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Food Factors and Food Safety... A Perspective

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ABSTRACT

Food Factors that positively contributes to Food Safety is a major issue today across the World. Additives that are added to Processed Foods and other factors have to have an attachment of Quality and Safety aspect which has to be beyond the doubt of any consumer. The problem of safety does not stem only from the small amount of contamination that may occur but sometimes it also has a huge amount of responsibility in the Chain as it moves across from Rural to Urban with a clear pathway of its destination into Hyper markets especially when one looks at Nutraceuticals. This is where, the role of Nutrigenomics will help a lot in tomorrow's Food Safety with Food factors which is one of the critical issue for long term benefit from especially Traditional and Ethnic Foods with a holistic approach. This has to be addressed with the clear backdrop of culture and even eating habits and the Biodiversity and the habitat balance from a Holistic approach. Are we geared to this Challenge in the immediate Near Future considering Food Factors being taken into the ambit of Food Safety?

Key words: Food safety, Food Factors, Holistic approach, Traceability, Reference Standards, Probiotics, Gut Health, Prevention, Nutraceuticals, Nutritionals, Toxicity, Plant Extract

INTRODUCTION

Foods occur in diverse forms comprising mainly of milk and milk products, cereal and cereal products, fruits and vegetables, meat and meat products, sea foods, sugar and sugar products. The food with its nutrients, apart from being consumed by humans, also acts as an excellent medium for the growth of spoilage and pathogenic microorganisms. A number of factors contribute to food being unsafe and causing foodborne illness. This environment consists of intrinsic factors inherent to the food (e.g., pH, water activity and nutrients) and extrinsic factors external to it (e.g., temperature, gaseous environment and competitive microflora).

Foodborne diseases are syndromes that are acquired as a result of ingesting foods that contain either an infectious or a toxigenic microorganism or a poisonous metabolite produced by these organisms. Epidemiological studies have indicated food and water as main causative agents of food poisoning outbreaks. The study of disease causing microorganisms associated with food forms an important and continuing topic of microbial safety. The study addresses safety aspects of food in relation to human beings. As awareness about food safety issues is increasing, there is a need for the countries to provide greater assurance about the safety and quality of foods. Food safety problems evolve with changes in society, economy, lifestyle and eating habits. The food industry with its diverse range of products is governed by strict food legislation.

In the present global scenario, microbiological safety has become a very key issue with emphasis on foodborne

pathogenic bacteria. Enumeration / detection and isolation of foodborne pathogens from the samples are often difficult due to the high number of contaminating and indigenous microflora and a low number of the target pathogen. The conventional methods of isolation, which includes pre-enrichment and selective enrichment, have moderate sensitivity and specificity. They are laborious and time consuming and have the limitation of ambiguity in identification of the microorganisms. Advances in molecular biology and genetics have revolutionized the field of analytical food microbiology. Polymerase chain reaction (PCR) is an extremely powerful tool that enables exponential amplification of a specific sequence in short time. The sensitivity and specificity of the technique combined with less time intensive factor has made it a method of choice for detection and identification of microorganisms.

FUTURISTIC VIEW

In the growing concern for microbial food safety on a global platform coupled with the advent of mandatory food safety programmes for almost all kinds of foods including those of traditional and/or ethnic foods, the development of more specific and reliable detection methods for pathogenic microbes is of great significance in public health microbiology. Several PCR-based markers including primers for species specificity, rRNA sequences and different toxin genes have been evolved to detect for the presence of virulent strains of this bacterial species.

Considering only those pathogenic microbial species of pathogenic microbial species, it would be more mean-

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ingful to analyze at a molecular level, the inter-relationships among the factors that could arise out of genotype and physiology of the organism. This could give a lead towards understanding of the reasons, as to why all strains of the same pathogenic bacterial species do not express as toxigenic under identical conditions. These aspects would give a comprehensive approach from the point of food safety and public health perspective leading to the formulation of protocols that could prevent health hazards and improve the quality of human life.

PROBIOTICS AND BIOTECHNOLOGY

Foods are being consumed by human population in order to derive functional benefits which would have an impact on human health. Studies into the traditional fermented foods have established the multiple advantages with reference to nutritive values, therapeutic properties and sensory attributes. In all these fermented foods, the process of fermentation is mainly initiated by lactic acid bacteria, followed by yeasts in a few of them.

The documented research findings support the hypothesis that the diet is instrumental in controlling and modulating various functions of the body so that good health and a disease-free life are made possible. A functional food is defined as a 'food that contains in adequate concentrations one or more combinations of components which affects functions in the body so as to have positive cellular or physiological effects'. Probiotics and prebiotics fall under this category.

The concept of probiotics, though not known in its present definition has been around for almost 100 years, as could be seen from the documented studies of lactobacilli in soured milks way back in 1906 and 1908. The word 'probiotic', which is derived from two Greek words meaning "for life" was not established by definition till 1965. The first workable definition for probiotics was proposed in 1989, which meant as "a live microbial feed supplement which beneficially affects the host animal by improving its intestinal microbial balance". Later on, probiotic has been defined as "Live microorganisms which when administered in adequate amounts confer a health benefit on the host". Probiotics do modify the composition of the gut microflora and as a consequence, they have been shown to influence both intestinal and body functions.

The theoretical basis for the selection of probiotic microorganisms is diverse with the selection criteria and attributes like (i) adherence to human intestinal cells, propagation and persistence in the human intestinal tract (ii) acid and bile stability, (iii) production of antimicrobial substances and antagonistic action, (iv) should be preferably of human origin and safe in food and clinical use and (v) stability and viability of live cells under varied food environmental conditions. Intestinal probiotics are dominated by members of *Lactobacillus* and *Bifidobacterium* as these two genera have a long history of safe use

and have GRAS (generally regarded as safe) status.

The concept of fermented foods, which is one of the easiest modes of probiotics incorporation, is well established and accepted. The fact that fermented foods have microorganisms is also very familiar. The great diversity in the traditional fermented food preparations gives ample opportunities for the use of the many potent cultures in appropriate and compatible food matrices. The choice of probiotic strains involves the assessment of many parameters including functional properties of the strain in question. The relation between health of an individual and the diet consumed, although poorly understood, is well established.

FUTURISTIC VIEW

In general, consumer's preference is to derive multi-dimensional benefits from a single commodity or product. It becomes imperative to focus research towards preparing the foods through the use of probiotics which would add multi-functional characteristics. Again here the study should address at molecular level to understand the behavioural pattern and lock/unlock target genes which would be desirable/undesirable. At the same time, microbial diversity through geographical habitat and unrelated food matrices would give a better understanding of such mechanisms involved.

Probiotics are just one such type of bacterial organisms, the safety issue is of concern, as in nature genetic transformations do occur in food system or human intestine. What is today a probiotic culture can be a pathogen in due course of time, if genetic studies and biomarkers are not well defined.