medroxyprogesterone acetate (MPA), hormone deprivation therapy, chemotherapies, and anticoagulants or disease processes like diabetes, hyperthyroidism, and chronic renal illness, results in bone tissue loss, **secondary osteoporosis** develops. (5)

VITAMIN D KI TAAKAT





3) Within a few years following menopause, women develop **oestrogen-androgen deficient osteoporosis** due to loss of trabecular bone tissue and a reduction in ovarian oestrogen production.

4) At around 70 and beyond, **age-related primary osteoporosis** starts to manifest as there is a decline in intestinal calcium absorption with age, and also reduction is seen in the ability of the kidney to synthesize 1,25(OH)2D3. Although both sexes are affected by age-related osteoporosis, women are more severely impacted since they have a smaller skeletal frame.

There are many factors that contribute to osteoporosis like ethnicity, certain genetic disorders, age especially older than 60, excessive use of cigarette smoking, and alcohol consumption because of their toxic effects on osteoblasts which are responsible for the formation of bone tissue, menopause or amenorrhea, lack of exercise, prolonged use of certain medications which interfere with calcium absorption or simply being underweight or having low body mass index and low body fatness. Despite their underlying cause, dietary deficiencies can worsen osteoporosis by depriving the skeletal system of vital components and regulatory

factors- WHO recognizes that calcium, vitamin D, protein, phosphate, vitamin K, magnesium, and other trace

elements and vitamins are all related to bone health.

Steps to maintain Bone health:

1) Energy:

Energy intake does not directly affect bone; rather, it is the result of either an excess of calories which leads to overweight, or an inadequate amount of energy that results in low body weight. Nowadays, many people choose to follow a lifestyle of calorie restriction to reduce body weight and minimize oxidative stress. However, a growing amount of research indicates that this should be carefully considered due to its deleterious effects on the skeletal system. Calorie restriction can inhibit bone regrowth and increase the risk of fracture. It is believed that calorie restriction-induced weight loss is mostly caused by decreased mechanical loads. In such circumstances, bone marrow adipose tissue (BMAT) rises despite fat loss. Therefore, appropriate amounts of calories in relation to your height, weight, and lifestyle should be taken daily (6).

2) Colourful plate: Fruits, Veggies and Whole grains! These foods are high in fibre, vital vitamins, and minerals, and often low in calories and fat. Additionally, they include phytochemicals, which are compounds that offer

protection against a number of illnesses, including osteoporosis. 1-2 servings of whole fruit while 3-4 servings of vegetables should be taken daily. When feasible, choose whole grains over processed ones because the former have a higher nutritious content, particularly in fibre and magnesium. Certain fibre compounds called inulin-type fructans are present in wheat, onions, bananas, and garlic which have the potential to improve the absorption of calcium and magnesium, while high-fibre meals that contain oxalates or phytates like meals containing soy or its products, potatoes, spinach, nuts, and beans may have the opposite effect. More fruits, vegetables, fish, and dairy products can help maintain healthy bones and BMD, according to research (7). These dietary groups are dense in vitamins, minerals, antioxidants, and protein needed to promote bone mineralization and limit osteoclast activity.

3) Healthy Macros: Good quality proteins and fats! Since protein makes up a large portion of bone tissue and aids in bone maintenance, it is crucial for bone health. Extremely low protein consumption may have a negative impact on bone growth and turnover. Increased protein intake may be recommended in situations where there is a negative nitrogen balance, such as after surgery or a fracture.



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Good quality protein includes poultry, meat, eggs, and fish with alternatives including beans, lentils, tofu, peanuts, or other nuts and seeds. Dairy products are also a good source of protein and have the added advantage of being good sources of calcium. They are also a rich source of Probiotics which can enhance bone metabolism and intestinal calcium absorption. A balanced meal with an appropriate amount of calcium, protein, prebiotics, and probiotics, improves the balance of bone mass and the reduction of sex hormone deficiency-induced bone loss, which is particularly significant after menopause. These substances may alter the metabolism and makeup of the gut microbiome. Consuming products made from fermented milk like curd, yogurt, and buttermilk will also support bone maintenance.

Rich in vitamins, minerals, and oestrogen, plant proteins assist in maintaining bone density. One should consume at least 1 g of protein/kg Ideal Body Weight (IBW), is defined as weight for height at the lowest risk of mortality for growth and maintenance. For example, if your IBW is 50 kgs then 50g of protein is the minimum requirement.

For the body to operate efficiently, one must consume some good quality fat in the diet. Monounsaturated fats, which can be found in nuts,

seeds, and olive oil, are the finest options. Fish

offers important omega-3 fatty acids. Avoid high amounts of saturated fats and trans-fats, as they negatively impact bone health.

4) Healthy Micros:

- Calcium- For strong bones, calcium and vitamin D are needed for calcium phosphate (hydroxyapatite) crystals, which are a component of the bone mineral matrix. Maintaining a balanced diet is the best approach to getting enough calcium. Yet, calcium supplementation may be helpful in cases where dietary sources are inadequate or poorly tolerated. Dairy products (milk, yogurt, and cheese), fish (particularly sardines with bones), lentils, nuts, and oilseeds are the main dietary sources of calcium.
- Vitamin D- It regulates Calcium homeostasis. Eighty to ninety percent of vitamin D comes from sun exposure through epidermal synthesis, while ten to twenty percent comes from a few foods including fatty fish, mushrooms, and some fortified dairy products. However, no diet can supply the necessary amount of vitamin D. The fortification of many foods may play a role in raising vitamin D consumption. It's critical to get enough sunshine exposure to both prevent and treat vitamin D deficiency. A lack of vitamin D can have detrimental effects on health outcomes, especially

on maintaining bone health. Insufficient levels of vitamin D in younger, older, or postmenopausal women can exacerbate osteoporosis. Sufficient levels of 25-hydroxyvitamin D (25(OH)D) are also required to optimize the effectiveness of anti-osteoporotic medications (8).

- Vitamin K2- Vitamin K is a crucial nutrient for bone health as it plays a role in modifying certain proteins involved in bone formation. Osteocalcin, a protein released during bone resorption, serves as a serum bone marker that can predict the risk of fractures. The main sources of vitamin K are green leafy vegetables and fats/oils, with a smaller contribution from bacteria in the gut. However, many older adults do not consume enough vitamin K due to low consumption of dark-green leafy vegetables.



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deficit is linked to decreased bone production because it stimulates osteoblast proliferation. Because magnesium is required for the majority of the enzymes involved in

the metabolism of vitamin D, it is also essential for the activation of vitamin D (9).

5) Cut out the Culprits:

High-fat foods, Sugar, salt, phosphate additives, alcohol, and caffeine:

High saturated fat diets have been shown to have negative impacts on calcium absorption from food, which in turn can have negative consequences on bone mineralization.

Therefore, eating fat in food may have long-term effects on bone health and skeletal diseases like osteoporosis.

Foods with added sugars from processing often have high-calorie counts, as well as additives and preservatives, but they are not very nutritious. Restrict your consumption of processed foods and drinks as they have high amounts of salt (sodium) and phosphoric acid which have the potential to elevate blood pressure in addition to increasing the quantity of calcium your body excretes through urination eventually bone mineral loss happens.

Therefore, monitor the amount of salt in your diet limiting it to 2,300 mg, which is roughly 1 teaspoon daily. Many manufactured foods contain phosphorus as an addition. The amount of calcium that is absorbed via your small intestine may be

affected by a diet high in phosphorus. Check the labels of processed goods for sodium content, and try choosing foods that claim 'sodium-free', 'salt-free', or 'low in sodium', but whenever possible try to select fresh foods.

Alcohol and caffeine consumption should also be limited to maintain healthy bones. Alcohol can lead to bone loss and reduce the body's ability to absorb calcium especially if had with meal. Caffeine can slightly increase calcium loss during urination and also inhibit the proliferation of osteoblasts, but moderate consumption of about one to two cups of coffee per day is not harmful as long as the diet contains adequate calcium. When consumed in moderation, tea-extract flavonoids have been shown to prevent bone loss and lower the risk of osteoporosis due to their antioxidant and anti-inflammatory qualities (10).

It is important to consider the vitamin K intake in older individuals who are also taking blood-thinning medications, known as vitamin K antagonists. Rather than avoiding vitamin K-rich foods, which could negatively impact bone health, it is recommended to regulate the vitamin K intake and adjust the medication dosage accordingly. The effectiveness of blood thinning medication can be achieved with low-dose vitamin K supplementation and minimal fluctuations.

- Potassium and Magnesium-Potassium from diet can reduce the acid load and, in turn, the loss of calcium from bones. In addition to aiding in the body's ability to remain alkaline, potassium can accelerate the buildup of calcium in the kidneys. The metabolism of calcium also requires magnesium. Nuts, legumes, and green leafy vegetables are just a few examples of whole foods that contain magnesium. The bone stores between 50 and 60 percent of the body's total magnesium content. Magnesium ions interact with the surface of hydroxyapatite crystals in the structure of bones to enhance the solubility of calcium and phosphorous hydroxyapatite, which in turn affects crystal formation and size. Moreover, a magnesium



Overall, in order to manage osteoporosis and lower the risk of fractures, prevention, early detection, and appropriate treatment are crucial. Maintaining bone health and halting the progression of disease can be achieved by lifestyle changes, appropriate diet, weight-bearing activity, and medication, as needed.

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INFLUENCER MARKETING IN THE FOOD SECTOR: STRATEGIES FOR SUCCESS



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In the vigorous landscape of digital marketing, the most powerful tool is influencer marketing, especially in the food sector. As consumers increasingly turn to online platforms for culinary inspiration, influencers play a pivotal role in shaping food trends, brand preferences, and buying decisions.

Consumers trust recommendations and reviews of food and beverage products. Influencer marketing provides an opportunity to capture this consumer behaviour by working with influencers who are considered experts in their field.

In addition to their capacity to

reach a wider audience, influencers possess a genuine bond with their followers. This bond fosters a greater level of trust, thereby increasing the likelihood of consumers venturing into new products or exploring various brands as per the recommendations of these influencers. By harnessing this trust, food and beverage brands can successfully endorse their products and leave a lasting impression on consumer buying choices.

The Rise of Influencer Marketing in the Food Sector

Over the last few years, influencer marketing has become a cornerstone of digital advertising, and the food sector has embraced this trend with open arms. From YouTube cooking channels to Instagram foodies, influencers have created a new approach for brands to connect with their target audience. For influencer marketing, the visual and experiential nature

of food makes it particularly well-suited, as influencers can showcase not only the product but also the associated lifestyle and experience.

Identifying the Right Influencers

For a successful influencer marketing strategy, the first step is to identify the right influencers for your brand. In the food sector, this involves finding influencers whose content aligns with your brand's values, target audience, and aesthetic. Micro-influencers, with smaller but highly engaged audiences, can be especially effective for niche or local food brands, while larger influencers may offer broader reach for more established brands.

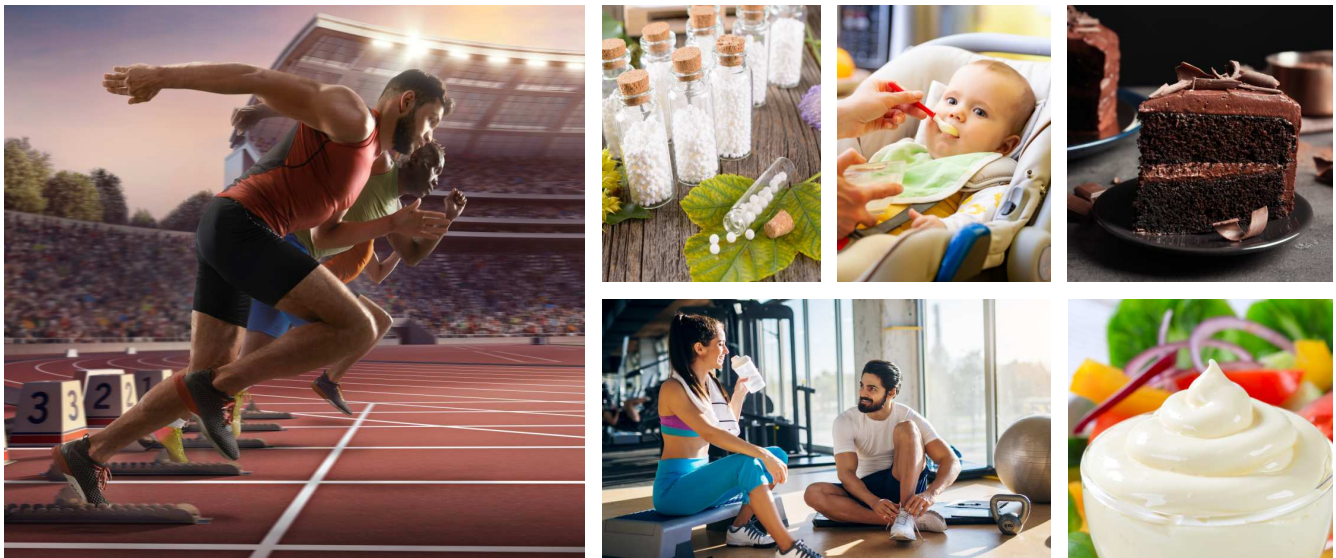
Authenticity and Genuine Engagement

Authenticity is the currency of influencer marketing. Successful influencers in the food sector are those who authentically share their passion for food and connect with their audience on a personal level.



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Strategies for Success in Influencer Marketing

Define Clear Objectives

Brands should look for influencers who genuinely enjoy and incorporate their products into their content. Authenticity fosters trust, and influencers who engage with their audience through comments, messages, and shared experiences create a more meaningful connection.

Visual Storytelling

Influencers are excellent at telling stories visually, and food is a visual experience. The presentation of a dish, the process of cooking, and the joy of savoring the final result can be captivating when shared through well-crafted visuals. Brands should collaborate with influencers who have a strong visual style that complements the brand's identity. High-quality, appetizing visuals not only showcase the product but also create a desire among viewers to try it themselves.

Creating Experiences and Lifestyle Connections

Influencers have the ability to create experiences and connections beyond the product itself. Successful food influencers often integrate the brand into their daily lives, showcasing how the product fits into their routines, celebrations, and special moments. This lifestyle integration allows the audience to envision the product in their own lives, making it more relatable and desirable.

Before embarking on an influencer marketing campaign, it's crucial to define clear objectives. Whether the goal is to increase brand awareness, drive sales, or launch a new product, having well-defined objectives helps in selecting the right influencers and measuring the success of the campaign.

Build Genuine Relationships

Successful influencer marketing goes beyond transactional relationships. Building genuine, long-term relationships with influencers can lead to more authentic content and stronger brand advocacy. Brands should invest time in understanding influencers, their preferences, and values to foster a connection that resonates with their audience.

Co-Creation of Content

Collaboration is key in influencer marketing. Instead of dictating the content, brands should encourage influencers to co-create content that feels authentic to their style while incorporating the brand message. This approach not only ensures a more genuine representation of the product but also allows influencers to showcase their creativity.

Utilize Multiple Platforms

While Instagram remains a powerhouse for food influencers, brands should explore other platforms such

as YouTube, and Pinterest, depending on their target audience and content style. Each platform offers unique opportunities for engagement, and diversifying the influencer marketing strategy can maximize reach.

Leverage User-Generated Content

Encouraging user-generated content (UGC) is a powerful strategy in influencer marketing. Brands can create campaigns that invite followers to share their experiences with the product, whether it's through recipes, reviews, or creative uses. UGC not only amplifies the brand's reach but also taps into the authenticity of real customer experiences.

Measure and Analyze Performance

Tracking the performance of influencer marketing campaigns is essential for refining future strategies. Metrics such as engagement rate, reach, conversions, and sentiment analysis provide valuable insights into the effectiveness of the campaign. Brands should use analytics tools to measure the impact on key performance indicators and adjust their approach accordingly.



Case Studies in Successful Influencer Marketing Campaigns

HelloFresh and Influencer Recipe Collaboration

Meal kit delivery service HelloFresh successfully leveraged influencers to create unique and shareable recipes using their products. By collaborating with food influencers known for their culinary expertise, HelloFresh not only showcased the versatility of its meal kits but also reached a wider audience through the influencers' followers.

Oreo's Dunk Challenge

Oreo launched a creative campaign called the "Oreo Dunk Challenge," encouraging users to showcase their unique ways of dunking an Oreo cookie. Influencers played a significant role in popularizing the challenge, resulting in a viral trend that boosted brand awareness and engagement.

Challenges and Ethical Considerations

While influencer marketing in the food sector offers numerous opportunities, it is not without its challenges and ethical considerations.

Authenticity and Transparency

Maintaining authenticity is crucial in influencer marketing. Brands should

ensure that influencers disclose their partnerships transparently, and influencers, in turn, should only collaborate with brands that align with their values. Authenticity builds trust, and transparency is essential for a sustainable influencer marketing ecosystem.

Audience Fatigue and Saturation

The excessive amount of influencer content can cause audience saturation and fatigue. Brands must be mindful of the frequency and timing of influencer campaigns to avoid overwhelming their audience. Quality should always take precedence over quantity to ensure that each collaboration brings genuine value.

Measurement Metrics and ROI

Measuring the return on investment (ROI) in influencer marketing can be challenging. While metrics such as engagement, reach, and conversions provide valuable insights, attributing direct sales to influencer campaigns may require more sophisticated tracking mechanisms. Brands should invest in analytics tools that provide comprehensive data to assess the impact of their campaigns.



Influencer marketing has become an integral part of the food sector's digital strategy, offering a dynamic and visually compelling way to connect with consumers. By understanding the strategies that lead to success - from choosing the appropriate influencers to developing sincere connections and producing immersive experiences - With influencer marketing, brands can take their products to the next level and reach a wider audience. As the digital landscape continues to evolve, influencer marketing in the food sector remains a dynamic and influential force, shaping not only consumer preferences but also the future of digital marketing itself.

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WEBINAR ON 'MANAGING DIABETES THROUGH DIET AND NUTRITION'

WEBINAR REPORT

by
Ms Simran Vichare,
Nutritionist, PFNDIAI



Protein Foods & Nutrition Development Association of India (PFNDIAI) Organized a Webinar on 'Managing Diabetes Through Diet and Nutrition' in collaboration with Marico Ltd. on the 17th of November 2023.

The opening address of the webinar was given by, Dr Shashak Bhalkar, Executive Director of PFNDIAI, who welcomed all the speakers and attendees.



He started by discussing the importance of early diagnosis and treatment for diabetes. He mentioned that 90% of diabetics have type 2 diabetes and that close to half of them are undiagnosed. Dr Bhalkar emphasized the importance of managing blood sugar levels to avoid

complications. He shared his personal experience with type 2 diabetes and how he was able to control his sugar levels through a nutritious diet, frequent testing, medications, and regular exercise. He strongly believed that diabetes brought discipline and positive behavioural changes to his life, allowing him to progress in his career successfully. He also gave the example of a famous Pakistani bowler and captain, Wasim Akram, who was diagnosed with Type 1 diabetes but continued to excel in his cricket career through diet control and exercise. He concluded by stating that experts from the fields of Medicine, Nutrition, and Dietetics will address and discuss various aspects of diabetes in this webinar. Dr Bhalkar also expressed his gratitude to Marico for sponsoring the webinar.

The speakers for the event were then welcomed and greeted by Ms. Dolly Soni, PFNDIAI's Manager of



Marketing and Projects and Webinar Convener. She also gave detailed introduction of each speaker.

Talk on 'Nutrition Priorities in Type 2 Diabetes Management' was delivered by, Dr Jagmeet Madan, National President, IDA and Principal & Professor Dept. of Food, Nutrition & Dietetics, SVT College of Home Science, (Autonomous), SNTWU, Mumbai. She talked about the Theme of Diabetes Day 2023, which is 'Access to Diabetes Care; Know your risk, know your response; Delay and prevent diabetes'. She highlighted the need to monitor carbohydrate intake and provided data on macronutrient distribution in T2DM patients in India. Dr Madan also presented findings from a dietary survey in an Indian T2DM population, which includes information on the composition of various food samples. She further discussed the relationship between nuts



and diabetes prevention and management, presenting findings from various trials. Moving ahead, she emphasized the importance of good

quality protein and dietary fibre in the diet, as well as traditional Indian dietary practices that include a variety of local seasonal vegetables and fruits. She concluded her talk by highlighting the need for productive management of diabetes to prevent complications.

Ms Gayatri

Dawda, Nutrition Expert at Marico Limited presented on 'Oats Decoded: Uncovering the Lesser-Known Nutritional Facts'. She discussed the lesser-known nutritional facts about oats and their potential impact on health. Triple burden of malnutrition: Ms. Gayatri highlighted the three main aspects of malnutrition in India, including undernutrition, overnutrition (obesity), and micronutrient deficiencies. She mentioned the increasing prevalence of NCDs in India. These diseases are often associated with dietary factors and how the nutrition transition in India is examined, showing the shift



towards a diet linked with NCDs. She emphasized the role of oats as a unique whole grain and how they are rich in dietary fibre, particularly beta-glucan, which is clinically proven to lower cholesterol levels, also contain resistant starch, which is beneficial for health, as well as higher protein content compared to other cereals. She talked about how the amino acid profile of oats is also favourable. Oats are also rich in lipids, particularly unsaturated fatty acids, and also have antioxidant potential, they have anti-inflammatory and anti-allergy properties and can help reduce blood pressure, body weight, and body fat. She concluded by highlighting oats as a potential food solution to help manage NCDs while emphasizing their nutritional advantages, including their high content of vitamins, minerals, and antioxidants.

Dr Shashank Joshi, Diabetologist and endocrinologist at Lilavati Hospital, Mumbai spoke on 'Diabetes and Lifestyle



Modification: Sustainable Behaviour Change'. Fortunately, Prof Akhtar Hussain, President of the International Diabetes Federation was present with Dr Joshi and as 'World Diabetes Day' was started by IDF and WHO he too addressed the audience. He mentioned about UN resolution of 2006, where it is strongly said that all countries and all members should encourage preventive activities for diabetes. He said, lifestyle changes can prevent up to 70% of diabetes cases as it is a very powerful tool not only to prevent happening of diabetes but to also prevent its complications. After this, Dr Shashank Joshi took the discussion ahead and talked about how India has the largest population of diabetics and pre-diabetic individuals. He said the main things to focus on are: eating slowly, eating on time, controlling proportions, especially of carbohydrates and fats in meals, eating right, and the addition of functional foods is a plus point.



He ended his talk by explaining the importance of physical activity, yoga, meditation, sleep quality and quantity, managing stress and doing digital detox was also mentioned as obesity and diabetes go hand in hand. Dr Joshi, also explained how at a large level we can start the intervention for diabetes, the first is by introducing school and workplace canteens which promote home-cooked meals and the second is by encouraging physical activities also recognising and early detection of diabetes are important.

After each talk, the speakers enthusiastically responded to all the questions that were asked by the attendees.

To start with the Panel discussion, Ms Dolly Soni introduced the moderator, **Dr Jagdish Pai**, Former Executive Director, at PFNDAI and currently working as the Editor at PFNDAI. She also welcomed and introduced the Panellists for the event, **Ms. Sheryl Salis**, Founder and Director, Nurture Health Solutions, **Ms. Zamurrud Patel**, HOD, Chief

Dietician at Global Hospitals, Mumbai, and **Ms. Jayashree Paranjape**, Sr. RD- BYL Nair Hospital, Diabetes Educator, Treasurer IDA Mumbai Chapter.

He started the discussion by first addressing questions to Ms Sheryl, about key dietary principles diabetics should follow to maintain blood sugar control she answered that nowadays, even young age groups are getting diabetes and people should start following 80-20 rule, where 80% of the time, they are eating home-cooked meals and 20% they can indulge in unhealthy foods if needed while focusing on complex carbs, healthy fats, and increase protein consumption she also talked about how we can improve our diets even by using something as simple as peanuts as they are affordable, has good quality fats and proteins plus is a part of our traditional meals. Moving ahead, Ms Jayashree was asked to share practical tips for meal planning with regard to portion control, she explained how in her work setup they address these questions and the key is to

control the glycaemic load of the meals. After this, Ms Zamurrud was asked to give her views on how to maintain a healthy weight and avoid diabetes complications to which she replied on how to maintain a balanced diet both quantitatively and qualitatively while keeping it similar to their normal diets for easy adaption and sustainability. Similar questions in pertinence to dietary management in diabetes, myths related to it, food choices and what to avoid daily as well as during outings were addressed by all the Panellists. Overall, the discussion was very lively and interactive and was very well moderated by Dr Pai.

Lastly, the vote of thanks was given by Ms Dolly Soni. She acknowledged all the speakers and Panel members for the day and also thanked Marico Ltd for sponsoring the webinar along with the audience for making this webinar a success.

The entire webinar recording is available on the following link
[\(https://fb.watch/oqCyJgTgiW/\)](https://fb.watch/oqCyJgTgiW/)



'MATERNAL HEALTH'

WEBINAR REPORT

by

Ms Simran Vichare,
Nutritionist, PFNDAI



Protein Foods & Nutrition Development Association of India (PFNDAI) Organized a Webinar on 'Maternal Health' in collaboration with Hindustan Unilever Limited on the 13th of December 2023.

The opening address of the webinar was given by, **Dr Shashak Bhalkar**, Executive Director of PFNDAI, who welcomed all the speakers and attendees. He set the stage for the webinar, emphasizing the critical importance of maternal health and nutrition for the well-being of both mothers and their children for proper physical and cognitive growth. He highlighted the social and economic factors contributing to poor health and nutritional status, including the secondary role of women in male-dominated



societies and the lack of awareness about micronutrients. He also discussed inequality in women's economic rights, which affects access to proper health and nutrition. Dr Bhalkar expressed confidence in the webinar, which will address these issues and discuss the reasons behind maternal malnutrition with expert insights. He expressed gratitude to Hindustan Unilever Ltd for sponsoring the webinar on such an important and relevant subject.

Ms. Dolly Soni, the Manager of Marketing and Projects at PFNDAI and the Webinar Convener, welcomed and introduced the event's speakers.



The first talk on 'Status of Women's Nutrition with Special Emphasis on Mothers' was delivered by, **Dr Sesikeran Boindala**, Chairman of the Scientific Advisory Committee, Hon. Scientific Director,



PFNDAI, Former Director, NIN, (ICMR). He discussed the state of women's nutrition in India, highlighting the prevalence of undernutrition among women of reproductive age. He highlighted the risk of undernourished girls becoming undernourished mothers, leading to low-birth-weight babies and perpetuating an intergenerational cycle. He also discussed the nutritional vulnerabilities faced by pregnant and lactating women. He highlighted the impact of pregnancy weight gain, birth weight, and residual pregnancy weight retention on women's nutritional status. He also discussed the nutritional status of Indian pregnant and lactating women, highlighting the mobilization of body fat to meet energy needs.

Dr Sesikeran emphasized the need for tailored dietary advice during pregnancy and lactation, as well as follow-up for babies born or conceived during the COVID-19 pandemic. He closed with a modified excerpt from Rabindranath Tagore's poetry, envisioning a society where women have unfettered access to knowledge and nutrition, equality, and freedom.



The last speaker was Ms Sheryl Salis, Founder and Director, of Nurture Health Solutions who spoke on 'Need for nutrition education of Indian women'. She started by talking about the impact of traditional stereotypes on women's eating habits. She underlined the importance of nutrition at various life stages, including adolescence, pregnancy, lactation, and menopause, and the impact of malnutrition on future generations.



She also highlighted the need for adequate dietary intake among pregnant and lactating women and the role of nutrition in addressing obesity, osteoporosis, and cardiovascular disease. Toward the end, she talked about adequate nutrition which is not just a matter of utility but a right, crucial for the well-being and contribution of Indian women to their families, society, and the country.

Following each presentation, the speakers answered all of the attendee's queries with great enthusiasm.

To start with the Panel discussion, Ms Dolly Soni introduced the moderator, Dr Sesikeran Boindala, and also welcomed and introduced the Panellists for the event, Dr Barkha Gupta, Claims & Medical Affairs Capability Leader, Hindustan Unilever Ltd., Dr Subhadra Mandalika, Prof.(Retired) of Nutrition, College of Home Science, Nirmala Niketan, and Ms. Ruby Sound, Consulting Dietitian and Performance Nutritionist Proprietor, Eat-wise Nutrition Clinic and Wellness Centre.



Next, Dr Deepti Khanna, Lead, Claims and Clinical Management, Medical Affairs, Hindustan Unilever Ltd. presented on 'Maternal Nutrition: Nutrients of Importance and India Context'. She focused on key statistics and trends such as fertility rates, maternal mortality rates, hygienic protection, exclusive breastfeeding, malnutrition, anaemia prevalence, and low birth weight. She spotlighted the significance of macronutrients and micronutrients in maternal health, particularly in addressing anaemia. She recommended dietary intake of energy, protein, and micronutrients, and discussed interventions like protein and lipid supplementation, and other micronutrients. She also gave a comprehensive review and recommendations aimed at guiding policies and practices for enhancing maternal nutrition and health in India.



Panel Discussion



Dr Sesikeran started the discussion by first addressing questions to Ms Ruby about maternal protein requirements and how to meet them, to which she said to focus on high biological protein and high PDCASS value, and also replace cereals with protein to meet the extra calorie requirements. The next question was addressed to Dr Subhadra about key micronutrients for proper cognitive development of the child for which she gave an overview on fat-soluble vitamins like A, D and E along with several water-soluble vitamins like B complex, she mentioned that minerals like iron, zinc, copper also play a

dominant role in cognitive development according to studies conducted. Later, Dr Barkha talked about the availability of food supplements which are used to cater to the need for extra nutrients during pregnancy and lactation, wherein she also mentioned WHO recommendations on anti-natal care for positive pregnancy experience. Other questions pertaining to macronutrient sources, the need for iron supplements during pregnancy, the relation between economic status and nutrient deficiencies in women, etc were addressed with very insightful insights from Dr Sesikeran.

Overall, the discussion was very lively and interactive and was very well moderated by Dr Sesikeran.

Lastly, Ms. Dolly Soni offered a vote of thanks. She thanked Hindustan Unilever Ltd. for supporting and sponsoring the webinar, the audience, and all of the speakers and panellists for making the day's event successful.

The entire webinar recording is available on the following link.
(<https://fb.watch/oXCeGshVRQ/>)



REGULATORY ROUND UP



AUTHOR
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Dear Readers,

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

[Streamlining the procedure for reactivation of Auto-Rejected Licensing/Registration Applications due to non-response to the queries](#) : This order will allow FBOs to activate auto rejected applications for licensing/ registration for non-response of queries. This provision can be utilised only once. Within thirty days of auto rejection, FBOs can self-reactivate the application without any intervention of the authority and fee. However, this must be provided with valid reasons for the delay. If the reactivation is to be done within 31st to 60th days, it will be with specified fee and valid reasons. The fees for Registration are Rs. 50 plus GST and for licensing Rs. 500



plus GST. This can be done only once. This initiative by Food authorities will reduce waiting time for the approval authorities in handling requests for reactivation. This is good step for ease of doing the business.

[QR code on test reports issued for FR, FRK & Vitamin Premix for FRK](#) : The order states that all the FSSAI notified laboratories testing FR, FRK and Premix of FRK should provide QR codes on test reports. This will help to authenticate and reproduce the reports when scanned by mobile and any other device.

[Gazette Notification of NABL Accredited Laboratories](#) : The notification gives the additional accredited laboratories in the different regions with scope of their accreditation.



[Validity Order of FSSAI notified laboratories](#) The order gives the list of FSSAI recognised laboratories along with their validity dates. This is routinely published by the Food authorities for the benefit of FBOs.

[Extension of time-period for compliance of provision of warning statement for 'Pan Masala'](#) : The direction warning statement on "Pan Masala" should cover at least 50% of FOP issued on 22.05.2023 was deferred several times (1st may and 1st August) is again deferred for three months from 1st November 2023 for the period of six months.



RESEARCH IN HEALTH & NUTRITION

Gut-Brain axis: Study links prebiotic dietary fibre to mood improvement

31 Oct 2023 Nutrition Insight

International researchers determined that intake of the prebiotic dietary fibre oligofructose and a combination of the fibre with the human milk oligosaccharide (HMO) 2' fucosyllactose may improve mood in healthy adults with mild to moderate feelings of anxiety and depression. The consumption of the prebiotic fibre produced from chicory root promoted an increase in Bifidobacteria in the gut.

"The study shows 'the gut-brain axis at work,' providing scientifically proven prebiotics that have been shown to deliver effective results to meet the growing market need for dietary-based mood improvement," Dr. Stephan Theis, co-author of the study and head of nutrition science at Beneo, tells Nutrition Insight. "This study, and other research from around the world, is increasingly demonstrating Bifidobacteria's positive influence on the gut environment and beyond: the whole body can be reached, and positive impacts are being

seen on the immune system, systemic inflammation processes and the nervous system. Simply by enriching a person's daily diet with 8 to 10 g of prebiotics (oligofructose or a combination of oligofructose with the HMO 2' fucosyl-lactose), their mood is improved."

This explains that the study, published in The American Journal of Clinical Nutrition, was a double-blind, randomized and placebo-controlled trial carried out over five weeks, consisting of a one-week run-in and four-week intervention. The study's 92 healthy participants had mild to moderate levels of anxiety and depression. They were split into four groups, with the first group consuming 8 g of oligofructose plus 2 g of maltodextrin daily. The second group took 8 g of oligofructose plus 2 g of 2' fucosyl-lactose daily, while group three consumed 2 g of 2' fucosyllactose plus 8 g of maltodextrin per day. The control group took 10 g of maltodextrin daily. At the end of the intervention period, participants who consumed the prebiotic oligofructose, with or without the HMO, experienced a significant increase in beneficial gut bacteria

compared to the control group, including Bifidobacterium, Bacteroides, Roseburia and *Faecalibacterium prausnitzii*.
By Jolanda van Hal

'Significant differences' in nutrients intake found between animal-based and plant-based diets, long-term impact hangs in the balance - study

By Hui Ling Dang 24-Oct-2023 - Food Navigator Asia

A new study reveals the key differences in nutrient intake when an animal-based diet is replaced with plant-based alternatives, with calls for greater in-depth research and consideration of such factors manufacturers when developing new products.

Sustainable nutrition and alternative proteins have been top-of-mind topics of the current century. However, the nutritional advantages of a diet composed of plant-based





alternatives (PBA) compared to one comprising animal-based proteins remains an area where more research is required. An observational study supported by Singapore Institute of Food and Biotechnology Innovation (SIFBI), A*STAR, modelled the replacement of animal-based proteins with PBA to analyse specific changes in the intake of major nutrients.

This study took place at SIFBI's Clinical Nutrition Research Centre (CNRC), and involved 50 participants (19 men and 31 women) between the age of 21 and 99 years. The participants were non-vegetarians, of Chinese, Indian and Malay ethnicities, and had been residing in Singapore for at least a year. They were asked to record their food and drink intake in detail for three weekdays and one day over the weekend, which generated the nutrient profiles for each individual.

An analysis of the food records showed that 22.9% of the study population's dietary intake (by weight) consisted of meat, dairy and seafood, which were substituted gram-for-gram with PBA.

The original and replaced nutrient profiles were then compared against each other. It was found that replacing sources of animal proteins with PBA proteins resulted in a 22.2% reduction in protein, 16.8% reduction in fat, 7.5%

increase in carbohydrate, and a 71.2% increase in fibre. In terms of specific fat types, there was a 30.3% and 16.8% reduction in saturated fat and total fat intake respectively. The increase in carbohydrate intake would indicate a significant replacement of saturated fat with carbohydrates.

"Food and nutrition have an important and direct synergistic effect on metabolic management. Our study showed that despite accounting for less than one quarter of a population's diet, a change in protein sources — from an omnivorous diet (with the exception of egg) to a plant-based diet — resulted in significant differences in macro- and micro-nutrient intakes. "At the same time, the findings highlighted that prolonged consumption of PBA proteins may have inadvertent health consequences that have yet to be documented," the authors wrote.

The reduction in total protein intake is a crucial consideration for vulnerable groups, including the elderly, hospitalised patients, and pregnant and lactating women. These groups may have difficulty consuming an adequate quantity of food to maintain energy homeostasis, which requires them to continue eating calorie-dense animal proteins to meet their energy and protein needs. Moreover, insufficient protein intake over extended periods of time will incur reductions in lean muscle mass. This is a serious concern for elderly populations, as they are unable to rebuild lean muscle

mass as quickly as younger individuals. This could be exacerbated by acute infections or catabolic conditions such as cancer or diabetes, which may cause rapid muscle wasting and sarcopenia to occur.

Another key concern about the replacement of animal protein with plant protein is in the quality of protein consumed. Plant protein is reportedly less bioavailable and lower in digestibility, compared to animal protein. "Plant-based proteins have been found to be lower in one or more essential amino acids, notably lysine, isoleucine, methionine, and cysteine, that are important for protein synthesis and turnover. However, researchers remain conflicted on the effects of protein quality on physiological outcomes, with data from clinical and epidemiological studies indicating mixed results. More research is necessary to understand the amino acid profiles of new PBA protein products."

PBA meat analogues are typically processed by adding flour and starches, which can result in carbohydrate contents ranging between 5% and 30%. This may ring alarm bells, given the rising prevalence of type 2 diabetes in many countries, along with the increasing stigma and antagonism of refined carbohydrates. Furthermore, processed foods are closely associated with high sodium levels, even for animal-based diets.





“Our study demonstrated a 14.5% increase in sodium intake following replacement. Many of the well-marketed alternative protein products are highly processed, and contain notable amounts of salt and flavour enhancers for palatability. This is something that manufacturers should take into account for their future innovations,” said the authors. On the other hand, previous studies have shown that animal-protein replacement with plant-based protein could bring “modest improvements” in glycaemic control. This is believed to be related to the effects that plant-protein foods have on metabolic risk factors of diabetes, such as blood pressure, lipids, inflammatory markers, and body weight. However, several of these studies were based on whole foods such as soy and pulses, which contain beneficial components like phytochemicals and fibre that aid in the management of diabetes.

The substantial increase in dietary fibre intake can be attributed to the fact that many PBA products are made from legumes, soy, mycoprotein, and added cellulose, which are generally higher in carbohydrate and fibre than animal products. This means that PBA provide an extra source of dietary

fibre on top of wholegrains, fruits, and vegetables. In addition, the high fibre content in PBA magnifies the bulk properties of foods and as such, reduce their overall caloric density.

From a weight-management perspective, satiation can be easily achieved with the consumption of fewer calories through high-fibre, low calorie-density PBA. Also, high-fibre foods increase the amount of chewing required, lengthening the time required for a meal. This slower pace of consumption has been linked to lower caloric intake. Although beneficial to individuals aiming to lose weight, the reduction in caloric density could be detrimental for those who suffering from malnutrition due to factors such as poor appetite, inadequate dentition, and medical conditions affecting nutrient absorption.

A key concern with plant-based diets is the reduction in calcium intake due to the lack of dairy products, lower bioavailability in consumed sources, as well as potential anti-nutritional factors by enzyme inhibitors or chelating cofactors. However, this study showed that calcium intakes increased by 43.4% following diet change. “This is likely because certain plant-based products, such as nut milks, are fortified with calcium to make them suitable as dairy replacements. Common vegetarian protein sources like tofu are also produced with calcium during the manufacturing process. Furthermore,

PBA are largely made of pulses or legume ingredients, which contain significant amounts of calcium. This is evident in the difference in calcium content between raw minced beef (9 mg) and the PBA replacement (186 mg). Nevertheless, it is still important to study the bioavailability and metabolic factors of PBA in greater detail.”

Iron is an important nutrient to consider in plant-based diets, especially for premenopausal women who may be susceptible to iron deficiency anaemia. Similar to calcium, plant-based sources of iron are considered to be less bioavailable than animal-based sources. “In our study, we found that replacing animal-based products with PBA led to an average increase of 11.7% in iron intake. This observation may also be attributed to the replacement of low-iron sources of animal protein, such as chicken and seafood, with PBA meat analogues, which have comparable or higher iron content to red meats.”

Navigating the path to healthy aging

31 Oct 2023 Nutrition Insight

Healthy aging has become a focal point in today's personal care industry, driven by the growing awareness of individuals looking to maintain their well-being and youthful vitality as they progress through the various stages of





life. As science advances and consumers prioritize their health, companies are developing innovative solutions to address age-related concerns.

"I was recently at the Age Research and Drug Discovery conference in Copenhagen. There is huge progress in identifying gero-protectors, molecules that can slow the aging process. Experts suggest that we may only be 3-5 years from having first longevity molecule validated," SRW Laboratories founder Greg Macpherson. "AI is going to accelerate the discovery and validation of these compounds, and we will likely see significant developments in this area by the end of the decade."

The most significant trend on the horizon, highlighted by the experts, is personalization and preventative wellness.

"Healthy aging is not just about addressing visible signs of aging but also about prevention and proactive care. Consumers are increasingly seeking products that help maintain youthful skin and hair and prevent age-related concerns from arising in the first place," Dr. Ariati Aris, scientific affairs specialist at PhytoGaia, stresses. "There has been a shift toward natural

and clean beauty products. Consumers, including those in the aging demographic, are more aware of the ingredients in their personal care products. They prefer formulations with minimal chemicals and artificial additives."

Aris elucidates that ingredients derived from natural sources are gaining popularity. "Compounds such as palm tocotrienols and tocopherol and squalene as well as other various plant extracts with anti-aging properties are being researched and incorporated into products."

Aris shares that research has shown tocotrienols to possess potent antioxidant properties, aiding in protecting cells and tissues from oxidative damage – a key contributor to age-related concerns.

Furthermore, palm tocotrienol vitamin E has demonstrated significant skin health benefits, such as maintaining moisture levels, pigmentation control, photoprotective properties and even promoting hair growth.

Squalene has been traditionally obtained from the livers of sharks, where it can be found in high concentrations. However, due to animal protection regulations and the potential presence of persistent organic pollutants such as polycyclic aromatic hydrocarbons, organochlorine pesticides, dioxins or carcinogenic heavy metals, shark-derived squalene

is discouraged and shunned by manufacturers and consumers alike.

Squalene, an essential component of human sebum, has powerful antioxidant and moisturizing properties. As individuals age, the decline in squalene levels in the skin necessitates supplementation to maintain skin and hair health.

Consumers are increasingly seeking products that not only address visible signs of aging but also focus on prevention and proactive care. Natural and clean beauty products are gaining traction, with consumers becoming more ingredient-conscious. Anti-aging skin care has expanded significantly, with ingredients like retinol, hyaluronic acid and peptides experiencing increased demand for their proven efficacy in reducing wrinkles, fine lines and skin texture.

Healthy aging is not limited to external skin care. Overall wellness, including mental and emotional health is also gaining importance. "As we all know, our population is getting older, and demographic change creates different consumer demands and behaviours. Consequently, the market for healthy aging supplements is growing," asserts Oliver Wolf, marketing EMEA at Gelita.





intervention to control cholesterol uptake that could complement other therapies and potentially save lives.



"In detail, consumers show much more interest in products helping them to cope with all the undesired side effects of aging, and they are willing to spend quite some money for supplements promoting their health and well-being. But at the same time, they are very sensitive about the promises made by the products they consume: Scientific background is mandatory."

Aris details that advanced delivery systems, such as nanotechnology and liposomal encapsulation, will optimize ingredient penetration and stability. Ingredients that offer multiple benefits, such as anti-aging and sun protection, are expected to appeal to consumers seeking efficiency in their skin care routines.

By Radhika Sikaria

Ground-breaking discovery could pave the way for new therapies to prevent cardiovascular disease and stroke

Science Daily November 13, 2023

Researchers at the University of Leicester have discovered the mechanism by which cholesterol in our diet is absorbed into our cells. This discovery, which has just been published in the journal Science opens up new opportunities for therapeutic

The research, conducted with colleagues from the USA, China and Australia, has shown that two proteins (called Aster B and Aster C) play a key role in transporting cholesterol from the membrane of the cells lining our intestine to the internal compartment where it is modified prior to circulation. University of Leicester researchers from the Institute of Structural and Chemical Biology, used their expertise to reveal how Ezetimibe, a cholesterol lowering drug, blocks the ability of Aster B and C to transport cholesterol.

Professor John Schwabe, Director of the Institute for Structural and Chemical Biology, said: "This breakthrough is the result of a long-lasting collaboration and forms part of an international effort to identify ways in which we can combat cardiovascular disease and stroke. A better understanding of important areas of cholesterol absorption and metabolism and, particularly, how cholesterol moves within cells and tissues is essential. This knowledge will allow us to design new drugs and therapies that target specific proteins involved in these pathways to combat most pressing public health problems such as heart attacks and stroke.

Cholesterol is a natural fatty substance found in the blood. Produced in the liver, it

is also found in some of the foods we eat such as red meat and dairy products. Frying our food can also add to cholesterol in our diet. Although we need cholesterol in our bodies to function, having too much (high cholesterol) can clog our arteries and cause health problems such as heart disease.

Professor Schwabe added: "If we can prevent some cholesterol from being absorbed into our cells, we may ultimately be able to prevent individuals from having high cholesterol and cut down their risks of heart attack and stroke and therefore potentially save lives.

"The Leducq team of experts have different expertise that is used to target the problem at different levels and following different approaches. In addition to target cholesterol absorption, we are trying to identify how cholesterol metabolism and transport affect cholesterol levels and atherosclerotic disease. Cholesterol transporters are essential to regulate blood cholesterol levels therefore we are testing small molecules that influence the function of these transporters in order to develop drugs that ultimately lower the risk for heart attack and stroke."





Clinical trial data suggests prenatal vitamin D reduces a child's risk of asthma

Science Daily November 9, 2023

A review of 15 years' worth of data from the Vitamin D Antenatal Asthma Reduction Trial (VDAART) found that vitamin D supplementation during pregnancy was linked to reduced rates of asthma and wheezing in children compared to standard prenatal multivitamin.

A new review paper from investigators from Brigham and Women's Hospital, a founding member of the Mass General Brigham healthcare system, strengthens the link between vitamin D levels during pregnancy and childhood wheezing and asthma in offspring. The researchers published their review paper in the Journal of Allergy and Clinical Immunology. "Vitamin D deficiency is very common, especially in pregnant women who are not taking supplements," study first author Scott T Weiss, associate director of the Channing Division of Network Medicine at Brigham Women's Hospital and professor at Harvard Medical School, said. "Based on our findings, we would recommend that all pregnant women consider a daily intake of at least 4400 IU vitamin D3 throughout their pregnancy, starting at the time of conception."

Vitamin D is a nutrient from sunlight exposure, diet, or supplements. It is commonly considered essential to bone health but also has a role in autoimmune and other illnesses. The review links vitamin D deficiency to childhood asthma and wheezing, a major cause of illness in young children. About 40% of kids report daily wheezing at age three. By age 6, 20% are diagnosed with asthma. The link between childhood asthma and vitamin D has been contentious. Observational studies suggest that higher vitamin D levels during pregnancy can be protective against asthma. However, a clinical trial of vitamin D supplementation in pregnancy, called the Vitamin D Antenatal Asthma Reduction Trial (VDAART), was inconclusive when comparing the supplemented group to the non-supplement group. "In general, the observational studies show an effect, but the clinical trials don't because nutrient trials are very different from drug trials," Weiss said. "In a drug trial, you're comparing giving a drug to giving no drug. In a nutrient trial, you're comparing more of a nutrient to less, but that baseline amount in the control group is variable."

Understanding the role of a nutrient during pregnancy requires consideration of the nutrient dose, the timing of when dosing starts, and the baseline levels in the control group. Weiss said the original VDAART trial and analysis and other meta-analyses of vitamin D supplements during pregnancy do not consider

this. Pregnant women with a family history of allergy or asthma enrolled in the original VDAART study between 10 and 18 weeks of pregnancy. Half of the women were given a dose of 4400 IU of vitamin D in addition to the 400 IU of vitamin D in their prenatal vitamin. The other half got placebos alongside their prenatal vitamins. The VDAART findings at age three, published in JAMA in 2016, showed a 20% reduction of asthma in the treatment group, with borderline statistical significance.

Study suggests even more reasons to eat your fibre

Science Daily October 24, 2023

Health professionals have long praised the benefits of insoluble fibre for bowel regularity and overall health. New research from the University of Minnesota suggests even more reasons we should be prioritizing fibre in our regular diets.

In a new study published in Nutrients, researchers found that each plant source of insoluble fibre contains unique bioactives -- compounds that have been linked to lower incidence of cardiovascular disease, cancer and Type 2 diabetes -- offering potential health benefits beyond those of the fibre itself.





"People understand the need for fibre and how it relates to gut health -- an area of wellness that is becoming increasingly important as scientific research continues to reveal its impact on overall health and wellbeing," said Joanne Slavin, co-author of the paper and a professor in the College of Food, Agricultural and Natural Resource Sciences at the University of Minnesota.

"Fiber is the marker of health that is included in our dietary guidelines and found on product labels, but our research indicates that we need to ensure the other valuable components of fibre-containing plant sources -- the bioactives -- are also recognized as providing valuable benefits for human health."

The study aggregated the available literature on the health benefits of bioactives in plant sources of insoluble dietary fibre. They found:

- A variety of plant foods, including fruits, vegetables, legumes, nuts, seeds and whole grains contain insoluble dietary fibre, and each source contains unique bioactives that support health in different ways.
- Desirable bioactives like Quercetin, Resveratrol, Catechins, Anthocyanins, Lutein, Lycopene and Beta-Carotene were found in a

variety of plant foods that also contain insoluble dietary fibre.

- Plant sources with bioactives and insoluble dietary fibre could be used to fortify processed foods to increase their nutritional value. Food production byproducts such as peel, hulls, pulp or pomace are generally high in fibre and bioactives and therefore offer unique nutritional value from sustainable sources.

- Consumer research found that utilizing this fortification at a low level did not decrease consumer acceptability of the food product.

"The suggestion to eat more fruits and vegetables isn't a novel idea, but it's something most people still struggle to do," said Jan-Willem Van Klinken, co-author of the study and senior vice president of medical, scientific, and regulatory affairs for Brightseed. "If we can offer widely accessible fibre-fortified products that have been developed to enhance rather than negate bioactive content, we can provide consumers with increased nutritional value."

This most recent research on bioactives' impact on human health further illuminates the need for industry, academia and government to join forces to champion broad awareness and education of bioactives in food and health systems.

"The collection of literature we reviewed and the results of this research can serve as a paradigm shift in how the food and health industries, as well as consumers, view insoluble dietary fibre and bioactives," said lead author Madeline Timm, who co-authored the

research for her graduate project at the University of Minnesota. "Continued research and broad inclusion of bioactives in foods and supplements can have a real impact on human health."

Women with a heart healthy diet in midlife are less likely to report cognitive decline later

Science Daily October 20, 2023

Women with diets during middle age designed to lower blood pressure were about 17 percent less likely to report memory loss and other signs of cognitive decline decades later, a new study finds.

Led by researchers from NYU Grossman School of Medicine, the new findings suggest that a mid-life lifestyle modification -- adoption of the Dietary Approaches to Stop Hypertension, or DASH diet -- may improve cognitive function later in life for women, who make up more than two-thirds of those diagnosed with Alzheimer's disease, the most prevalent form of dementia. The findings, published online today in the journal *Alzheimer's & Dementia*, have implications for the approximately 6.5 million Americans over age 65 diagnosed with Alzheimer's disease in 2022. That number is expected to more than double by 2060.





The investigators analysed data from 5,116 of the more than 14,000 women enrolled in the NYU Women's Health Study, one of the longest running

questions that are indicative of later mild cognitive impairment, which leads to dementia. These questions were about difficulties in remembering recent events or shopping lists, understanding spoken instructions or group conversation, or navigating familiar streets.

"Subjective complaints about daily cognitive performance are early predictors of more serious neurocognitive disorders such as Alzheimer's," said Yu Chen, PhD, MPH, professor in the Department of Population Health and senior author of the study.

"With more than 30 years follow-up, we found that the stronger the adherence to a DASH diet in midlife, the less likely women are to report cognitive issues much later in life."

The DASH diet includes a high consumption of plant-based foods that are rich in potassium, calcium, and magnesium and limits saturated fat, cholesterol, sodium, and sugar. Long standing research shows that high blood pressure, particularly in midlife, is a risk factor for cognitive decline and dementia.

studies of its kind that examines the impact of lifestyle and other factors on the development of the most common cancers among women, as well as other chronic conditions.

The researchers queried the study participants' diet using questionnaires between 1985 and 1991 at study enrolment when the participants were, on average, 49 years old. The participants were followed for more than 30 years (average age of 79) and then asked to report any cognitive complaints.

Self-reported cognitive complaints were assessed using six validated standard

Of the six cognitive complaints, 33 percent of women reported having more than one. Women who adhered most closely to the DASH diet

had a 17 percent reduction in the odds of reporting multiple cognitive complaints.

"Our data suggest that it is important to start a healthy diet in midlife to prevent

cognitive impairment in older age," said Yixiao Song, a lead author of the study. "Following the DASH diet may not only prevent high blood pressure, but also cognitive issues," said Fen Wu, PhD, senior associate research scientist and co-led the study.



& FOOD SCIENCE INDUSTRY NEWS

Challenging the vilification of ultra-processed foods

By Olivia Haslam 27-Sep-2023 - Food Navigator USA

The co-founder of Huel has taken issue with the current rhetoric that all ultra-processed foods (UPFs) are 'bad' saying this is an argument based on oversimplification and privilege.

James Collier, nutritionist and co-founder of the meal replacement company Huel, has spoken up about the current trend of painting all foods that have gone through processing with the same negative brush. UPFs have been hitting the headlines regularly in recent months spurred by a plethora of articles, podcasts and programmes in mainstream media, including a recent investigative documentary on the topic on UK mainstream TV.

A BBC programme broadcast in June 2023 explored the UK's rising diabetes and cancer rates, drawing attention to evidence suggesting this could

be linked to the consumption of ultra-processed convenience foods and the chemicals they contain.

But Collier asserts that this has become a popular discussion because humans tend to be drawn to the oversimplification of complex issues and they enjoy categorising things into boxes.

"But we don't live in a black and white world. We live in a very grey, nuanced world, where things are not just one way or another." He explains that he believes to say a product is 'unhealthy' because it's ultra-processed is lazy and reductive.

In the case of Huel, the products are made from oats, rice protein, pea protein, sunflower, flaxseed, coconut oil medium-chain triglycerides (MCTs), and dietary supplements such as vitamins and minerals, as well as components like stabilisers, emulsifiers, and preservatives.

Collier explains that their "nutritionally complete" meal replacements aim to address the challenges of modern eating habits by providing all

essential nutrients and phytonutrients, minimising waste, and being environmentally friendly by using only plant-based components.

He says companies such as Huel often produce products that fall into the category of ultra-processed, due to the ease of stability, longevity, and accessibility, that ingredients like emulsifiers, stabilisers, and preservatives offer.

Whilst the ideal might be for consumers to only eat homemade wholefood meals, these processing methods allow the creation of nutrition-filled, longer-life products that fit hectic lifestyles and appeal to taste buds, which are essentially the key consumer purchase drivers.

NOVA is the classification system for defining processed foods, organising food according to the extent and purpose of food processing: Group One is for unprocessed or minimally processed foods; group two contains processed culinary ingredients; group three is for processed foods; and group four is for ultra-processed food and drink.



But Collier suggests that guidelines like NOVA are too literal and should not be relied upon, as such classifications wrongly imply that the more a food is processed, the “worse” it is. He says that the classification system is useful as an inter-industry guide but that for consumers it is too simple to communicate the nuance of nutrition.

Simon Jurwick, product director at sports nutrition company Bulk, shares concerns that the term “ultra-processed” is “almost being used interchangeably with ‘unhealthy’.” He argues there is little evidence that UPFs alone are associated with negative health outcomes, especially when you consider confounders in research such as smoking and lack of exercise. The main concerns are that the public may immediately see any UPF as unhealthy; or, even, any food that isn't natural as unhealthy. You could have a UPF that is nutritionally balanced, but people may automatically assume it's unhealthy.”

But Jurwick considers that the consequences of the UPF debate are less likely to impact active nutrition brands like Bulk, explaining: “I feel an active nutrition consumer is likely to research more into what a UPF is or could be, and is likely to only consume them in moderation.” Ultimately, he thinks consumers should

concentrate more on the nutritional value of the products, rather than the processing methods. Consumers need information on what constitutes a healthy balanced diet and what role foods, such as UPF, have within that. Education needs to be on what a food does or doesn't contain, as opposed to the specific processing method.”

Collier argues that it is important not to judge people based on their food choices, especially considering socioeconomic factors. He argues this is a conversation built on consumer responsibility and consumer blame but the wider issue of ill-health and poor lifestyles comes down to infrastructure and policy. He suggests that the best way to help consumers make informed and healthy decisions, is through collaborations between academics, industry professionals, and policy makers, to look at all the attributing factors in nutrition. He agrees that processed foods should be part of the conversation, but only alongside high-fat-salt-sugar (HFSS) concerns, protein levels, fibre content, micronutrient content, and cost.

Fermenting fungi: Researchers uncover potential source for new probiotics

30 Oct 2023 Nutrition Insight

A recent study has uncovered probiotic properties in two fungi traditionally used in

food production, bringing to light the benefits of these microscopic organisms — their potential in mitigating gut inflammation — suggesting a new direction for developing effective probiotics.

In urban environments, where high-calorie diets and low physical activity are common, gastrointestinal issues like inflammatory bowel diseases are on the rise. It is known that probiotics can help modulate immune and inflammatory responses. However, the probiotic potential of fungi remains largely untapped.

The study, published in *mSystems*, a journal of the American Society for Microbiology, delved into fungi utilized in the food industry, such as those involved in cheese and charcuterie production. “There is much to learn by studying the role of the fungal strains in the microbiota and host health and also that species simply used in food processes can be the source of new probiotics,” says lead study author Mathias L. Richard, Ph.D., research director at National Research Institute for Agriculture, Food and Environment in the Micalis Institute in Jouy-en-Josas, France.



The yeasts selected represent a diverse array of species, undergoing tests in both cultured human cells and animal models mimicking ulcerative colitis. Among the tested strains, *Cyberlindnera jadinii* and *Kluyveromyces lactis* showed the potential to alleviate gut inflammation in a mouse model of ulcerative colitis.

“These two strains have never been specifically described with such beneficial effects, so even if it needs to be studied further, and particularly to see how they are efficient in humans, it is a promising discovery,” Richard says. In the case of *C. jadinii*, the fungi protection appeared to exert its protective effects by altering the gut’s bacterial microbiota, yet the mechanism is still unknown.

This study also points out the importance of characterizing the different strains used in the food industry because they may harbour many properties that are inefficiently used today.

By Sichong Wang

Absorbing ingredients: Bioavailability trends and research top of mind for industry experts

26 Oct 2023 Nutrition Insight

Active ingredient absorption, also referred to as bioavailability, is one of the most vital aspects of dietary supplements, as

without it, their functionality diminishes greatly. Nutrition Insight discusses the issue with experts from Lubrizol Life Science, Gencor and Balchem.

“Human nutrition is mainly based on digestibility. Digestion deals with the breakdown of complex food materials into simpler food materials, whereas absorption means the body accepts those simpler food materials,” says Alan Connolly, R&D manager of nutraceutical ingredients at Lubrizol Life Science, Health. “Without the absorption of nutrients by the human body through blood, the body would not be able to use the food material; therefore, the nutrients must be well absorbed for the repair of body cells, generation of energy, and maintenance of osmoregulation, among others.”

Maggie McNamara, marketing director at Gencor, adds: “Without good absorption, the efficacy is strongly reduced. Many active ingredients or nutrients are lipophilic (fat-soluble) or insoluble in water, consequently offering poor bioavailability.”

The most important aspect is that the active ingredient is intact and maintains its functionality until it reaches



the target area, underscores Connolly. “Vitamins and botanicals are very sensitive to external factors and, once destroyed, lose their beneficial effect.”

Encapsulation of the sensitive ingredients is the most effective way to protect them. Encapsulation involves ‘packaging’ the sensitive ingredient in a secondary material resulting in improved stability and bioavailability.”

Meanwhile, Balchem’s Ciappo outlines the interaction with other nutrients and dietary components as the most impactful determinant of bioavailability. “The so-called anti-nutrients are a great example – compounds found in food that can interfere with the absorption of specific minerals such as calcium, iron, zinc and magnesium.” He explains that phytates and oxalates are among the most common anti-nutrients, these are typically found in plant-based foods such as whole grains, nuts, seeds and legumes. “Their effect can be remarkable – just 10 mg of phytates can inhibit iron absorption by roughly 60%.” Connolly explains that Lubrizol Life Science combines multiple technologies to ensure a great taste and low gastric irritation, enabling the delivery of nutrient-enriched products with optimum performance.



formulation.

Gencor's Compressible Powdered Oils (CPOs) use an oil-to-powder conversion technology designed to overcome the challenges of formulating with oily lipid-

based ingredients and optimize an ingredient's functionality.

"This material development allows oily active ingredients to be included in stable tablet and powder formulations without the oils leaching," notes McNamara.

Considering the growing consumer interest in convenient supplements designed to tackle different health areas simultaneously, without compromising on absorbability, bioavailability and effectiveness.

By Milana Nikolova

"In several cases, we first micronize the active ingredients to reduce the mean particle size and increase the bioavailability of different nutrients. This allows for more excellent absorption within the body in a second step. The micronized nutrient particles are encapsulated in protective matrices to impart additional functionality."

Gencor's clinically validated self-micro-emulsifying drug delivery system is designed to increase the bioavailability of lipophilic actives such as ubiquinol, omega-3s, lutein and resveratrol while maintaining product stability.



LipiSpense technology is an advanced cold water dispersion technology that allows solid or powder lipophilic active ingredients, such as curcumin, resveratrol, palmitoyl ethanolamide and quercetin – with otherwise relatively low bioavailability and poor solubility in water – to be easily dispersed in cold water, thereby increasing their bioavailability. Only 10% of LipiSpense is required with a 90% active load, which she asserts represents the most significant active to nutrient ratio in a water-dispersible

Top Ten Food & Drink Trends 2024: Innova Market Insights pinpoints ingredients "Taking the spotlight"

25 Oct 2023 Nutrition Insight

Innova Market Insights is revealing its Top Ten Food & Drink Trends for 2024, with "Taking the spotlight" coming out on top. Certain ingredients are expected to rise to prominence next year as sentimental factors, social media and health claims drive purchasing decisions.

"Nurturing nature" is identified as the number two trend, followed by "Prioritizing prevention," "Plant-based: The rise of applied offerings" and "Local goes global."



New research shows that, while the effects of high food price inflation and the need to cut back are still affecting consumer markets worldwide, eye-catching or well-loved ingredients, nature-friendly claims, as well as health benefits, will increasingly inspire higher spending into 2024. "There is always an overlap across trends and regional or local differences and differences between genders and even income groups. But trends help to see where things are moving in broader terms and uncover opportunities with your consumer," Lu Ann Williams, global insights director at Netherlands-based Innova Market Insights, tells Food Ingredients First.

"Some consumers will pay a premium price for the benefits they want. For some, sustainability factors are most important – for others, it is a tiebreaker. Our consumer research shows that consumers are looking for affordable products that boost their health and make it easy to do that."



For many families, simply finding the food they need at a price they can afford is the prime challenge. However, Innova Market Insights' research with consumers and across the products they buy indicates that other considerations are coming into play. For instance, a third of the consumers polled said they respond positively to certain key ingredients being flagged up.

"This demand may be for flavour or texture, for example, or other positive associations as much as for any better-for-you benefits. Those associations might echo other well-loved products, snippets picked up from social media or potentially many years of online information on healthy ingredients – from 'superfruits' to gut-friendly bacteria," explains Williams. In two examples from Innova Market Insights' global research, 42% of consumers said that protein was the most important ingredient, while main meals featuring mushrooms (or specific mushroom types) as an ingredient grew 12% year-on-year between 2018 and 2023. "For 15 years, we have been talking about 'clean label' and focusing on ingredients to exclude from food. This movement created an 'avoid' list and made consumers think a lot about ingredients. But before this, starting in the early 1990s, functional foods and the addition of health-boosting positive ingredients was a huge trend," Williams tells us.

"We've come full circle, and today, in an environment

where simple messages spread quickly across social media, ingredients are being talked about non-stop – for food but also personal care products. There is also an overlap between food and personal care, so these hero ingredients are amplified even more. Vitamins A, C and E are good examples – 30 years ago, there were quite a few ACE beverages, and now we see these vitamins being highlighted for immunity but also skin health."

By Joshua Poole

Hybrid innovation and affordability: How food firms can meet Asia's evolving protein demands

By Pearly Neo 24-Oct-2023 - Food Navigator Asia

Hybrid innovation with meat and plant-based ingredients, affordability and a focus on the needs of flexitarians is needed to boost the protein sector in APAC over the long-term.

This is the opinion of Connell Caldic, a new-yet-old manufacturing firm formed from the merger of two legacy firms Connell (over 125 years) and Caldic (over 50 years) earlier this year. "The thing about Asia is that the global trends for food and beverage are definitely here as well, be it personalisation, sustainability or health and wellness," Connell Caldic APAC CEO Knud Mohr told



FoodNavigator-Asia at the recent Fi Asia 2023 show in Bangkok, Thailand.

"This is being strongly driven here as consumers are getting more affluent and more conscious of their eating and drinking, especially in the post-COVID-19 era where a lot of focus is on staying healthy, so they are looking more closely at what ingredients to focus on or avoid when buying their groceries and foods. Amidst all this is the rise in demand for protein as consumers realised the importance of this and how consumption has not been high enough in many markets, and this initially helped the whole plant-based concept to really pick up so there was a really big boom a few years back.

But as its popularity due to the trend of it all went up, the issue was that prices have been going up as well particularly for products in stores and worsened by ingredient cost hikes - and in Asia, there is really a very clear limit to which consumers are willing to pay extra so consumption went down after that and is lower than it could have been.





Consumers are unlikely to be the ones to act differently and even less likely to be willing to spend more during these times, so it is up to the industry to react and adapt accordingly."

Rising tide: Food safety and convenience driving pre-packaged seafood growth in APAC supermarkets

By Pearly Neo 26-Sep-2023 - Food Navigator Asia

Heightened consumer awareness of food safety as well as increased demands for convenience in food preparation are driving demand for packaged seafood in the post-pandemic market.

Traditionally many consumers in APAC have preferred to buy fish from specialised supermarket seafood counters, where it was perceived to be fresher and could be cleaned on the spot. However, the COVID-19 pandemic led to increased awareness of food safety, both in terms of bacterial transmission via touch as well as shelf-life concerns given the major supply chain challenges at the time. These factors have collectively contributed to the growth of a different category - prepackaged seafood.

"In Australia for example, before the

pandemic we were seeing 60% of seafood being bought from across the counters in supermarkets and the other 40% went to prepackaged products -but today, these percentages have been swapped around, and 60% of purchased seafood is in the prepackaged format," Tassal Head of Sales and Marketing Matt Vince told FoodNavigator-Asia at the recent Seafood Expo Asia 2023 in Singapore. "One of our best-selling products is smoked salmon, which fits nicely into this category and we have certainly seen an uptick for this. We believe that this change has come about because of firstly the food safety factor, where consumers are more reluctant than they were before to have strangers handling their food with their hands. The other factor that has played strongly into this is convenience - this is a trend that grew significantly during the pandemic as well and has continued to be significant not just in Australia but the APAC region and globally."

Tassal is one of Australia's largest seafood companies, holding the largest brand share of the local smoked salmon market in the country. The firm won the Seafood Excellence Asia Award at the expo this year for its Tassie Smoked Salmon Twin Pack.



But this is not to say it is the end for this market as it has now revamped and is focused on flexitarians as opposed to vegetarians the first time around - crucially, brands have moved to make products more affordable and one of the major strategies we are seeing is the rise of hybrid innovation, say using 70% meat and 30% plant-based to make a nugget as opposed to 100% meat in order to make this more affordable and healthier too."

He added that the crucial factor here is for the messaging and marketing to be right, and for companies to be willing to be flexible when it comes to hybrid innovation. "It is really a flexible market with many opportunities, but it is in no way wise to try to force consumers to change especially if the price is high - so the food manufacturers will need to be agile in these situations and adapt innovation strategies accordingly in order to cater to consumers," said Mohr. "It might be difficult for firms that had invested a large amount solely in vegetable and other plant-based strategies, but I would advise all brands to find a way to be as flexible as possible especially in these times when inflation and geopolitical conflicts are on the rise.

“The twin pack is a great example of how pre-packaged seafood is growing - as compared to our conventional larger packs of 500g or 1kg where consumers generally don't consume it all at once then have to worry about the semi-raw products' shelf-lives, based on our research showing that people tend to eat about 100g at a time, these smaller packs allow for convenient carrying around and immediate consumption,” he added. We also have resealable larger packs for sharing or entertaining, which also allow for better storage, all in the name of convenience.”

‘A natural journey’: Freshness and clean label crucial combo to nail flavours in processed foods

By Pearly Neo 03-Oct-2023 - Food Navigator Asia

The crucial combination of freshness and clean label is emerging as an important flavour strategy that food and beverage brands need to hit in order to cater to APAC consumers' increasingly exacting demands.

The rising demand for convenient food and beverage options can lead products that tend to be highly processed, but at the same time

consumers also want items that are as fresh, nutritious and natural as possible. This has led to the birth of a paradox of sorts, which now requires food and beverage brands to ensure that the products put on shelves can meet both ends of this spectrum.

“We consider there to be four groups of food items, with Group One being the completely fresh and raw items like fruits and vegetables, Group Two being the seasonings such as salt and sugar, and Group Three being some form of combination of these two groups,” Symrise President APAC Kapil Sethia told FoodNavigator-Asia at the opening ceremony of the firm's new natural-focused R&D premises Enhanced Naturals in Singapore. “Group Four on the other hand is formed after a bit more processing where the final product no longer physically resembles those in Group One - the challenge is here as consumers definitely still want these to taste similar to the Group One foods in terms of flavours and aromas, and also want the natural aspect of these to shine through.”

Examples of Group Four items can include products such as peanut butter (which no longer physically resembles its Group One base ingredient peanuts) or cheese (which no longer physical resembles milk). “So, what we have done is develop technology that is able to tackle the freshness element



for the flavours that go into the products after extracting these from natural elements, so when the consumer eats a potato chip for example, they will be able to not only have that crispness that is so closely associated with freshness, but also the flavour they expect from, say, a chicken or onion which are Group One foods. Group Four products will always exist as consumers will always want some form of enjoyment in their diets, so the aim is really to make these less processed per se and to taste and resemble foods in Group One as closely as possible so the natural element really stands out.”

Flavours that convey freshness alone are no longer enough to satisfy many APAC consumers today however, as more and more people are playing close attention to product labels, requiring food brands to keep these understandable and as short as possible as well in order to ensure consumers still feel safe when consuming these.

“Clean label is really where the intersection of taste and health lies, especially with consumers increasingly looking closely at the ingredients and composition of their food products, including processed and packaged foods,” Sethia added.





“So, we have things like nut snacks which may have just nuts and salt on the ingredient label; as well as a biscuit that has a list of 15 ingredients on the label - and in the context of what consumers are doing today, many are likely to choose the former.”

So really it now falls to food firms to look at how to make products less processed, and using natural flavours and ingredients is an important way to do this - even shortening the ingredient list from 15 to 10 items for example can make a big difference, and even more importantly if the additives can be essentially replaced with natural ones that consumers are familiar with and use in their kitchens daily, this can have a very strong positive impact. There are also other aspects of looking at this, such as a case study we have done with cheese before where the companies wanted to reduce dependence on traditional ingredients with a rise of vegan consumers or

consumers wanting to reduce dairy consumption - this can have impacts for manufacturers in many areas from instant noodles to snacks, and we developed dairy free cheese from natural ingredients as part of those collaborations.”

Scientists discover genes behind “ultra-low” GI rice for low blood sugar spikes

27 Oct 2023 Nutrition Insight

Researchers at the International Rice Research Institute (IRRI) in the Philippines have discovered the genes responsible for low and ultra-low glycemic index (GI) in rice and used the findings to formulate rice with a low GI score of 44.

The findings aim to give diabetic consumers the freedom to eat rice without the high insulin spikes that usually follow its consumption. The scientists used the Samba Mahsuri x IR36ae rice varieties for the innovation.

Three of the world’s four most populous nations have rice as their staple – India, China and



Indonesia – constituting over 3 billion people, which makes the discovery’s impact significant. Rice is the main staple in more than 100 countries and “nearly half of the world’s population,” says Ajay Kohli, interim director General at IRRI. “With this finding, researchers can now convert popular rice varieties anywhere in the world into low and ultra-low GI for refined white rice through conventional breeding starting in the Philippines. Expect them to turn out in the Philippine market in a couple of years,” he continues.

According to Devinder Sharma, one of India’s leading food security specialists, a considerable number of consumers in the Asia Pacific region are “forced” to restrict the urge to consume rice just because they have diabetes. “With ultra-low GI rice, the freedom to consume rice will hopefully be restored.”



REGULATORY NEWS

UK government accepts ACI's recommendations for first legal framework of CBD products

25 Oct 2023 Nutrition Insight

The UK Home Office has positively responded to the Association for the Cannabinoid Industry's (ACI) expert recommendations to create a legal framework for consumer products that contain cannabidiol (CBD). The government had not responded to these prior.

"It is imperative for the nascent UK consumer cannabinoid sector that a legal framework is put in place to provide comfort for companies operating in the space and reassurance for consumers and retailers," says Steve Moore, co-founder of the ACI.

"This will also help accelerate the regulatory process that businesses have invested in. It only adds to the importance of the explicit commitment to bring forward the necessary amendments to the Misuse of Drugs 2001 regulations."

This response came after the publication of a report by the Advisory Council on the Misuse of Drugs detailing its recommendations for changing the law in December 2021. In the coming days, the ACI will

work with the Home Office to address the ambiguities and areas of clarification in the ministerial response.

Meanwhile, CBD is on track to be integrated into bread, cereal, ice cream and other common foodstuffs to create a whole new functional food and supplement market, following a green light from the UK's Food Standards Agency. In addition, the US FDA received criticism for its lack of regulatory action on CBD. Organizations sent testimonies questioning how there can be a lack of CBD laws when dietary supplements became part of the FDA's regulation three decades ago.

By Inga de Jong

Postbiotic approval: Kirin subsidiary's ingredient approved for use in foods, supplements in India

By Tingmin Koe 03-Oct-2023 - NutraIngredients Asia

Kyowa Hakko Bio, a subsidiary firm of Kirin, says its postbiotics is now approved for use in general foods and health supplements in India.

The company received approval from the Food Safety and Standards Authority of India (FSSAI) in August that

IMMUSE, its proprietary Lactococcus lactis strain Plasma (LC-Plasma) postbiotic, could be used in general foods and health supplements. The postbiotic was approved under Food Safety and Standards (Approval for Non-Specified Food and Food Ingredients) Regulations, 2017. Outside of India, the ingredient is already used in various functional food and beverages as well as supplement products. Examples include Kirin's Foods with Function Claims (FFC) series known as iMUSE launched in Japan. In fact, the ingredient is the first to be recognised by Japan's Consumer Affairs Agency (CAA) for its immune health benefits.



Speaking to NutraIngredients-Asia at last month's Vitafoods Asia tradeshow held in Bangkok, Dr Ryo Ohashi, managing director, Kyowa Hakko Bio Singapore, believes that the strong history of dairy, natural products, and probiotics use, could help promote postbiotic consumption in India.



"India has a big population, which is why we are interested in this market. Also, India has a strong history in dairy and probiotics use. People know the benefits of probiotics.

"Although our ingredient is a postbiotic and it functions a bit differently from probiotics, the concept itself is close to that of probiotics. As such, we believe that customers in India will be receptive to the idea of using a postbiotic," said Dr Ohashi.

The company had filed a registration with the FSSAI in January this year and the green light was given earlier than its registrations submitted elsewhere. This included Indonesia and Thailand, where a registration was filed about two years ago, while a registration was also filed in Malaysia about a year ago. Unlike probiotics, there is no clear regulatory framework for postbiotics in many countries, which could pose as a challenge to the industry. "India's regulators see our ingredient as a parabiotic instead of postbiotics. We need to explain to them what a postbiotics is," he said.

A 2020 paper published in *Microbial Cell Factories* describes postbiotics as "the complex mixture of metabolic products secreted by probiotics in cell-free supernatants such as enzymes, secreted proteins, short chain fatty acids, vitamins, secreted biosurfactants, amino acids, peptides, organic acids."

Paraprobiotics, on the other hand, are described as "the inactivated microbial cells of probiotics (intact or ruptured containing cell components such as peptidoglycans, teichoic acids, surface proteins, etc.) or crude cell extracts (i.e. with complex chemical composition)".

So far, the FSSAI has published a list of permitted pre- and probiotics. Asked the registration process for postbiotics, he said that the Indian authorities had asked about their human clinical trial findings, as well as whether the postbiotic has already received approval in other countries. IMMUSE currently enjoys the self-affirmed GRAS status in the US, which he said was "good supporting data."

There are also concerns coming from the Indian authorities on whether postbiotics will produce antibiotic resistant effects. "This is a dead cell, but regulators still see it as probiotics, live cells. They will ask if it is antibiotic resistant," he said. In 2021, the International Scientific Association for Probiotics and Prebiotics (ISAPP) published a consensus statement in *Nature Reviews Gastroenterology & Hepatology* defining postbiotic as "a preparation of inanimate microorganisms and/or their components that confers a health benefit on the host". "As the authorities only have the framework for probiotics, they will tend to adapt the framework that they use for probiotics to define postbiotics. There are physical differences between pro- and postbiotics, but there's still

confusion, even with the regulators," added Amy Lau, business development and marketing lead.

Food label changes: Philippines updates policies governing sodium limits and caloric labelling in pre-packaged food products

By Pearly Neo 02-Oct-2023 - Food Navigator Asia

The Philippines Food and Drug Authority (FDA) has announced new changes to sodium content limits and how caloric values are to be displayed on the packaging of pre-packaged processed food products in the country.

In September 2023, the Philippines FDA issued a formal circular highlighting that food manufacturers and distributors in the country will need to adhere to updated labelling requirements for pre-packaged processed food products. These changes were based on the Recommended Energy and Nutrient Intakes (RENI) nutritional system dietary standards used in the Philippines, which has been in force since 2002 but saw major updates based on advances in the understanding of energy and nutrient requirements back in 2015. Many adjustments were made to the area of Recommended Energy Intake / Recommended Nutrient Intake (REI/RNI), which is commonly displayed

Typical values	100ml contains	250ml contains	%GDA*	typical adult
Energy	199kJ 47kcal	500kJ 120kcal	6%	2000kcal
Protein	0.5g	1.3g		90g
Carbohydrate of which sugars	10.5g	26.3g	29%	70g
Fat of which saturates	10.5g	26.3g	29%	70g
		trace		
		trace		

as a %REI/RNI value on food packaging, but adherence to these were not officially mandated in local regulations until this time. "In line with updates made to the RENI by the Department of Science and Technology - Food and Nutrition Research Institute (DOST-FNRI) based on scientific advancements in nutritional understanding, the FDA shall now use the new REI/RNI [as prescribed]," FDA Director General Dr Samuel Zacate stated in the circular. "This change will apply to the nutrition labelling of all pre-packaged processed food products, as well as when it comes to planning food fortification programmes, nutrition advocacy, formulating regulations and more, in place of the 2002 RENI. This will serve as guidelines for all food and beverage firms will regard to the use of % REI/RNI, and all affected manufacturers, traders and distributors of such processed food products in the Philippines will be given a transition period [of] two years."

The portion of the product label containing Nutrition Facts or Nutrition Information must also carry the statement 'Based on PDRI 2015' moving forward in order to avoid any ambiguity. The PDRI 2015 recommended daily nutrient intakes cover a wide scope from macronutrients such as protein and fatty acids to vitamins to minerals such as calcium and magnesium, and

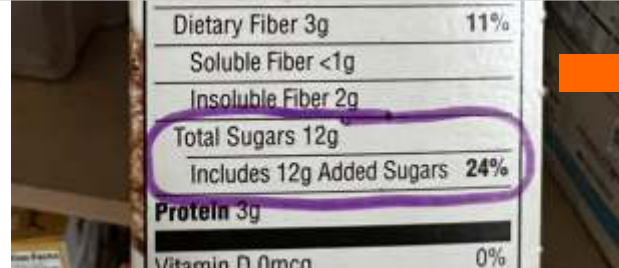
specified levels are recommended according to different age groups i.e. infants, children, teenagers and adults, specific down to the age and gender of the consumer. For instance, 46g of protein is recommended for an 11-year-old female child as opposed to 43g for a male child; and 62g for a 31-year-old female adult compared to 71g for a male.

Sweet complexities: ANZ ministers want clearer definition of 'added sugars' ahead of labelling policy changes

By Pearly Neo 18-Sep-2023 - Food Navigator Asia

Australian and New Zealand ministers responsible for the region's food industry have called for clearer definitions for the term 'added sugars'.

The ministers convened as part of the quarterly Food Ministers' Meeting on food regulation and policy matters, where a major topic of discussion was the inclusion of 'added sugars' information in on-pack nutrition information panels. Although the meeting generally agreed on the need for such information to be included, concerns were voiced over stating volumes in a quantified manner. "FSANZ has completed a systematic literature review with regard to added sugars in the nutrition information panel [and found that] there may be complexities and challenges with implementing the option of simply quantifying these in the panel," the ministers stated via the Food Regulation



Secretariat. This indicates that this move may not achieve Food Ministers' desired policy outcome, hence ministers have discussed alternative approaches to this. "This includes the incorporation of a incorporating a definition of added sugar into the Food Standards Code as a matter of priority, to ensure added sugar claims align with dietary guidelines."

This definition was called for as a result of FSANZ findings that a significant proportion of consumers currently still have poor understanding of what 'no added sugar' entails, leading to concerns that allowing such claims could lead to a health halo effect in the market. "A sizable proportion (17% - 30%) of consumers did not understand [that] products with 'no added sugar' may still contain sugar, or were unsure," the FSANZ study authors stated in their final report. "So, if this is presented simply by quantifying the sugar content in the nutritional panel, it is unclear whether consumers would perceive 'zero grams of added sugars' to mean that completely no sugar is present, [even] if total sugar information was presented in close proximity.

"One study suggested that presenting 'added sugars' information as zero grams might create a health halo, but based on the data available it is not possible to draw a definitive conclusion."





The researchers found that general consumer understanding of 'added sugars' is very literal, referring to sugar that is added during the processing or manufacturing process, perceived to be done by manufacturers. When the definition has been set, the next step will be for ministers to decide how the quantity of 'added sugars' will be displayed in nutritional panels, and whether or not simple quantifying will be sufficient.

"Consumer testing will be the next step, to identify the best way to incorporate added sugars information into the NIP and on front of package labelling," they said. "Apart for direct quantification which remains [our] preferred option for now, there are other options being considered such as the use of a pictorial about sugar on sugary beverages or sugar-sweetened beverages; or changing the statement of ingredients to identify sugars-based ingredients."

Myilk or milk? APAC plant-based dairy sector sees 'no confusion' amongst consumers regarding naming conventions

By Si Ying Thian 02-Aug-2023 - Food Navigator Asia

The APAC plant-based dairy industry believes that controversy surrounding the use of dairy terms for plant-based product labelling is

unlikely to happen in this region despite contention in other markets, citing differences in local consumption drivers as a major factor.

Plant-based product labelling has been a major source of contention within the food and beverage sector in markets such as the United States and Europe over the past few years, particularly in the context of plant-based milk and dairy products. This has been less of an issue here in the Asia-Pacific (APAC) region so far in the growth of the local plant-based industry, and according to industry experts such as Good Food Institute (GFI) APAC Managing Director Mirte Gosker, this is likely due to existing consumer familiarity with such products. "Label censorship has not been a programmatic priority for GFI APAC, as Asian consumers already have deeper familiarity with plant-based milks and the many health benefits they offer," she told FoodNavigator- Asia, citing soy milk as an example of a beverage that has been traditionally consumed across Asia for many years. "Asian consumers are wise enough to understand that the 'milk' category includes both plant-based products—which have been popular across the continent for centuries—and those derived from animals."

She added that East Asian cultures in particular do not have as deep a history of cow's milk consumption as the West, and local consumers now tend to view plant-based dairy as a supplement to a healthy lifestyle rather than a

nutritional replacement to cow's milk. According to the Euromonitor International Fresh Food 2023 report, APAC emerged as the best-performing region for plant-based milk retail dollar sales at US\$9.8bn (compared to Europe at US\$4.1bn and North America at US\$3.6bn) although year-on-year consumption growth was very incremental at just 4% (compared to Europe at 8% and North America at 9%). Australia's MILKLAB concurred with Gosker, with its General Manager of Marketing for dairy and plant-based beverages Serge Costi saying: "We find that consumers can navigate the entire range from dairy to plant-based quite easily."

Top drivers for plant-based milk consumption in the APAC region include: 1) the prevalence of lactose intolerance among Asian consumers - making them receptive to dairy alternatives; 2) environmental consciousness by Gen Z and millennial consumers; and 3) individual taste preference of consumers, e.g., nutty taste of oat milk. According to Singapore-based Bambara nut product specialist WHATIF Foods, regulatory guidelines in the APAC region tend to centre around product safety and consumer value, rather than labelling and nutrient statements.





“Sometimes, these kinds of requirements are also influenced by non-plant-based players,” Chong Jin Loy, Innovation and Strategy with WHATIF told us. Costi added that markets here tend to vary more by taste preferences than regulations. “The usage occasions across South East Asia differ slightly to Australia, especially in the prevalence of cold, mixed drinks as well as acidity levels,” he said. “So, we’ve spent a lot of time working with international markets to ensure our product maintains high quality when mixed in local markets - tailoring our recipes to make sure they don’t split and still perform well in café-style drinks in Asia.”

According to Gosker, many of the issues regarding plant-based labelling in western markets are ‘misguided’, and are often aimed at halting the development of the plant-based sector in these markets. “GFI often has to respond to misguided attempts to restrict the sale of plant-based products wherever they appear - most often in the US and Europe,” she said.

As an example, earlier this year the USFDA proposed a draft guidance regarding the labelling of plant-based milk as well as for the inclusion of voluntary nutrient statements on-pack - this was later re-opened after seeing disagreement from both the plant-based and conventional milk sectors, and has yet to

reach a decision as of time of writing. Europe on the other hand has seen a back-and-forth tussle for several years following regulatory changes proposing the ban of dairy-related terms for plant-based alternatives - this ban was later withdrawn by parliament after lobbying efforts by the plant-based industry.

Middle East majors: Clean label and sugar reduction ‘a must’ to penetrate local beverage market

By Pearly Neo 20-Sep-2023 - Food Navigator Asia

Beverage products entering the Middle Eastern market need to be clean label and low in sugar in order to gain a strong local foothold, with both regulatory pressure and consumer demand firmly pushing trends in this direction.

The Middle East and Dubai in particular is well known for being associated with luxury and opulence, which also brings with it a higher awareness amongst consumers when it comes to food and beverage consumption and increased demand for higher quality. This has very much in the local beverages sector, particularly so when products are associated with beauty and skincare given the weather conditions in the region and the potential impacts of this on the skin.

“High quality is a must here in the Middle East and especially Dubai, and when it comes to anything associated with

beauty the need and demand is even more apparent,” Rob Furse, Director of the +PW beverage brand’s parent company Millennium Group, told FoodNavigator-Asia.

It is very clear that consumers are limiting their consumption of sugary drinks and carbonated drinks, [partially due to higher price points] but mostly due to higher awareness of the health and wellness connotations, so beverage brands also need to accommodate these changes.

For us, newer products such as the beauty-focused Collagen Booster were formulated to have zero sugar, no artificial ingredients, as well as a blend of vitamin B3, B6, B7 and C for skin maintenance alongside the collagen itself. Any existing products that do have any ingredients that might be of concern are looking at being reformulated to remove these, as alongside sugar the idea of clean label is also really gaining steam.”

The impetus for sugar removal is especially clear for companies looking to position themselves from a beauty or wellness aspect, as various dermatological studies have identified sugar overconsumption as a factor in skin ageing, compounding issues such as inflammation and collagen damage.



"Everyone wants to live better and feel better, and beauty is such a big part of that, especially in a market like the Middle East," he added. "Here high quality and premium are very front and centre, so it's all about clean, it's all about pure, it's all about giving consumers products that they can trust in to look after them, and this is no different for beverages, so added sugar is quite the no-go these days."

Sugar has overall long been a matter of concern for the Middle Eastern region, which struggles with high obesity rates and the position as one of the fastest global growers in terms of sugar consumption. According to the World Health Organisation (WHO), average daily sugar consumption in this region comes in at 85g per day - well over the WHO recommended value of 5g daily. Governments across the region such as the UAE and Oman have enforced regulatory and levy attempts to control sugar intakes, particularly in beverages, with a 50% taxation on soft drinks and 100% taxation on energy drinks respectively, which has given these sugar-sweetened beverages higher price points on average since 2020.

Regulatory constraints are driving the world's 'looming seafood shortage,' says McKinsey

By Pearly Neo 19-Sep-2023 - Food Navigator Asia

The Food Safety and Standards Authority of India down alcohol adulteration in the country.

Regulatory constraints — particularly those around new fish farming licenses — drive the lack of supply that's causing this "looming seafood shortage," according to McKinsey. "To achieve well-managed fisheries, many regions have limited existing fishing licenses, which has made new quotas a scarce resource," the research notes. Some of these restrictions are enacted to ensure more sustainable fish farming. One of the upsides of alternative seafood is that the sector doesn't face the same restrictions, since products are typically created in the lab, not on a farm. Theoretically, this makes them "one option for scaling production."

Plant-based seafood products have been in the market for years and currently do about \$14 million in retail sales in the US, according to the report. Products normally use GRAS (generally recognized as safe) ingredients and don't need premarket approval to launch. Cultivated products

are another matter. No cultivated fish company anywhere in the world has yet received regulatory approval to sell to consumers. The process (harvesting fish cells and cultivating them in bioreactors) is fairly new in the food world and not yet proven at scale, so these products will not hit the market overnight, despite there now being a regulatory pathway in the US and some other regions.

Regulatory matters aside, alt-fish startups must overcome similar challenges faced by the rest of the alt-protein sector: price, taste and texture, and nutrient content in products.

"Once these products are more established in the market, it remains to be seen how consumers will respond, and how products continue to develop accordingly," says McKinsey. Much of that will come down to how startups are branding and marketing products to consumers. This is perhaps the biggest place alt-seafood can learn lessons from the alt-meat sector, where many companies have struggled to communicate their value proposition to customers. As the report notes, "the industry still must work to identify target core consumers and develop messages that resonate with them."

