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Advances in Bioresearch

## SHORT COMMUNICATION

# Role of Pathya Aahar (Healthy diet), Agni(Digestive power) and Gut microbiome in Madhumeha (Diabetes Mellitus)

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**ABSTRACT**
*Pathya and Apathya are defined as the substance or regime which do not adversely affect the body and mind are regarded as Pathya,those which adversely affect them are considerd to be Apathya. The role of the Pathya aahar and gut microbiome in health and Madhumeha (diabetes mellitus) helps to provide a scientific knowledge of key concept in Ayurveda. In every disease three basic causes are described in Ayurveda (a) Samavayi karana (Inherent cause) (b) Asamavayi karana(Non inherent cause) (c) Naimittika karana (Initiating cause).Various Apathya aahar ,which excites the doshas to produce disease are sahakari karana,that are accessory cause of the disease. Pathya ahara in Madhumeha (diabetes mellitus) are metabolized into SCFA by gut microbiome. Apathya aahar (accessory cause) in Madhumeha(diabetes mellitus) are metabolized in LCFA and VLCFA.*
*Key words: Madhumeha, Pathya-apathya, Agni and Gut microbiome, Healthy diet in diabetes, Samvayi-asamvayi karana.*

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## INTRODUCTION

Aacharya Charaka has given a definition of Madhumeha as the disease in which one passes urine as astringent, sweet and rough is called Madhumeha [1].Sushruta has denoted Madhumeha by the term "kshaudrameha" and stated that the urine in this condition resembles honey and acquires a sweet taste (2).In Ayurvedic classics, Hetu, that is causes stand first in the examination of disease. These cause has been classified on the principle of nyaya darshanam (a system of philosophy).The three basic cause of every disease are described in Ayurveda :(a) samavayi karana (inherent or material cause)which is inseparable from the karya(effect), destruction of which leads to the loss, destruction or the absence of the effect.(b) Asamavayi karana (non inherent cause)which may or may not be inherent in the effect always, but might bring about alteration in it.(c) Naimitika karana (instrumental, initiating or efficient cause)also known as pradhanika karana.The pradhanika karana cause is always apart from the effect and its destruction not lead to the loss or destruction of the effect. Philosophy has been applied to the disease in Ayurvedic science, considering a disease as effect. All the body tissue(dhatus) are samavayi karana of the disease.The dosha dushya sammurcchana (the union of imbalanced doshas with dhatus) is asamavayi karana of disease and the active principle vata,pita,kapha are the naimitika karana of the disease.The different foods,drugs and activities(mental and physical)etc.,which excites the doshas to produce disease are sahakari karana,that is accessory cause of the disease.

In the disease Madhumeha the body tissues meda,mansa, kleda, vasa, lasika, majja, rasa, ojas, and pishita are the material causes(3),association of these dhatus with affected doshas is un-inherent causes. The bodily principles vata,pitta,kapha are the efficient cause.The excessive indulgence in sweet,food,sleep etc. are accessory cause(4) .

**IMPORTANCE OFPATHYA-APATHYA (HEALTHY-UNHEALTHY DIET) IN MADHUMEHA (DM)**:

The word Pathya derives its origin from root word Patha which literally means a channel. Pathya(wholesome) are defined as the substance or regime which do not adversely affect the body and mind ; those which adversely affect them are considered to be Apathya (unwholesome)(5)

Madhumeha is mainly caused due to Apathya Aahar and Vihar sevana, while describing the chikitsa for Madhumeha, all Acharyas have focused on Pathya Aaharas & Viharas in management of Madhumadhu. A Chikitsa Granth of Middle Ages "VaidyaJivanam" by Lolimbaraja has stated the importance of Pathya and Apathya in Chikitsa, "Pathye asati gadartasya kim aushadha nishevanm, pathye sati gadartasya kim aushadha nishevanm." If a person follows the dietary rules for particular disease there is very little significance of drug treatment and when a person is exposed to Apathya the drug treatment has no value, because without Pathya Sevana taken drug can't cure the disease(6)

The role of Aahar and Vihar are equally or even more important in Madhumeha (diabetes) to control blood sugar as well as to prevent the complication of the disease. In all the classics, Aahar Dravyas are described in detail, such as:

Yava(Hordeum-vulgare), Kangu (Setaria italica), Shyamaka (Echinochloa frumentacea), Kodrava (*Paspalums crobiculatum*), Mudga (Vigna radiata), Chanak(Cicer arientium), Kulattha (*Dolichos biflorus*),Adhaki (Cajanus cajan),all the types of bitter vegetables (TikataShaka) eg.- Karela (*Momordica charantia*), Methi (Trigonella foenum), Patola (Vietnamese luffa), Rasona (*Allium sativum*), Katillaka (*Momordica charantia*), Shigrupatra (*Moringa oleifera*), Lonika (Portulaceaoleracea), Dronapushpipatra (Leucas cephalotes), Guduchipatra (*Tinospora cardifolia*), Kakamachipatra (Solanum nigrum), Vastuka (*Chinopodium murale*),fruite eg.- Jambu (*Syzygium cumini*),Amalaki (Phyllantus emblica), Kapittha (*Limonian acidissima*), seeds eg.- Kamala (Nelumbo nucifera) & Utpala (Nymphoea stellate), Sarshapa taila (Mustard oil),danti taila(*Baliospermum montanum* oil),Ingudi tail (*Balantes aegyptica* oil),Atasi tail(*Linum usitatissimum* oil)(7),(8)

**GUT MICROBIOTA, HUMAN BODY AND AGNI CONCEPT IN AYURVEDA**:

Microbiome refers to the collective genomes of the micro-organisms in a particular environment, and microbiota is the community of micro-organisms themselves. Approximately 100 trillion micro-organisms (most of them bacteria, but also viruses, fungi, and protozoa) exist in the human gastrointestinal tract(9).Gut microbes play a big role in energy extraction from food through a variety of mechanism. Many plant and complex carbohydrates can't be digest by the host (10) ;however ,the gut microbes can metabolize these to short chain fatty acid (SCFA) like butyrate, ropionate and acetate.Butyrate is used as the primary energy source for colonic epithelial cells,while propionate and acetate are necessary for lipogenesis and gluconeogenesis in the liver.Our diet affect gut flora the most.If we follow a Pathya aahar(Good diet) ,it will increase the colony of gut flora useful for us.If we follow a Apathya aahar( unhealthy diet),it will increase the colony of gut flora harmful for us(figure 1).Aacharya Vagbhatta in his famous book Astang hridyam says that "all disease are from the gut".Ayurveda places great importance on proper diet and digetion,as well as all aspect of lifestyle.Acording to ayurveda almost disease are caused by Aam(undigested food) and Agni(digestive power).Agni not only relates to digestive enzyme but also metabolic process in the different tissue or dhatus of the body. When the Agni(digestive power of the body) is low,then the complete digestion of food does not happen and it become a toxin(Aam). The condition of Agni depends on the diet.When person take Pathya aahar(healthy diet),digestive power remains proper and when person take Apathya aahar(unhealthy diet),digestive power becomes more or less and Aam(toxin) is formed.

Trimathilamine(TMA) and indeloprpionic acid are also product of gut microbiota.The production of TMA from dietry phosphatidylcholine and carnitine(from meat and dairy) depends on the gut microbiota.TMA is oxidised in the liver to trimethilamine-N-oxide(TMAO).TMAO closely related to obesity,diabetis mellitus,cardiovascular disease(11). Indelopropionic acid reduce the risk of diabetes mellitus(figure2)(12) .

Becteriodes,Blautia,Faeclibacterium,Lachnospira,Psuedobutyrivibrio,Roesburia,Prevotella,Bifidobecteriu m producing short chain fatty acid have been observed to decrease in Diabetes(13).Proteobecteria, Verrucomicrobia, Actinobacteria, Subdoligranulum, Akkermansia, Enterococcus, Bifidobacteria, Klebisella, Megaspaera all these species are abundent in Diabetes mellitus (14).

Recent research shows that ginger (Gingiber officinalis),haritaki(Terminalia chebula) aamalaki (Embelica officinalis) , and vibhitaki can have beneficial effect on the gut microbiome. In the study,it was shown that the polyphenols in Triphala regulate the gut microbiota and thereby encourage the growth of beneficial Bifidobacteria and lactobacillus while discourage the growth of undesirable gut microbiota (15) .

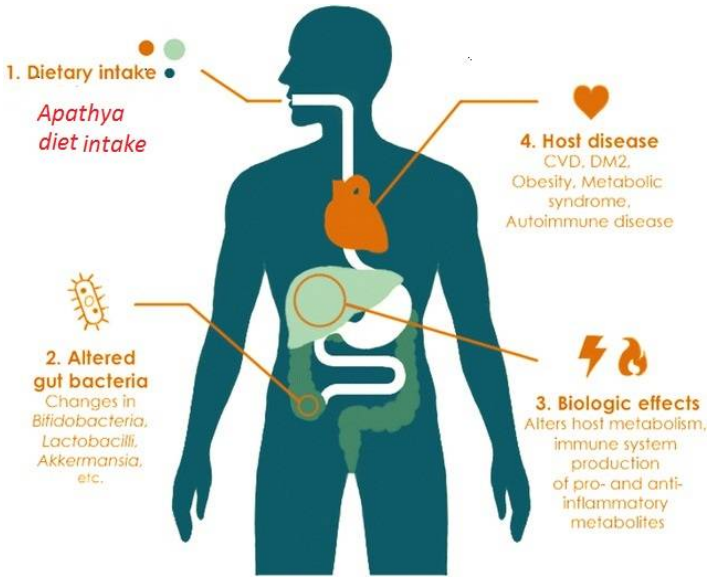


**Figure 1 Schematic representation of the imbalance in Gut microbiome due to Apathya Aahar (unhealthy diet) leads to disease**

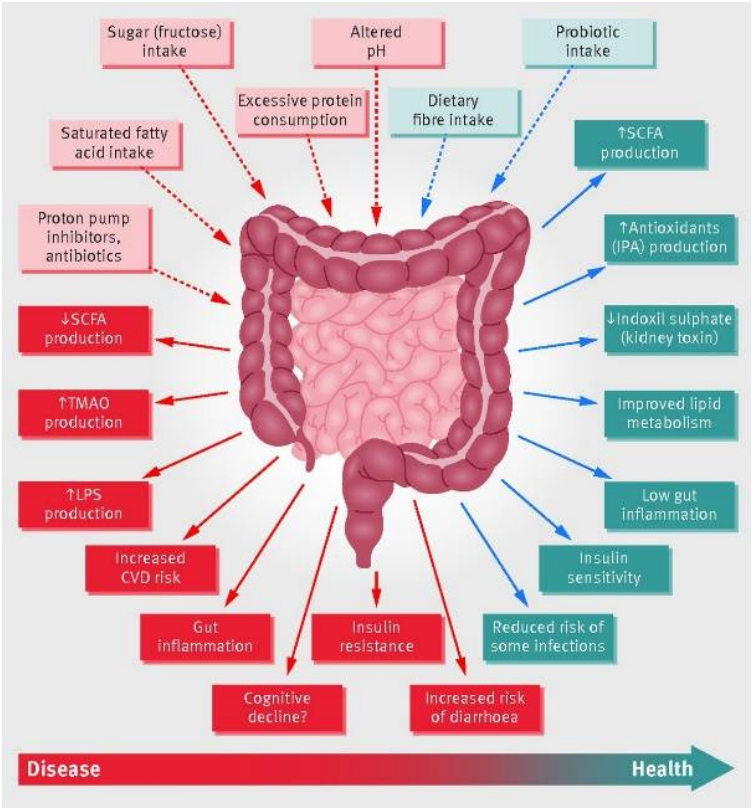


Figure 2 Schematic representation of the role of gut microbiome in healthy & disease person.SCFA=short chain fatty acid , CVD=cardiovascular disease ,IPA= indopropionic acid, TMAO= trimathylamin N oxide

## CONCLUSION

Despite multiple studies along with Ayurveda literature supporting the importance of Pathya-Apathya, Agni and gut microbiota in pathophysiology of T2DM,the field is in early stage. When the Agni( digestion power) of the body will be proper and if a Pathya aahar (healthy diet) consumed, only beneficial microbes will be abundant. All these above mention Pathya aahara are metabolized into SCFA by gut microbiome and in butyrate producing bacteria as like Becteriodes, Blautia, Faeclibacterium, Lachnospira,

 

Psuedobutyrivibrio, Roesburia, Prevotella, Bifidobecterium. Lifestyle modification(Withdrawal of Sahakari karan) can eliminating Asamvayi karan and Naimittika karan of diabetes Mellitus and these improve in beneficial human gut microbiome.

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