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Review Article

CONCEPT OF AYURGENOMICS IN CONTEXT TO NUTRIGENOMICS

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ABSTRACT

Nutrigenomics is an emerging branch of science that creates foundation of the relationship between nutrients from diets and their effects on expression of genomes. It also encompasses the heterogenous response of gene to different nutrients, dietary components and developing nutraceuticals under the heading of nutrigenetics. Exploring the aspects of nutrigenomics has been conceptualised to develop the approaches for the determination of the etiology of different physiological conditions, pathological conditions alongside the management of different morbidities by application of the dietics and also prevention of certain possible gene expression causing morbid conditions. All these facts that diet plays in determination of health or disease have already been mentioned in the ancient times by the scholars of Ayurveda. Ayurgenomics in other side includes of classical facts that has been mentioned in the Ayurvedic classic texts which clearly mentions that the *Aahar* determines the state of health and diseased conditions in an individual. It determines the individuality in the requirement of the nutritional sources in all different individual is different and unique. When the nutrition for the individual is personalised determining the *Prakriti* (constitution) of the individual, this will ensure maintaining the health and resolving the diseases in the subject. Also different forms of incompatible combinations of *Aahar* have also been mentioned in Ayurveda and their different levels of effects in different individual have been described under the topic of *Virruddhaahar*. Analytical study of these subjects together could be manifested in the management of different pathological conditions or even for the prevention of the disease condition in the field of disease management.

INTRODUCTION

Nutrigenomics is a branch of nutritional genomics and is the study of the effects of foods and food constituents on gene expression. It will also determine the individual nutritional requirements based on the genetic makeup of the person as well as the association between diet and chronic diseases. It will identify the genes involved in physiological responses to diet and the genes in which small changes, called polymorphism and the influence of environmental factors on gene expression. Nutrigenomics identifies how the genetic makeup of a particular individual co-ordinates his or her response to various dietary nutrients.

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It also reveals why and how people respond differently to the same nutrient. Though used synonymously the influence of nutrients on gene expression is called Nutrigenomics, while the heterogenous response of gene variants to nutrients, dietary components and developing nutraceuticals is called Nutrigenetics.[1]

Four Basic Components of Nutrigenomics

- Improper diets are risk factor for disease.
- Dietary chemicals alter gene expression and change genome structure.
- The degree in which diet influences the balance between healthy and disease states may depend on an individual's genetic makeup.
- Some diet regulated genes are likely to play a role in the onset, incidence, progression and severity of chronic diseases.

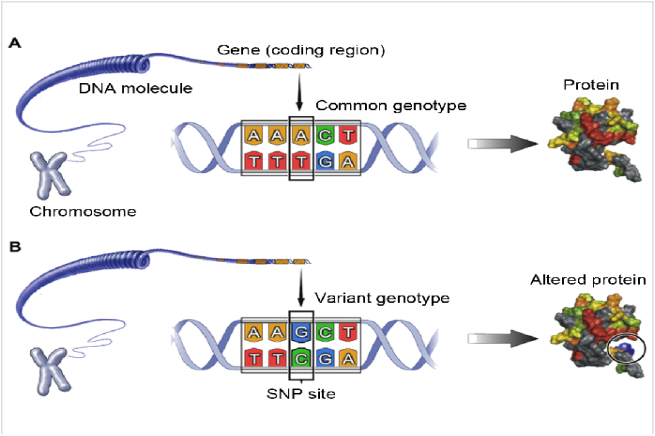
The aim of nutritional genomics is to identify genetic variants that may be significant in understanding genetic response to diet. Identify the

genetic variants associated with diet related diseases. Identify effective dietary strategies to prevent or treat diseases.

Specific dietary profiles can modulate the delicate balance between health and disease acting either directly or indirectly on gene expression. The individual genetic makeup i.e., presence of polymorphism in nutrient regulated genes, affects individual risk of diseases. Personalized diet, which taken into account individual genotype, represent the ultimate goal of Nutrigenomics/Nutrigenetic studies. These can lower risk of disease expression in genetically predisposed individual and population groups. Gene expresses themselves through proteins. Enzymes are special proteins designed to get things started. Genome instructs ribosomes to produce many enzymes that destroy toxins. Some foods such as cauliflower, broccoli and Brussels sprouts contain chemicals that actually tell our gene to direct biosynthesis of these enzymes. In some individual's genes give unclear instructions for making an enzyme that metabolizes the amino acid, phenylalanine. As a result this amino acid builds up, thereby causing brain damage. A diet restricting this amino acid will stop the damage, if detected in early infancy.

Single Nucleotide Polymorphism

Polymorphism is known as variation in DNA sequencing that has prevalence of at least 1% of total population causing several different alterations in manifestation of the gene. SNP are the most common type of variation in which difference is present due to change in single DNA building block, i.e. nucleotide. For example a SNP may replace the nucleotide cytocine (C) with the nucleotide Thymine (T) in a certain stretch of DNA. [2] Specific genetic polymorphism in human populations changes their metabolic response to diet and influence the risk patterns of disease. Some SNPs change the recipe for the gene so that either a different quantity of the protein is produced or the structure of the protein molecule is altered.



Single-Nucleotide Polymorphisms (SNPs) are genetic mutations that alter single base in DNA, causing sequence modification in amino acids and malfunction of a corresponding

Knowing on average, that SNP occur once every 1000 base pairs enables the estimation of approximately 3 million SNPs in the 3 billion base pair human genome. Most SNPs are binary, meaning that the process of genotyping the single SNP typically consists of determining which one of two neucleotide bases is present at the SNP locus. Methods for making that determination are diverse and include array based hybridization, PCR and sequencing.[4]

Restriction Fragment Length Polymorphism (RFLP) is considered to be the simplest and earliest method to detect SNPs. SNP-RFLP makes use of the many different restriction endonucleases and their high affinity to unique and specific restriction sites[5]. Genetic profiling is the analysis of DNA from samples of body tissues or fluids, especially when conducted in order to predict susceptibility to a specific disease.

Nutrition Gene Interaction[6]

- **Direct Interaction-** Nutrients or nutrient factors could sometimes be binding with some receptors acting as a transcription factor that subsequently binds and induces expression of respective genes.
- **Epigenetic Interaction-** There also may be changes in the gene expression due to changes in epigenome/DNA structure.
- **Genetic Variation-** There may be changes in certain component or building blocks of a genome and thus alteration will occur in the manifestation or expression of the Gene.

Ayurgenomics

Concept of Ayurgenomics has been derived from the facts that have been already mentioned in the classical references about significance of diet. In Ayurveda, detailed description of dietetics is mentioned. The concept of nutritional epigenetics which defines probable role of diet and nutrition upon individual gene expression and peculiar ability of each person to cope or metabolize or assimilate certain nutrition are new area of research in modern genetics. The same has been defined under the concept of *Tridosha*, *Hitaahar- Ahitaahar* and *Viruddha Aahar* of Ayurvedic classics of such ancient past. These topics could be integrated as the aspects under the term "Ayurgenomics". Implication of the food and dietics accordingly so as to maintain the health of the person, prevent any kind of susceptible morbid conditions or treatment of morbid conditions or even help in stabilizing and recovery from the diseased condition could be considered as the ultimate motive of the concept of Ayurgenomics.

In Ayurveda, determination of state of health or disease has been defined upon the principle of *Tridosha*; fundamental bodily humors. *Tridosha* determines the bodily composition, physiology, and metabolic processes of human body. All the medicine

that is taken will subsequently been affecting the state of *Dosha*. Health will be ascertained when there is *Samyaawatha* (equilibrium) of the *Doshas* while any unbalance of these factors will lead to the diseased conditions.[7] In Ayurveda, body constitution of every individual has been considered unique which is known as *Deha Prakriti*. *Prakriti* is determined at the time of conception and determined by the dominance of *Dosha* in the fertilizing gametes.[8] On the basis of predominance of *Doshas*, there are 7 types of *Deha Prakriti*; *Vataj, Pittaj, Kaphaj, Dwidoshaj* (3), *Sannipataj*. Some of the individual all three *Doshas* are with equilibrium state ever since the time of conception, while others will have dominance of any one or two of these. Such that, those with equilibrium state are considered to remain healthy while most of those who are having predominance of a particular *Dosha* will be more vulnerable to diseases.[9] Hence, *Prakriti* determines the susceptibility of the individual towards disease; viz. *Vataja prakriti* individual is more susceptible to *Vataj Vyadhi* like Arthritis, neurological conditions, etc. Similarly, the condition of *Agni* (Digestive fire/metabolic capability) in each *Prakriti* is different according to the dominant *Dosha. Vataj Prakriti* have *Vishamagni* (Unstable/weak *Agni*), such s/he is not able to digest heavy foods. Likewise in *Kaphaj Prakriti* individual, there is *Mandagni* condition (weak digestive fire) such that intake of any heavy food will cause improper digestion of the food and will cause development of *Aamaj vyadhi*. Similarly, in an individual of *Pittaj Prakriti*, there is condition of *Tikshnaagni* such that the person has strong digestive fire and greater ability to digest and assimilate food. On the other hand, *Samagni* is present in the condition of *Samadosha*, i.e., healthy person.[10] Hence, all kinds of foods, diets, behaviours and treatments should be personalized according to dominance of different *Doshas* in the very individual. From this very concept, personalization of diets for every individual could be portrayed so as to maintain the equilibrium state of *Doshas*. Diets, behaviourial practices and medicinal drugs having opposite features should be planned.[11]

Table 1: Peculiar features of *Trisodhaj Prakriti* as mentioned in the *Charak Samhita* [12]

Kaphaj Prakriti [13]	***Pittaj Prakriti*** [14]	***Vataj Prakriti*** [15]
Snigdha • Oily Skin,	***Ushna*** • Intolerant to heat • Soft textured • Fair complexion • Increased presence of moles • Good appetite and thirst • Premature greying and fall of hair	***Ruksha*** • Dry skin, • Poorly formed and poorly nourished body, • Dry, poor, interrupted and unpleasant voice • Reduced sleep
Slakshna • Smooth skin	***Tikshna*** • Voracious eater • Voracious drinker • Good digestive capability • Sharp reacting, argumentive • Intolerant to discomforts	***Laghu*** • Quick but inconsistent movements • Quick but inconsistent appetite • Quick but inconsistent speech
Mridu • Less tolerant to difficulties • Fair complexion • Good looking face features	***Drava*** • Lax and soft flesh and joints • Profuse sweat, urine and stool formation	***Chala*** • Unstable joints and body parts
Madhur • Good sexual capacity • More offspring	***Visra*** • Increased body odor from Armpit, head and body	***Bahu*** • Increased number of visible tendons • over talkative
Sandra • Well formed, proportionate body parts • Well nourished body parts	***Katu, Amla*** • Less sexual capacity • Less no. of children	***Shighra*** • Quick indulgence in some activity • Increased amount of anxiety • Quick reactions in the form of attachment, detachment • Fearfulness and timidness • Quick understanding and grasping • Less memory

Manda • Slow physical movements • Slow conversation - Slow eating		***Sheeta*** • Intolerant to cold • Prone to cold-induced ailments like common-cold, Upper respiratory tract infections
Staimitya • Delayed/well thought beginning of actions • Cool temperament (less anxious)		***Parush*** • Rough hair, nail, body, foot and hands
Guru • Slow walking speed		***Vishad*** • Prominent body parts (like joints) • Crepitus while moving
Sheeta • Less appetite • Less thirst • Less sweating • Tolerant to heat		
Pichchhila • Compact joints (not prominent)		
Achchha • Pleasing Face • Pleasing complexion • Pleasing voice		

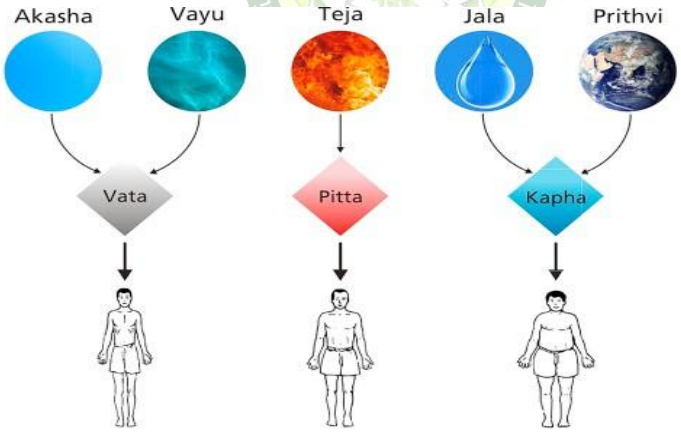


Fig no.2: Depicting different phenotypic constitution of different *Doshaj Prakriti*

Personalized Nutrition

Inter- individual genetic variation is also likely to be an important factor in nutrient requirements. With the recent availability of human genome sequence, cataloguing of human genetic variations and SNP map of human genome the investigators can identify specific polymorphism linked to altered risk of disease or sensitivity to diet. It will provide the basis for personalized dietary recommendations based on the individual's genetic makeup. Like in case of defective aldehyde dehydrogenase enzyme, alcohol must be avoided. Patients having Galactosemia (lack of a liver enzyme to digest Galactose) should avoid diets which contain lactose or galactose, including milk products.

Advantages

- Increased awareness of risk of certain diseases.
- Focus on prevention of diseases.
- Better understanding of the mechanism involved in disease susceptibility.
- Reduced health care cost.
- Increased focus on a healthy diet and lifestyle.

Disadvantages

- Attention is drawn away from other modifiable risk factors.
- Focus only specific nutrients/foods.
- Misleading claims.
- Increased costs associated with personalized diets and designer foods.

DISCUSSION

The food should be taken in proper amount. The quantity of food consumed depends upon the power of digestion. The food which is digested at proper time without disturbing the normalcy of body is regarded as the measure of proper quantity. But it doesn't mean that the diet articles can't be divided into light and heavy. Light articles are predominant in properties of *Vayu* and *Agni* while heavy articles are predominant in *Prithvi* and *Soma.* Due to this light articles are stimulant of digestion, even taken upon to the saturation point they cause little derangement. On the contrary the heavy articles are not stimulant of digestion by nature thus cause considerable derangement if taken upon saturation point except in case of physical exercise and adequate strength of *Agni* (digestion). Hence the quantity is related to *Agni bala* (power of digestion). Intake of heavy articles is advised to one third or half of saturation point and not excessive saturation. Even in case of light articles excessive saturation is avoidable in order to maintain the proper strength of *Agni*. Food intake in proper quantity provides strength, complexion and happy life to the person without disturbing normalcy. [16]

Prakriti determines discrete psycho-somatic composition of individual. It is determined by the predominance of *Doshas* of maternal and paternal gamates, environmental factors, epigenetic factors during the time of conception and fertilization. Eventhough, *Deha Prakriti* has been broadly categorised into 7 subtypes according to the predominance of the *Tridosha*, each individual has unique bodily composition of *Doshas*. Regarding the fact that "We are what we eat", the state of health and disease of an individual is determined by the features of foods that the individual. Also regarding the individuality of each human and considering the features of respective *Doshaj Prakriti* of the individual, food items that have the opposite features should be provided to the respective individual so as to prevent the susceptible vitiation of the dominant *Dosha* of the person and development of any kind of morbid conditions. Hence, some of the foods that have opposite effects on particular individual have been tabulated as follows.

Tridosha	**Features of *Dosha*[17]**	**Opposite properties**
Vata	*Rasa: Katu, Tikta, Kashaya* *Guna: Ruksha* (dry), *Laghu* (light), *Chala* (mobile), *Shighra* (fast), *Sheeta* (cold), *Parush* (coarse), *Vishad* (non-slimy) *Veerya: Sheeta*	*Rasa: Madhur- Amla- Lavana* *Veerya: Ushna* *Guna: Snigdha, Ushna, Guru, Sthoola, Sthir, Pichchhila, Slakshna Eg: Taila*
Pitta	*Rasa: Amla-Katu-Lavana* *Veerya: Ushna* *Guna: Ushna* (hotness), *Tikshna* (sharp), *Drava*(fluidity), *Visra*,	*Rasa: Madhur-Tikta-Kashaya* *Veerya: Sheeta* *Guna: Sheeta, Mridu, Sugandhit* *Eg. Ghreeta*
Kapha	*Rasa: Madhur - Amla- Lavana* *Guna: Snigdha* (oily), *Slakshna* (smooth), *Mridu* (soft), *Madhur* (sweet), *Sandra* (dense), *Manda* (gentle), *Guru* (heavy), *Sheeta* (cold), *Pichchhila* (slimy)	*Rasa: Katu- Tikta- Kashaya* *Veerya-Ushna* *Eg- Madhu*

For *Vata* pacification oil is best because it possesses the properties of unctuousness, hotness and heaviness and by regular use pacifies *Vata dosha*. *Vata* possesses roughness, coldness and lightness which are contrary to properties of oil. In the same way *Ghrita* overcomes *Pitta* due to sweetness, coldness and dullness because *Pitta* is non sweet, hot and sharp. Honey overcomes *Kapha* due to roughness, sharpness and astringent action as *Kapha* is uncutous, dull and sweet. [18]

Diets for Different *Doshaj Prakriti*[19,20]

Food Categories	***Vataj Prakriti***	***Pittaj Prakriti***	***Kaphaj Prakriti***
Cereals (*Shali/ Shastik varga)*	*Shasthik dhanya, Godhum* (wheat), *Shaali dhanya, Lohitshaali*	*Shaali dhanya*, millet, *Kodrav Lohitshaali, Yava, Godhum* (wheat)	*Shaali dhanya*, millet, *Brihidhanya, Yava* (barley), *Shasthik dhanya, Lohitshaali*
Legumes *(Shami/ Simbi Varga)*	*Moong* (green gram), *Maash* (black gram), *Rajmash* (red broad beans), *Kulattha* (horse	*Moong* (green gram), *Chana* (gram), *Masoor* (red lentils), Peas, *Rahar* (yellow	*Moong* (green gram), *Rajmash* (red broad beans), *Kulattha* (horse gram)

	gram)	lentils)	*Chana* (gram), *Masoor* (red lentils), peas, *Rahar* (yellow lentils)
Maamsa Varga	*Aanupa, Varishaya & Varichar Varga* (aquatic-fish, sea foods, oyesters, shellfish, duck, quail, buffalo, boar, pigs), mutton, sheep *Jangaal* (deers, antelope, musk deer, etc),	*Vishkir & Pratud Varga* (cock, quail, turkey, ostrich birds, pigeons, peasants), *Jaangal varga* (deers,), mutton	*Jaangal varga* (deers,), *Samanya Desh varga* (mutton, rabbits), quails *Vishkir* (birds/scatterer)
Shaak Varga (Green Vegetables)	*Bathuwa* (white goosefeet/wild spinach), *Changeri, Kakmachi, Rajkshavak* (black mustard), Indian spinach *Punarnava, Jeevanti, Tambulpatra* (beetle leaf)	*Bathuwa* (White Goosefeet/wild spinach), *Changeri, Kakmachi, Rajkhavak* (black mustard), Indian spinach, *Chaulai* (Amaranthus), *Mandukparni, Patola Patra, Adusa, Neem, Nari saag* (Water Spinach), *Jeevanti, Kanchanar* flower, *Paalak* (Spinach), *Vidarikand* leaves	*Bathuwa* (white goosefeet/wild spinach), *Changeri, Kakmachi, Rajkhavak* (Black mustard), *Kusumb* (safflower) *Tambulpatra* (beetle leaf)
Phala Varga (Vegetables)	Brinjal, Ginger, Baby Radish, *Sahijan* (drumsticks), *Karvellak* (bitter gourd), *Kanda* (tubers)	*Trapush* (cucumber), lotus seeds, baby radish *Kshavak-udbhid* (mushroom), *Kanda* (tubers)	*Trapush* (cucumber), *Lauki* (bottle gourd), ginger, baby radish, *Sahijan* (drumsticks), *Vartak* (brinjal), *Karvellak* (bitter gourd)
Spices	*Ajawain, Saunf* (fennel), *Raya* (mustard), *Jalpippali, Tumburu, Sonth* (dry ginger), *Pippali,* black pepper, *Hing, Jeera, Lashun, Palandu* (onion)	*Saunf*	*Ajawain, Saunf* (fennel), *Raya* (mustard), *Jalpippali, Tumburu, Sonth* (dry ginger), *Pippali*, black pepper, *Hing, Jeera, Lashun*
Lavana	*Saindhav, Saurvachal, Vid lavana* (black salt)	*Saindhav*	*Saindhav*
Fruits	*Anjir* (Fig), *Kharjur*, *Draksha, Phalasa* (Indian sherbet berry), *Madhuka* (butter tree), *Amra* (mango), coconut, plum, *Gambhar*, raw *Bilva* (stone apple), ripe *Amra* (mango), ripe *Ber* (Jujube), banana, Jackfruit, *Daadim* (pomegranate), Citrus, Dry fruits (almonds, cashew, walnuts, etc)	*Kharjur, Draksha, Munakka* (raisins), *Anjir* (Fig), *Phalasa* (Indian sherbet berry), *Madhuka* (Butter tree), Coconut, *Gambhar, Jamun* (black plum), Ripe Ber (Jujube), apple, banana, jackfruit, *Amla* (Indian gooseberry), sweet *Dadima*, *Pung* (beetle nut)	*Naashpati* (pears), *Kapittha* (wood apple), *Raw Bilva* (Stone apple), *Jamun* (black plum), dried Jujube, *Amla* (Indian gooseberry), *Baheda* (*Beleric myrobalan*)
Dairy Products	*Godugdha* (Cow's milk), Buffalo's milk, Camel's milk, *Dadhi*, *Takra* with *Saindhav*, *Navneet, Malai, Puraan Ghreeta*	*Godugdha* (Cow's milk), Coconut milk, Buffalo's milk, goat's milk, *Ghreeta*, *Takra* with *Sarkara*, *Ksheerottha Navneet*, *Puraan Ghreeta*	*Godugdha* (Cow's milk), Camel's milk, *Takra* with *Trikatu*, *Puraan Ghreeta*
Madhur Varga	*Ikshuras, Guda* (jaggery), *Sheeta* (sugar)	*Ikshuras, Guda* (jaggery), *Sheeta* (sugar), *Madhu* (honey)	*Madhu* (honey)
Kritaakrit Anna	*Peya, Vilepi, Manda, Vesawar, Yush, Mamsaras*	*Peya, Vilepi, Manda, Sattu, Paanak, Yush, Mamsaras*	*Peya, Vilepi, Manda, Sattu Laaja*

	Yavagu, Paayas, Krishara		
Taila Varga (Oil)	*Taila, Eranda tail,* Mustard oil, *Chiraunji oil* (Charoli nuts), *Teel taila*	*Chiraunji* oil (Charoli nuts)	Mustard oil, *Teel taila*

According to the classics, intake of *Hitaahar* causes growth of the *Purush* whereas intake of *Ahitaahar* causes development and increment of the diseases. Similarly, on further description of the *Hitaahar* and *Ahitaahar*, it has been clearly depicted that the benefits or undesirable effects any food bringing in an individual depends upon different factors like quantity of food, time of intake, processing's, geography, physiology, *Dosha Prakriti* constitution of the individual. That means same food can be beneficial to some while same could have deteriorating effects in other individual. *Hitaahar* can be defined as the food that when consumed do not alter the equilibrium state of *Dosha-Dhatu-Mala* or those which bring back the altered or vitiated *Doshas* back to the normalcy. Likewise, those food that cause the opposite effects; i.e. vitiation of the normalcy of *Dosha-Dhatu-Mala* in body are known as *Ahitaahar.* [21] Since individual condition of *Dosha*, bodily constitution, *Agni*, geography like factors are different in different person. Need for nutrients, individual ability to digest foods, assimilation of the nutrients, all of these are differently present in every individual. This clearly verifies the need of individualization and personalization of food and nutrition. Similarly, type of admixtures, adulteration, processings done on the food and individual compatibility with foods, all matter the fact what kind of effects will the individual obtain.

A person after taking food should never eat heavy preparations of flour, rice and flattened rice. Even when hungry, one should consume them in proper quantity. Continuous use of milk products is not good. A person should eat *Sashtika*, *Sali* rice, *Mudga* (pulses), *Saindhva*, *Amlaka,* barley, rain water, milk, ghee and honey. One should take the articles which maintain the health and prevent the disease.[22]

Detailed descriptions of incompatible articles are mentioned. The eatables that are contrary to *Deh Dhatus* and behave antagonist to them in terms of properties, combination, processing, place, time, dose etc. or in natural composition.[23] For example-

- One should not take fish and milk. Because combination of both of them is *Madhur ras*, *Madhur Vipaka* and *Mahabhishyandi* (causing obstruction in channels) and milk is *Sheeta* and fish is *Ushna* that is why the combination is *Viruddh virya* that is why it vitiates blood.
- Meat of domestic, marshy and aquatic animals should not be taken mixed with honey, sesamum, jiggery, milk, black gram, radish, lotus stalk or germinated grains because it causes deafness, blindness, tremors, coldness, indistinct voice, nasal voice or death.
- After eating radish, garlic, *Shigru*, *Arjaka, Tulsi* etc. one should not take milk because of the risk of leprosy.
- The potherb of *Jatuka* or ripe fruit of *Nikucha* should not be taken with black gram, pulse, jaggery and ghee because they are antagonistic.
- Likewise, *Amra, Amrataka, Matulunga, Nikucha, Karmarda, Moca, Dantshatha* (type of lemon), *Badara, Koshamra, Bhavya, Jambu, Narikela, Dadima, Amalaka*- these fruits and similar other substances, all sour liquids or non-liquids are antagonistic to milk.
- The potherb of *Padmottarika* (kusumbha), *Sarkara* and *Maireya* (types of wine) and *Madhu*, all used together are antagonistic and vitiates *Vata* too much.
- The oil in which fish is cooked, if *Pippali* and *Makoya* are fried in same oil and consumed with honey then it will cause sudden death.
- Hot honey taken by a person afflicted with heat leads to death. Likewise honey and ghee in equal quantity, honey and rain water in equal quantity, honey and rain water in equal quantity, honey and lotus seed, hot water after taking honey, hot water after taking *Bhallataka, Kampillaka* cooked in butter milk, stale *Makoya (Kakmaachi)* all these foods are antagonistic.

Types of Antagonistic Food

Any food or medicine which increases the doshas but doesn't expel it out from the body is called antagonistic food or *Viruddh ahara*. There are 18 types of *Viruddha ahara*:

- ***Desha viriddha-*** The use of dry and pungent articles in *Jangala Pradesh* (dry area) and unctuous and cold substances in *Anoopa desha* (wet place) is antagonist to place.
- ***Kala viruddha-*** The use of cold, dry substances in winters and use of bitter and hot substances in summers is antagonist to time.
- ***Agni viruddha-*** If diet is not in accordance of digestive fire that is antagonism to digestive fire.
- ***Matra viruddha-*** If honey and *Ghritta* is taken in equal quantity that is antagonism of quantity.
- ***Satmya viruddha-*** The person who is habitual of eating bitter and hot things for that person sweet and cold eatables are antagonist to his palatability.
- ***Dosha viruddha-*** The diet agonist to three *Dosha* i.e., *Vata, Pitta* and *Kapha* if taken continuously it is called *Dosha viruddha*.

- ***Sanskar Viruddha-*** As meat of peacock if roasted by piercing it with the wood of castor then it becomes poisonous and called antagonism in processing.
- ***Virya viruddha-*** If *Ushna virya* (hot articles) taken by mixing with *Sheet virya* (cold articles) then it is *Virya viruddha*.
- ***Koshtha Viruddha-*** If a person with hard bowel is given very little, mild potency and laxative drug and if a person with soft bowel is given heavy, drastic purgative and abundant in quantity then it is antagonist to bowel or *Koshtha*.
- ***Avastha Viruddha-*** If the person indulged in excessive work, coitus and exercise eats *Vata* aggravating food and *Kapha* aggravating articles by a person who is lazy and sleeps a lot is called antagonism in condition of patient.
- ***Kram Viruddha-*** If one takes food before excreting faeces and urine and without appetite or excessive hunger it is called antagonisnm in order or *Kram*.
- ***Parihar Virrudha-*** If hot things are taken after intake of pork etc. or cold ones after intake of ghee etc. it is known as antagonism in *Parihar* or indications and contraindications.
- ***Paka Virrudha-*** When cooking is done over damaged or bad fuel or if the grains are uncooked, overcooked or burnt it is the antagonism of *paka* or cooking.
- ***Sanyoga Viruddha-*** Sour things taken with milk is antagonism in combination or *Sanyoga virrudha.*
- ***Hridya Virrudha-*** when a person takes the things who is disliked by him then it is *Hridya virrudha* or antagonism of palatability.
- ***Sampada Viruddha-*** If a person consumes immature, overmature or substance with damaged rasa then it is *Sampada viruddha* or antagonism of quality.
- ***Vidhi Virrudha-*** when food is not taken in privacy it is called *Vidhi viruddha* or antagonism of rules of food intake.

Health Hazards of eating incompatible food

Antagonistic food is the cause of impotency, blindness, erysipelas, ascitis, pustules, insanity, fistula in ano, fainting, narcosis, tympanitis, spasm in throat, anaemia, *Ama visha*, leucoderma, leprosy, *Grahni roga*, oedema, gastritis, fever, rhinitis, gastric disorders and even death.

Management of Food Antagonism

There are some measures which are used to counteract the disorders arising due to food antagonism such as emesis, purgation, use of antidotes and prior conditioning of body with similar substances. The antagonism becomes inert due to suitability, small quantity, strong digestive power, in young age and persons having unction, physical exercise and strength.

Regular or Excessive use of Following Substances is Contraindicated- [24]

Long Pepper- Long peppers are pungent (*Katu*) but sweet in *Vipaka*, heavy (*Guru*), not much unctuous, hot and moistening. It is esteemed among drugs. If used properly it is beneficial but excessive use of it may cause accumultion of *Dosha*. On constant use it aggravates *Kapha* due to heaviness and moistening action, *Pitta* due to hotness and unable to pacify *Vata* due to little unctuousness and hotness. It is *Yogvahi* or synergistic in action hence should not used excessively.

***Kshara* (alkalies)**

Kshar is *Ushna, Tikshna* and *Laghu* in *Guna*. It creates *Kledata* (unctousness) at first and then does shoshan. *Kshar* is used for *Pachan* (digestive), *Dahana* and *Bhedana* (penetrate) of tissues. Excessive consumption of *Kshar* causes greying of hair, hairfall, vision loss and loss of libido.

Lavana

Lavana has *Ushna* and *Tikshna guna* too. It is *Upakledi* in nature i.e., it causes increase in unctousness. It also has *Vishramsan* property i.e. causes extraction of debris. *Lavana* also makes food palatable. When used in appropriate amount it causes benefits like digestive, carminative, moistening, mucolytic actions while when taken in higher amount or for longer time period causes vitiation of *Doshas* and conditions like vitiation of *Rakta, Mamsa*, decrease in tolerability in an individual, decreased stamina and general debility, immature hairloss, alopecia, immature greying of hair, etc.

CONCLUSION

Nutrigenomics is new advancing science that focuses on importance of diet in relation to health and morbidity. Genetic mapping of every individual is required to advice personalized diet to the person to stay healthy and prevent unmasking of genetically determined metabolic disorders. That kind of management may cause hefty burden on the pockets of general population. By taking in account the recent advances in the field of nutrigenomics, if we promulgate the ancient wisdom of Ayurveda which defines health by elaborate description of indications and contraindications in relation to diet, we may get better results without making hole in pocket of general population. Phenotypic characteristics of a person are depicted by *Prakriti* is indirect representation of genetic constitution of that person which is determined at the time of fertilization of ovum. We can advise personalized diet according to *Prakriti* to improve and maintain the health of masses. If Nutrigenomics and Ayurgenomics work as hand in hand then both sciences can cater the health related issues of population in more effective and friendly way.

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