

Food, Nutrition and Beverage

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The food we eat, the beverages we drink and the nutrients we consume have a direct link to the culture, customs and beliefs we have inherited over the millennia. The food and drinking habit of people vary from place to place and these are largely influenced by the ambient biological wealth and environment. Further, food and drinking habits are influenced by weather and climatic conditions. India, being a vast country with a multitude of climatic, cultural, racial and religious diversities provide delightful gastronomic variations to the discerning connoisseurs. The ethnic food and beverages of different regions of India have been developed by generations of people keeping in view of the nutritional needs of the common man right from the cradle to the grave. Our ancestors have designed different types of food and beverages keeping in view of the nutritional needs of people of different age groups such as growing children, youth, working class, pregnant and nursing mothers, the sick and the old. The Ayurvedic concept of Rasayana therapy is now being confirmed by the recent advancements in genomics. Nutrigenomics, nutrigenetics, proteomics, metabolomics and transcriptomics, etc. have substantiated the holistic approach adopted by the Ayurvedic acharyas in dealing with human health and nutrition. In this article an attempt has been made to review our rich and varied ethnic food and beverages.

Keywords: Ethnic foods, Nutrition, Beverages, Phytonutrients, Nutrigenomics and Nutrigenetics

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Food, nutrition and beverage are indispensable companions of humans since the very beginning of his existence. The early man explored his surroundings to locate materials of natural origin for food and medicine. He continued his search in the plant and animal kingdoms to expand his food basket, to heal his ailments and discomforts. The desire to attain vitality and longevity also prompted the early man to experiment with whatever available in his immediate neighbourhood. By a process of trial and error, observation and empirical reasoning and inference the early man made conscious selections of a variety of biological materials to enhance his health, to alleviate pain or to treat other physical and mental ailments. The knowledge thus gathered was passed on to succeeding generations. Creative members of the succeeding generations incrementally improved and even added new knowledge to this body of traditional knowledge system. This traditional wisdom has come down to us from our ancestors and we now term it as traditional knowledge or ethnic knowledge. We find this

knowledge system getting perpetuated through folklore, local health traditions, tribal knowledge system, family and community based knowledge systems etc. All ancient cultures and civilizations of the world had thus evolved their own traditional food, nutrition and medicine from their ambient biological wealth.

The disappearance of healthy food preservation practices from the rural areas have also led to nutritional loss. There has been a procedure for drying and preserving seasonal foods for the whole year until the coming of canned foods. Thus during the season of mangoes and jack fruits, there was a rural tradition of drying the fruit pulp in the sun, applying layer after layer on herbal mats every day. This, when dry, was kept in sealed containers with native herbal preservatives. It served as an unadulterated source of supplementary nutrition to the young and old. There were also ways of preserving raw mangoes in salt, dried jack fruit seeds in containers, etc. These cheaply available and highly nutritious food items have almost disappeared, leaving no alternative models behind. Thus, large quantities of surplus seasonal food now get wasted.

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Importance of Ethnic food and medicine

Ethnic food and medicine are mostly location specific and is best suited for the local climate and environment. Such systems of food and practices are deep rooted in the communities' social, cultural and religious values. For centuries these practices of food and medicine helped the people to lead a healthy, holistic life, free from most of the modern day diseases. That is the reason why WHO recognized the intrinsic importance of such traditional food, nutrition and medicine particularly in primary healthcare practices. WHO also emphasized the strategic role of medicinal plants in ensuring the primary healthcare needs of the people particularly those in the rural sector. The introduction of modern medicine in 19th century began to exert a negative influence on the traditional healthcare sector. The advances made in biological sciences, chemistry, pharmacology, microbiology, etc contributed to the rapid development of modern medicine in the 19th and 20th centuries. These developments in modern medicine and food processing caused a rapid decline in ethnic food and medicine. However, by the end of the 20th century there had been an unprecedented revival of interest in ethnic food and medicine. In the 21st century natural drugs, especially of plant origin, are expected to play a major role in the healthcare programme of mankind^{1,2}.

The revival of interest in plant based drugs and the other herbal products is mainly because of the widespread belief that 'green medicine' is healthier than the synthetic products³. This is mainly due to the increasing evidences of the health hazards associated with the harmful side effects of many synthetic drugs and the indiscriminate use of modern medicines such as antibiotics, steroids, etc. The preference for green food and medicine has resulted in the rapid growth of plant based drugs, pharmaceuticals, nutraceuticals, functional foods and even cosmaceuticals. In 1980s this led to the rapid spurt of demand for health products like herbal tea, ginseng and products of traditional medicine. The health promotive and disease preventive strategies in treatment, prevalent in oriental systems, especially the Indian (Ayurveda, Siddha, Unani and Amchi) and the Chinese systems of medicine are finding increasing popularity and acceptance all over the world. Because of this sweeping "green wave" a large number of herbal drugs and plant derived herbal products are sold in the health food shops all over the developed countries.

According to some healthcare experts, there will be more dieticians rather than physicians in coming years, as many diseases can be prevented and better health can be maintained if one takes right food containing plant products with specific functional attributes.

The Ayurvedic Masters of ancient India had a clear understanding of the delicate cellular mechanism of the body and the deterioration of the functional capacity of human being. To arrest such deterioration of the functional efficiency and to revive and revitalize the body system, the Ayurvedic masters developed an elaborate rejuvenation therapy known as '*Rasayana*' therapy. '*Rasa*' in Sanskrit means the essence and '*ayana*' means to circulate in the body without any obstruction. '*Rasayana*' is one of the eight clinical specialities of Ayurveda that is aimed for the rejuvenation and geriatric care. *Rasayana* is not a drug therapy, but a specialized procedure practiced to cleanse the body from the toxic and other microbial substances. In *Rasayana* therapy, with the help of special diet and nutritional agents comprising of highly powerful antioxidants, the body is rejuvenated by providing greater immunity, vitality, longevity and by improving all faculties to attain youthfulness of the whole body.

Special food for mother and child

Child bearing and propagation of culture through the generations are central to any society. In the agrarian society preparations for this began very early and the birth of a child, particularly the girl, was an important event. Offering prayers to beget a girl was common place, like performing ritual arts like '*theyyam*' in Malabar. The girl child had many privileges and her attaining puberty was another occasion to celebrate. Family and friends brought choice food items meant to give her the much needed nutrition at that stage. A girl was to take rest during her menstrual periods and eat specific foods which are no longer possible in the fast-paced modern life. Traditional social support systems like the compound families took care of the various needs. Proper pre-marital counseling is a requirement in modern society where plain ignorance leads to far too many complications and diseases. Earlier, elderly women used to advice and counsel. Respect and knowledge empowerment of the girls gave them honor, confidence and courage. The traditional practices continue in many regions and in the Gangetic plains

of India, scenes of girls attaining puberty being carried in bullock carts with music and dance could be seen till recently. Of late this takes place only in remote villages. Majority in the country now consider sexuality and reproduction a private matter, perhaps after the spread of western values when everything related to these are considered sinful and secretive⁴.

In traditional societies the crucial phase of pregnancy-care starts the moment pregnancy is confirmed. The expectant mother is advised to conform to a series of customary behaviours with almost every elder family member or villager monitoring her. The woman receives special care in all day to day activities what is now lost in the modern life styles. The treasures of native wisdom on this subject are opened to the new mother-to-be. Certain foods were taboo for pregnant women while some others were mandatory. Do's and don'ts were all part of folk wisdom. Thus it was mandatory for those in advanced stages of pregnancy to do specific house hold chores like sweeping the floor, where many others were barred. Such natural exercises enabled easy child birth and are endorsed by modern obstetricians now. Many of the preparations of this tradition remain unwritten, kept alive by being passed on from one generation to the next.

Pregnant women are normally not allowed to stray outside during the night in most villages. They have restrictions in visiting sick people and witnessing traumatic events. In several families there are also stipulations that these women listen to music, pray and read epics like *Ramayana*. These point to an acute awareness of the latest findings in psycho-somatic linkages, that is, mind-body connections. It is now known that turbulence in the mother's mind, fear or extreme anxiety, affects the unborn child. The traditional Indian science of Yoga has postures for various stages of pregnancy which makes child birth easy and natural. There are also *asanas* and exercises for post-natal stages which restore the body tone before delivery. Together with this there are herbal preparations like medicated oils and herbal nutrients.

Breast-feeding is a very important ingredient in baby care in Indian culture. Mother's breast milk is also given as medicine, used as eye drops and used in assorted ways for baby care. Breast milk is considered to have all the nutrients and antibodies what the child needs. It is a sharing of love and the mother child bondage is cemented at the time. Those receiving long term breast feeding have been shown to be more resistant to various diseases. Many herbs such as

Brahmi (*Bacopa monnieri* (L) Pennel,) commonly used by native healers and considered stimulants. There are also specific animal based potions that are given to children at later years. Since the foundation of health is laid in childhood, traditional healing gives great importance to child care. More and more people are now turning to herbal and traditional approaches in child care as the toxins and chemicals, say in cosmetics, are proving to be damaging.

Sprouted cereals and pulses

Grains, like Bengal gram, green gram get enriched when sprouted after soaking in water. This is a common technique traditionally used in India. The protein assimilated by the body goes up by 10 to 60 % when the grains are soaked and sprouted. From the nutrition angle this helps provide various enzymes which can get easily absorbed by the digestive system. The sprouted grains are normally given to pregnant and lactating mothers. There are other common practices among rural people in South India like consuming rice fermented overnight. In traditional society farmers who went out to the fields for work ate '*pazhankanji*' or previous day's rice. Rice when fermented overnight becomes rich in various anti-oxidants and this helps the farmers working in the hot sun have a protection. Vitamins B6, B12, etc. have been isolated from fermented rice. However, this practice is no longer in vogue with the onslaught of modern breakfast items.

Phytonutrients and Phytochemicals

Phytonutrients/ phytochemicals have tremendous impact on the healthcare system and may provide health benefits including prevention and treatment of diseases and physiological disorders. Polyphenols are one of the most widely distributed groups of phytochemicals that are responsible for the health promoting effects of nutraceuticals. They range from simple phenols to highly polymerised tannins. They protect plants from oxidative damage and they also play the same role in humans protecting the tissues from oxidative decay thereby acting as antioxidants. The outstanding feature of these phytonutrients is their ability to block specific enzymes that cause inflammation. They also modify prostaglandin pathways and thereby protect platelets from clumping.

Nutraceuticals and functional foods

The role of food and nutrition is now fairly well understood. With the advancement in science,

molecular biology and genetic engineering, our ability to understand and manage health at molecular level is manifold increased. It is now scientifically demonstrated that it is possible for one to achieve a high level of health and well being if one takes right food and nutrition that suits one's genetic constitution. Molecular biologists are now busy in designing individualized food, customized food based on one's genetic makeup called 'nutrigenomics'. It has become very clear that traditional food and nutritional recipes, now called ethnic food are best suited for the people living in that particular locality or in similar agroclimatic conditions. Towards the end of the 20th century, this understanding led the health Scientists and nutritional experts to scientifically investigate on the traditional foods and that has led to the discovery that the traditional food and other traditional nutritional recipes can be best suited for maintaining a healthy life. It has also led to the development of designer food that suited different groups and also different categories of people suffering from what is now called life style diseases like diabetes, obesity, cancer, arthritis, hypertension, etc. Functional foods or medicinal food or pharma food or nutraceuticals are the best treatment regime for curing or managing such diseases. In future, one may first go to genomic expert who will make a genomic profile and based on the genomic profile the dieticians will prescribe a new diet regime or a 'Rasayana' therapy of Ayurveda or advise for a proteomic therapy or a gene therapy.

Nutrigenomics and Nutrigenetics

The term 'Genomics' refers to the study of nucleotide sequences in the genome of an organism. Nutrigenomics refers to the study of the impact of specific nutrients or diets on gene expression. It should not be confused with another closely related discipline 'nutrigenetics', which investigates how genetic variability influences the body's response to nutrient and diet. Transcriptomics measures the relative amounts of messenger RNAs (mRNA) in a given organism for determining patterns and levels of gene expression. Proteomics is the study of proteins expressed in a cell, tissue, or organism, including all protein isoforms and post-translational modifications. Metabolomics is defined as the comprehensive analysis of all metabolites generated in a given biological system, focussing on measurements of metabolic concentrations and secretions in cells and tissues. It is not to be confused with 'metabonomics',

which investigates the fingerprint of biochemical perturbations caused by disease, drugs, and toxins⁵. Systems biology aims at simultaneous measurement of genomic, transcriptomic, proteomic, and metabolomic parameters in a given system under defined conditions. The vast amount of data generated with such omics technologies requires the application of advanced bioinformatics tools to obtain a holistic view of the effects of nutrients or non nutrient components of foods and to identify a system of biomarkers that can predict beneficial or adverse effects of dietary nutrients or components for promoting health and preventing disease⁶.

It has become apparent that nutrients not only fuel our life but also participate in gene regulation. Nutrigenomics and nutrigenetics offer the promise to unravel complex interactions among genes, gene products, genetic polymorphisms and functional food components⁷. The ultimate goal is to devise strategies for personalized nutrition and dietary recommendations aiming at improving human health⁸. Indeed, nutrigenomic approaches based on ethnopharmacology and phytotherapy concepts have demonstrated the interaction of nutrients and botanicals with the genome to cause significant changes in gene expression⁹. This observation has resulted in the commercial launch of nutraceuticals and functional foods that can regulate health effects of individual genetic profiles¹⁰.

Nutraceuticals in Ayurveda

The *Acharyas* of ancient Indian codified systems of medicine namely Ayurveda and Siddha seemed to have an indepth knowledge and understanding about the delicate relationship between food, nutrition and health. They also had a clear understanding of the delicate cellular mechanisms of the body and the deterioration of the functional capacity of human beings. These ancient medical masters had developed certain dietary and therapeutic measures to arrest/delay ageing and rejuvenating whole functional dynamics of the body system. This revitalization and rejuvenation is known as the '*Rasayan Chikitsa*' (Rejuvenation therapy) in Ayurveda. It is specifically adopted to increase the power of resistance to disease (enhance immunity) and improve the general vitiation and efficiency of the human being. '*Rasayana*' therapy is done for a particular period of time with strict regimen on diet and conduct. *Rasayana* drugs are very rich in powerful antioxidants, hepatoprotective agents and immunomodulators.

Rasayana is one of the eight clinical specialties of the Indian classical Ayurveda, aimed for the rejuvenation and geriatric care. *Rasayana* is not a drug therapy, but is a specialized procedure practised in the form of rejuvenation recipes, dietary regimen (*Ahara Rasayana*) and special health promoting conduct and behaviour ie. '*Achara rasayana*'. *Sushruta* while defining *rasayana* therapy says that it arrests ageing (*Vayasthapam*), increase life span (*Ayushkaram*), intelligence (*Medha*) and strength (*Bala*) and thereby enable one to prevent disease. There are over 30-35 medicinal plants mentioned in different treatise of Ayurveda and Siddha having *rasayana* properties. The important among them are *Sida cordifolia*, *S. cordata*, *Abutilon indicum*, *Tinospora cordifolia*, *Acorus calamus*, *Ocimum tenuiflorum*, *Withania somnifera*, *Embllica officinalis*, *Asparagus racemosus*, *Piper longum*, *Commiphora mukul*, *Semicarpus anacardium*, *Centella asiatica*, *Curcuma longa*, *Chlorophytum borivilianum*, *Chlorophytum tuberosum* and *Dactylorhiza hatagirea*, etc.^{11,12}.

The ancient Ayurvedic physicians treated every individual as unique. According to them, normally there cannot be two individuals with same constitutional nature. That they referred as '*Prakruti*' and therefore, the treatment is prescribed only after diagnosing the constitutional nature of the individual. This constitutional nature of the individual is based on the '*Tridosha*' philosophy. The various permutation-combination of the '*dosha*' in conjunction with '*triguna*'-the qualitative nature could offer countless variation in the constitutional nature of the individual and an experienced physician can very well diagnose it. Interestingly, the modern molecular geneticists also now speak a language similar to this, i.e. genomic composition – i.e., DNA finger print is unique to an individual and we are now talking about gene profiling to understand the genetic predisposition and then suggest treatment to correct it, either by proteomic therapy or using other substances that can alleviate the defects or even the genomic therapy-proteomics, metabolomics and genomic methods for correcting disorders or treating diseases and nutrigenomics, genetically designed nutrition or food items. The ancient Ayurvedic masters had advised to consume specific food that suit to the constitutional nature of the individual whom they have categorized into 7 major groups. They have insisted certain dos and don'ts with regard to food and nutrition according to the constitutional nature of the individual (*Prakruti*). Modern molecular biology and genetic

engineering is offering genetically modified nutrition/food that suit to the constitutional/genomic background of the individual or designer drug suited to the individual – known as Nutri genomics and pharmacogenomics respectively. With the perfection of technology of mapping the human genome, it is now possible to get the DNA profile of individuals and then develop customized nutrition and treatment regimen.

Pharmacogenomics is the study of the hereditary basis for differences in response of populations to a drug¹³. The same view was expressed by the ancient Ayurvedic master *Charaka*, some 4000 yrs ago. *Charaka* observed that 'Every individual is different from another and hence should be considered as a different entity. As many variations are there in the universe, all are seen in human beings. Patwardhan¹⁴ (2003) referred it as the Ayugenomics and explained that it has quite clear similarities with the pharmacogenomics that is expected to become the basis of designer medicine.

A review of some exemplary evidence based research and approaches now resulted in wider acceptance of Ayurvedic medicine^{15,16}. National Botanical Research Institute jointly with Deenadayal Research Institute, Chithrakoot organized a national workshop in 2003 that led to the development of a 'Golden Triange' approach¹⁷. 'Golden Triangle' refers to the converging of Ayurveda, modern medicine and modern sciences to form a real discovery engine that can result in newer, safer, cheaper and effective therapies.

Beverages

The promotive, preventive, corrective /restorative and curative approach in healthcare and medicinal plants possessing such properties are indeed the strength of Indian Systems of Medicine. The increasing evidence /realisation of the health hazards associated with the harmful side effects of many synthetic medicines and also the hazards associated with indiscriminate use of modern medicine such as antibiotics, steroids and other synthetic drugs have given a new impetus to the study of medicinal plants with a view to develop novel herbal drugs. The increasing popularity in plant based drug is now felt all over the world leading to a fast growing market for plant based drugs, pharmaceuticals, nutraceuticals, functional foods and even cosmaceuticals. This has led to the rapid spurt in demand for health products like herbal tea, ginseng, grape seed extract and Noni health drink. Noni healthcare products for promoting vigour, vitality and increasing immunity have been well established.

Somaras or *Soma* served as a much prized ancient beverage in India, which was prepared as a part of a sacrificial ritual, by pressing the plant between stones, mixing the juice with milk and filtering it through sheepskin. It was however strictly not an alcoholic drink, since less time was involved between manufacture and consumption.

India has proudly developed a multitude of beverages to be consumed by its all and sundry habitants. Mango, the choicest summer fruit, grows in most parts of India. This fruit has so many varieties existing and growing in the soil, that all those varieties further taste differently. In summer, one always holds the pleasure to enjoy popular Indian beverages prepared out of mango. Mango Shake and Mango *lassi* are the two most popular amongst these mango beverages. Mango Shake is an excellent fruity beverage on any blistering and sultry day in the yearly singeing summer of India. Thick mango pulp is also used along with milk, cream and sugar. Frozen pulp of mango however guarantees better consistency compared to fresh pulp. Usually, a shake is garnished with cracked or crushed dry fruits, to lend both a visual and psychological impact.

Coconut powder and rose essence is used to top up the garnishing in any Indian mango beverage. One just needs to taste it to enjoy the real flavour of this drink. Mango can also be replaced sometimes with banana or other seasonal wonders. Mango *Lassi* is as popular as Mango Shake. In *Lassi*, the base is yogurt rather than milk. Mixing the pulp of mango in yogurt along with sugar and further in a blender, ensures a complete vision of Indian beverage. The Thickness of the beverage can be made more or less as per one's personal palate. Water is mostly used to make the *lassi* less thick.

A version of *Lassi* without mango is another favourite Indian beverage. It comes in two variants, comprising sweet or salty options. Most of the dairy product manufacturers commercialise *lassi* in these variants. It is an outstanding drink, especially during the regular summer months in India. Peach Melody tastes excellent, implying a fruit cocktail based on rock solid and savoury orange juice. Other ingredients of this concoction include peach and ice-cream.

Aam Kheer is another beverage in India made out from mango. *Aam Kheer* also serves as a great treat during summer. Sweetened milk makes a great creamy base and additional flavour is added in the form of cardamom. This drink is simply splendid after

a spicy dinner before retiring to bed. Choco-Coffee Shake, another admired beverage, serves as refreshing summer drink, concocted from chocolate and coffee. Tea and coffee are indeed most common beverages in India. Liked in both the hot and cold variations, they are served in umpteen varieties all across India.

Strawberry milk shake is especially popular in South India. Frozen and fresh strawberries and milk is used for this shake, to dish out a memorable beverage, suiting Indian tastes; strawberry milk is yet once more, an excellent summer drink. Banana Berry Smoothie made with fruits like banana, strawberry and raspberry, makes one go weak in the knee, each time he/she is served with it in a chilled glass. Yogurt and milk add creamy richness to the smoothie. The shake also serves more as a health food rich in potassium, antioxidants and calcium.

Whether to beat the heat of oppressive Indian summer or just to savour the taste, Indian beverages do possess a worldwide appeal. Tasty, refreshing, easy to make and at the same time cheap, Indian beverages have efficiently carried off a number of celebrations. *Thandai* (nut milk) *Lassi*, a drink prepared from curd *Nimbu Paani* (fresh lime juice) *Aam Panna* (drink prepared from mango juice), *Jal Jeera* are some of the typical North Indian beverages. These drinks are popular on festive occasions and served for entertaining guests. Beverages are also served at Indian weddings, amidst much fanfare. *Chaach* is a traditional Gujarati beverage and in some places consumed instead of drinking water and is the vernacular term for butter milk. *Sharbat* is yet another traditional Indian drink that was popularised by the Mughal rulers and is prepared from fruits or flower petals. The Coromandel Coast variation of tea, a mixture of coffee and tea is also a grossly admired beverage in India. However, this is only the tip of the iceberg as the Indian beverages can be found in their endless variety and subtlety, perhaps still in an unripened stage, maturing towards futuristic prospects.

The most traditional Indian beverages comprise *Garam-Chai*, *Lassi*, *Chach*, *Sharbat*, *Thandai*, *Shikanjmi*, *Kanj*, or even sweetened milk with ground nuts. During the olden days, sweetened warm milk (un-pasteurised, un-homogenised) was known to have been drunk in the morning and as a night-cap at bedtime. *Chaach* (Buttermilk) was consumed during lunch and dinner. Young women were of the habit to drink sweetened warm milk with turmeric powder, in

order to possess a translucent, shimmering skin. The contemporary restaurants, however, prepare their own version of *masala* milk. Depending upon the season, coconut water, unfermented coconut sap (*Neer*), fermented coconut sap (*Toddy*), tempered mango juice (*Aam Panna*) are quite widespread as beverages in India. The Mughals are acknowledged to have introduced the concept of *Sharbat* (sweet fruit/flower fragrant beverages) amongst the pan-Indian populace, moving finally from royal household. The British Raj were the foremost to introduce the class as well as the mass to get hooked on to `tea` time, ensuing in the most legendary and admired Indian beverages recognised as `Garam Chai` or `Masala Chai`. In Punjab, the cold beverages under popular demand include: *Lassi*, *Shikanjami* and *Kanji*. *Thandai* is yet another popular cold beverage in Rajasthan and Uttar Pradesh. *Jal-Jeera* is a popular street beverage in the whole of the country.

India has remained legendary, rising to top chart for its mouth-watering, refreshing, cheap and easy to make beverages. Literally drunk with a savouring tongue, until the last drop, the beverages available in India have formulated the most choicest selection of interesting drinks that are reflective of the indigenous culture. Beverages imply those flavoured drinks, suitable for a hot, humid scorching day, when nothing seems at peace with oneself, making them apropos in human consumption. It can be any drink prepared in highly unlike manners in order to satisfy a quenching, yearning thirst. Since alcoholic drinks have always been prohibited by health professionals and medical practitioners, especially in many ethnic cultures in India, Indians have successfully developed a multitude of non alcoholic beverages in its own right.

Tea or *Chai* is a North Indian beverage made from leaves, twigs or buds of a tea bush called *Camellia sinensis*. Indian tea processing procedures includes fermentation, heating and drying. Herbs, flowers, fruits and other spices are being added as an added appeal. *Chai* is known throughout many countries. It comes in different flavours and strengths. Some of the Indian teas are the Darjeeling Tea, Assam Tea and Nilgiri Tea. Most people use tea as a natural hair conditioner, skin vitaliser and a cure for arthritis. To make an Indian tea, it's helpful to understand the basics.

Tea can blindly be looked at as a staple beverage all through India; the finest varieties are however grown in Darjeeling and Assam. It is generally concocted as *masala chai*, wherein the tea leaves are

boiled in a mix of water, spices such as cardamom, cloves, cinnamon and ginger, and massive quantities of milk to produce a thick, sweet, milky concoction. Umpteen varieties and flavours of tea are prepared to suit dissimilar tastes all over the country. Another popular beverage, coffee, is largely dished out in South India. One of the finest varieties of *Coffea arabica* is grown in stretches of Mysore, Karnataka, and is marketed under the trade name "Mysore Nuggets". Indian filter coffee, or *kaapi*, is also especially popular in South India. Other beverages incorporate *nimbu pani* (lemonade), *lassi*, *chaach*, *badam doodh* (almond milk with nuts and cardamom), *sharbat* and coconut water. India also possesses numerous indigenous alcoholic beverages, including palm wine, fenny and Indian beer. There also exists the much-liked *bhang*, prepared using cannabis and typically consumed, especially in North India, during *Holi* and *Baisakhi*. However, the practice of drinking a particular kind of beverage with a meal, or termed as "wine and food matching" (the process of coupling food dishes with wine to only enhance the dining experience), is not however traditional or familiar in India.

Although the above listed Indian beverages are popular, the populace prefers to consume drinking water with their food, because water does not ever outshine the smack of the food. In fact, it is customary to offer drinking water to guests in any Indian household before serving any hot or cold drinks.

Beverages in India possess that `something special` about the drinking concoction or mix, which is mostly introduced and instilled in the drink. Any given beverage, possesses an interrelation with the culture of a particular society. Although water is not considered as a beverage in the Indian scenario, beverages can be both alcoholic or non-alcoholic. In case of alcoholic beverages, base of the drink is alcohol, where as, in case of non-alcoholic beverage, alcohol is less than 0.5 % by volume. Carbonated drinks mostly serve as flavoured water concoctions. Hot drinks refer to coffee and also the chocolate flavoured drinks.

Fruit Juices

Different fruit juices such as Apple, *Amla*, Orange, Grape, Mango, Pineapple, Guava, Strawberry, Sapota, etc. are very common. *Noni* fruits from *Morinda citrifolia* extracts is a powerful health drink that keeps us healthy always, all the time. It is rich in almost all

vitamins, calcium, niacin, folic acid, pantothenic acid, magnesium, zinc, copper and other minerals like chromium, manganese, molybdenum, sodium, potassium, carbohydrates and more than 160 nutraceutical components. *Noni* fruit juice has several health enhancing attributes such as antibacterial, anti-inflammatory, anti-oxidant, adaptogenic, analgesic, hypotensive, etc. It enhances cellular activity, starting point of all nutritional metabolism. *Noni* fruit juice can act as an excellent nutritional supplement.

New technologies are constantly being developed to isolate and identify the components responsible for the activity of plants, particularly *Noni*. But these technologies should consider and possibly use the fact that the biological activity of plant extracts often results from additive or synergistic effects of its components. Another possibility is the qualitative and quantitative variations in the content of bioactive phytochemicals, which are currently considered major detriments in its use as a medicine. Different stresses, locations, climates, microenvironments and physical and chemical stimuli, often called elicitors, qualitatively and quantitatively alter the content of bioactive secondary metabolites. Enzymatic pathways leading to the synthesis of these phytochemicals are highly inducible¹⁸. This is particularly true for phytochemicals that are well documented for their pharmacological activity, such as alkaloids¹⁹, phenylpropanoids²⁰ and terpenoids²¹ whose levels often increase by two to three orders of magnitude following stress or elicitation²². Thus, elicitation-induced, reproducible increases in bioactive molecules, which might otherwise be undetected in screens, should significantly improve reliability and efficiency of plant extracts in drug discovery while at the same time preserving wild species and their habitats. Molecular biologists and genetic engineers are currently engaged in designing food and medicinal plants with desired genetic make up so as to make custom made nutritional composition food or therapeutically desirable agents in plants –known as nutrigenomics and pharmacogenomics or proteomic approach to healthcare. Another emerging research area in medicinal plants is the metabolomics and systems biology. Metabolomics is considered as a key technology in the systems biology approach to study the mode of action in the therapeutic activity of traditional medicine and medicinal plants²³⁻²⁵. By measuring the activity of living organisms (which can be anything from a cell culture, animals to patients)

for extracts with different composition, possibly one may identify a compound or a combination of compounds that correlate with the activity. Thus systems biology approach is a major challenge for the coming years in studying medicinal plants²⁶.

Beer and Alcoholic beverages

When discussed on alcoholic beverages, India is considered to be the third largest market for alcoholic beverages in the world. The domestic beer and alcoholic beverage market is largely dominated by United Breweries, Mohan Meakins and Radico Khaitan. The demand for beer and spirits is estimated to be around 373 million cases per year. There are 12 joint venture companies having a licensed capacity of 33,919 kilo-litres per annum for production of grain based alcoholic beverages. Around 56 units are manufacturing beer under license from the Government of India.

Country liquor and Indian Made Foreign Liquor are the two segments in liquor; both cater to different sections of society. The former is very much consumed in rural areas and by low-income groups, while the middle and high-income groups consume the latter.

Liquor license outlets in India figures approximately 23,000 with another 10,000 outlets in the form of bars and restaurants. Regulations in this sector differ state-wise in terms of excise and custom duty. In Tamil Nadu, Kerala and Andhra Pradesh, the distribution is controlled by the state government, and any change XVIII in the ruling party has a direct impact on the availability of alcohol.

The wine industry in India has come into prominence lately and has been receiving support from the Government as well, to promote the industry. The market for this industry has been estimated to be growing at around 25% annually. Maharashtra has emerged as an important state for the manufacture of wines²⁷.

Soft drinks

After packed tea and packed biscuits the soft drink segment is considered to be the 3rd largest in the packaged foods industry. Over 100 plants are engaged in aerated soft drinks industry and provide huge employment. It has obviously attracted one of the highest FDI in the country. Strong forward and backward linkages with glass, plastic, refrigeration, sugar and the transportation industry further

strengthen the position of the industry. Soft drink segment has a huge potential in the Indian market, as a vast portion of the market is still to cover²⁷.

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