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Scope and Viability of Functional Foods in India

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India is currently facing a clear and parallel process of a demographic and epidemiological transition occurring at remarkable speed over all geographical regions, with dominant rise in non-communicable diseases (NCDs) accompanied by a marked fall in infectious disease. 35% (3.6 million) of all deaths in India are attributed to NCD chronic diseases. Amongst, cardiovascular diseases (CVD) are major contributors to the high death rates followed by depressive disorders, diabetes, cancer, chronic respiratory, and musculoskeletal disorders. The rise of NCDs are associated with several risk factors such as low physical activity, and the use of tobacco, but the role of diet and nutrition as one of the key determinants of chronic NCDs has been well established.

The philosophy of food as a medicine is not a new concept. '*Food as medicine*' holds true only if it is consumed in right quality and quantity. Thus, evolved food, and nutrient consumption dose based recommended guidelines to limit and encourage certain foods such as with low in animal fat, salt (5*g/d*), sugar (<10%*en*) while encouraged fruits and vegetables (>400g/d) for the prevention of chronic disease. Besides this, increased intake of iron, zinc, vitamin A and folate-rich foods also been stressed upon to address the micronutrient deficiencies. Although emphasis has been placed on the overall dietary pattern (DP) that limits foods low in animal fat, sugars, salt while encouraging plant-based diet; Indian studies still show that daily requirement is far below recommended. The question that is pertinent here is how to promote a healthy diet? Is it possible to address this burden with only a perfect DP emphasized above or do we need to have specific *'functional foods'* (FF) or a combination to mitigate the growing chronic disease burden?

A large body of scientific evidence indicates that eating foods with specific bioactive compounds (e.g. Omega-3, α-carotene, lutein, lycopene, β glucan, soluble fibre, conjugated linolenic acid, catechins, and many more) on a regular basis can help to reduce the risk, or protect against a number of health concerns including gut health, CVD, and cancer. On the other hand, a perfect DP is known to have a protective effect but with only specific combinations (e.g., Mediterranean / DASH diet). Currently, this doesn't pave the way as current intake lacks functional benefits

while other factors such as sedentary lifestyle, better access to high-calorie foods, contribute to the burgeoning chronic disease risk. Yet, today, we're unlikely to meet the recommended guidelines. Besides, to obtain specific functional benefit from the traditional DP, one must consume sufficient quantities of bioactive compound from a variety of fruits, vegetables, legumes, oils, and nuts which are not always practical. Consequently, to deliver the required quantity, and with persistent need the food industry fortifies everyday foods with bioactive compounds, either isolated from natural food sources (such as lycopene in tomatoes) or enhanced (such as vitamin A enriched rice) for functional benefit. Thus, the role of *FF* (less commonly known as nutraceuticals) remains desired due to satisfactorily demonstrating beneficial effects to one or more target functions in the body, in a way that provides added physiological benefits especially in the case of chronic diseases or aid to maintain optimum health.

To delve deeper into the Indian scenario, FF contributes only a meager percentage of the share in the global nutraceutical market. But with growing health awareness, higher and disposable incomes, co-prescription with regular drugs, and other factors, the industry is poised to show a promising growth. Despite its potential, there are only a few commercialized functional products that are available today. The most popular are energy drinks, ready-to-eat breakfast cereals, probiotic dairy products, heart health spreads, soy proteins, and so on. Besides the opportunity, such translation of food into FF category is not without challenges, especially with high markup and market skimming practices, lack of regulatory framework to validate health claims and inadequate investment in food research. The report considers some of the specific challenges along with possible recommendations to the uptake of FF in the Indian context.

The regulatory framework Any food products including dietary supplements and FF must pass the Food Safety Standard Act (FSSA) to establish and sustain consumer and buyer confidence for safe and high-quality foods and ingredients. While presently (FSSA) approval is not required, if therapeutic usefulness is consistently mentioned in the literature, such an action must be made mandatory to prevent exploitation of consumers. This would allow nutraceuticals to go through a rigorous clinical trial (or animal, experimental or epidemiological) process to measure their efficacy, dosage requirement, and possible adverse effects. Further, the government should mandate certification systems to boost domestic supplier and reduce sub-

standard imports.

Understanding the right Demand Unlike in the past, all demographics – from generation Z to baby boomers take more responsibility for their health food as medicine and understand food's nutritional value. Nielsen's 2015 Global Health & Wellness Survey reported that consumer mindset about healthy foods has shifted and they are ready to pay more for products (including those that are GMO-Free, have no artificial coloring/flavors and are deemed natural) that claim to boost health and weight loss. The rapid rise in health care costs, and urbanization, also forces the consumer to look for health and FF. Yet, such awareness is observed only in the high income and educated consumers, not the middle sector, who often equate these FFs to medicine. They feel that to consume FF for the betterment of disease or health is like taking medicine.

Awareness Although FF may be consumed independently as pills or fine powder, without prescription, there is a generalized lack of awareness among the people/consumers as to the use, dosage, safety, and need for FF. Even at the manufacturer level there is a lack of basic knowledge of regulations and scientific validation of the product. The success of any product depends on effective communication. Therefore, there is a need for clear, balanced and non-misleading communication not only to consumers but other stakeholders too, such as scientists, editors, journalists and other interest groups for improved public understanding of emerging science. Yet, such an effort has to be sincere and honest in their claims while marketing and communicating with consumer till appropriate regulations for scientific validations are evolved.

Availability, Cost and Affordability From the perspective of the consumer, availability is an issue as not all people can find FF easily as they are available only in select middle-high profile stores. This also brings in the issue of cost and affordability as only people with high income can afford such foods. Government should encourage funding for research and development at the manufacturers level

The Underlying Science High product failure rates in FF indicate that consumer acceptance is often neglected or not understood. Yet, the success can only happen if partnership occurs not only amongst biotechnology researchers but also involves nutritionists, public health researchers, pharmaceuticals, nutraceutical and food additives companies,

agriculture, food technologists during product development. Further, separation, purification, and production at the industrial level of such nutraceutical and membrane technologies also provide key opportunities. During manufacturing, factors such as shelf-life, taste, and flavor also needs to be considered.

Although there are few fortified foods (e.g. Iron, folic acid) available, it is designed for specific target groups run by the government. Availability of these foods even in general retail stores would benefit consumers already at risk for chronic diseases. Much effort has gone into addressing micronutrient deficiency and few on maintaining normal growth and wellness (e.g. Chawanprash, Shilajit Gold), hence more research is required for condition-specific needs which have huge potential. But we should remember that awareness on overall FF is significantly low, even if we focus on bringing products to decrease the availability issue, without consumer awareness, it’s unlikely to succeed in the market.

To conclude, with the day-to-day increase in the rate of chronic diseases and with the aging of the world population, FF has been regarded as the future. Taking these into consideration, India may well be able to achieve the projection of being the fifth largest consumer market for FF in the world by 2025. An enabling environment with appropriate policies, including governance and accountability is also needed to prevent marketers from marketing junk food as FF. The Indian FF market is still in an infancy stage and to date, the potential impact on clinical end points is generally not established and requires investigation; Therefore, FF should be part of the healthy recommended DP recognizing the complex influences of different foods, in order to obtain a holistic benefit.

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