

## Impact of Healthy diet (Pathya), Agni (Digestive power) and Gut microbiome in Aamvat (Rheumatoid Arthritis)

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### Abstract

Diet and Gut microbiota each have a direct impact on many chronic, inflammatory disease and metabolic disease. The role of the *Pathya aahar* (Healthy diet) and gut microbiome in health and *Aamvata* (Rheumatoid Arthritis) helps to provide a scientific knowledge of key concept in Ayurveda. In this review we'll look at how diet changes the Gut microbiome and how it triggers Aamvat (Rheumatoid Arthritis). There is evidence that some foods have pro and anti inflammatory effects mediated by diet related metabolites. *Pathya ahar* (Healthy diet) in Rheumatoid Arthritis are metabolized into SCFA by gut microbiome. *Apathya aahar* (Unhealthy diet) in Rheumatoid arthritis are metabolized in LCFA and VLCFA.

### Key words

Aamvat, Agni , Gut-microbiome, Pathya, Rheumatoid Arthritis.

### Introduction

Aacharya Madhav has given a definition of Aamvat as the disease in which stiffness, swelling, tenderness in small and large joint<sup>1</sup>. Ancient ayurvedic classics have described the, Hetu that is causes stand first in the examination of disease. These cause has been classified on the principle of nyaaya darshanam (a system of philosophy). The three basic cause of every disease are describe in ayurveda : (1) samavayi karana (inherent or material cause) that which is inseparable from the karya (effect), destruction of which leads to the loss, destruction or the absence of the effect. (2) Asamavayi karana (non inherent cause) which may or may not be inherent in the effect always, but might bring about alteration in it. (3) Nimitika karana (instrumental, initiating or efficient cause) also known as pradhanika karana. The

pradhanika karana cause is always apart from or separable from the effect and its destruction not lead to the loss or destruction of the effect.

The above 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, pitta, kapha are the nimitika 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 Aamvat the body tissues mamsa, snayu, asthi, kandara, rasa are the material causes<sup>2</sup>, 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<sup>3</sup>.

### **Importance of pathya (healthy diet) in Aamvat (Rheumatoid Arthritis):**

The word Pathya derives its derivation 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)<sup>4</sup>

Aamvat is mainly caused due to Apathya Aahar and Vihar sevana, while describing the chikitsa for Aamvat, all Acharyas have focused on Pathya Aaharas & Viharas in management of Aamvat. A Chikitsa Granth of middle ages "Vaidya Jivanam" by Lolimbaraja has stated the importance of Pathya and Apathya in Chikitsa, "Pathye asati gadartasya kim aushadha nishevanm, pathye sati gadartasya kim aushadha nishevanm"<sup>5</sup>. 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<sup>6</sup>

The role of Aahar and Vihar are equally or even more important in Aamvat to symptoms 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 (Paspalum crobiculatum), Mudga (Vigna radiate), Chanak (Cicer arietinum), Kulattha (Dolichos biflorus), Adhaki (Cajanus cajan), all the types of bitter vegetables (Tikata Shaka) eg.- Karela (Momordica charantia), Methi (Trigonella foenum-graecum), Patola (Vietnamese luffa), Rasona (Allium sativum), Katillaka (Momordica charantia), Shigrupatra (Moringa oleifera), Lonika (Portulaca oleracea), Dronapushpi patra (Leucas cephalotes), Guduchi patra (Tinospora cardifolia), Kakamachi patra (Solanum nigrum), Vartak (Solanum melongena), Punarnava (Boerhavia diffusa), Gokshura (Tribulus terrestris), Vriddhdaru (Argyrea speciosa) Vastuka, Ginger (Zingiber officinale), fruit eg.- Amalaki (Phyllanthusemblica), Bhallatakam (Semicarpus anacardium), Oil eg.- Erand tailam (Castor oil), Bhallataka tailam (Semicarpus anacardium oil), Leaf eg.- Arka Patra (Calotropis procera), Erand patra (Ricinus communis)<sup>7,8</sup>

### **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<sup>9</sup>. Gut microbes play a big role in energy extraction from food through a variety of mechanism. Many plant and complex carbohydrates can't be digesting by the host<sup>10</sup>; however, the gut microbes can metabolize these to short chain fatty acid (SCFA) like butyrate, propionate 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). Acharya Vagbhatta in his famous book Astang hridayam says that "all disease are from the gut". Ayurveda places great importance on proper diet and digestion, as well as all aspect of lifestyle. According to ayurveda various 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 whole digestion of food does not happen and it become a toxin (Aam). The condition of Agni depends on the diet. When human being take Pathya aahar (healthy diet), digestive power remains proper and when person take Apathya aahar (unhealthy diet), digestive power becomes more or less, disturbance in Kledak Kapha, Pachaka Pitta, Saman Vayu and Aam (toxin) is produced<sup>11,12</sup>.

*Heamophilus*, *Bacteriodes*, *Eubacterium rectale*, *Blautia*, *Faecilibacterium*, *Lachnospira*, *Psuedobutyri vibrio*, *Roesburia*, *Bifidobacterium* producing short chain fatty acid have been observed to decrease in early Rheumatoid Arthritis<sup>13</sup>.

*Proteobacteria*, *Verrucomicrobia*, *Actinobacteria*, *Subdoligranulum*, *Akkermansia*, *Enterococcus*, *Bifidobacteria*, *Klebsiella*, *Megasphaera*, *Lactobacillus salivarius*, *Collinsella*, *Akkermansia* all these species are abundant in Rheumatoid Arthritis<sup>14</sup>.

Gut microbiota can lead to damage of the epithelium and to the opening of the paracellular pathway and can cross the epithelium and get in contact with immune cells beneath the epithelium layer, which leads to inflammation. Furthermore, bacterial antigens promote activation of autoreactive immune cells in the lymphoid tissues, resulting in an imbalance between regulatory cell T-cell and T-helper cell, leading to inflammatory response. Activated B cells produce autoantibodies (Anti citrullinated protein antibody and RA factor). Gut microbiota imbalance can trigger the migration of autoreactive cells to the joint, causing cartilage and bone damage. Bacterial antigen trigger promotes inflammation in synovial membrane, attracting leucocytes into the tissue. Autoreactive cells activate macrophages, resulting inflammatory cytokine production (figure 2)<sup>15</sup>.

Trimethylamine (TMA) and indolepropionic acid are also product of gut microbiota. The production of TMA from dietary phosphatidylcholine and carnitine (from meat and dairy) depends on the gut microbiota. TMA is oxidised in the liver to trimethylamine-N-oxide (TMAO). TMAO closely related to obesity, diabetes mellitus, cardiovascular disease. Indolepropionic acid reduce the risk of Rheumatoid Arthritis<sup>16</sup>.

Recent research shows that ginger (*Gingiber officinalis*), haritaki (*Terminalia chebula*) amalaki (*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 there by encourage the growth of beneficial Bifido bacteria and lactobacillus while discourage the growth of undesirable gut microbiota<sup>17</sup>.

## CONCLUSION

Despite multiple studies along with Ayurveda literature supporting the importance of Pathya-Apathya, Agni and gut microbiota in pathophysiology of Rheumatoid Arthritis, 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 (Healthy diet) are metabolized into SCFA by gut microbiome and in butyrate producing bacteria like Bacteriodes, Blautia, Faecalibacterium, Lachnospira, Psuedo butyrivibrio, Roesburia, Prevotella, Bifidobacterium. Lifestyle modification (Withdrawal of Sahakari karan) can eliminating Asamvayi karan and Naimittika karan of Rheumatoid Arthritis and these improve in beneficial human gut microbiome.

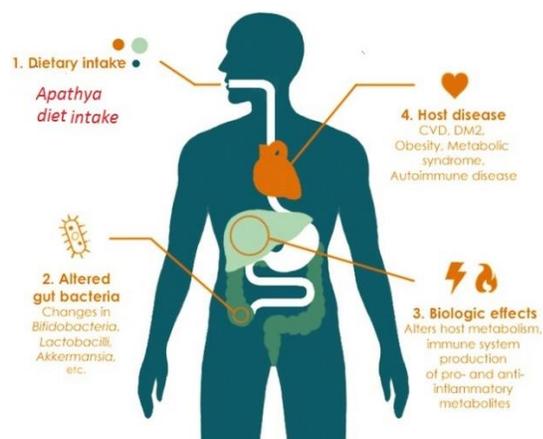


Figure 1 Schematic representation of the imbalance in Gut microbiome due to Apathya Aahar (unhealthy diet) leads to disease

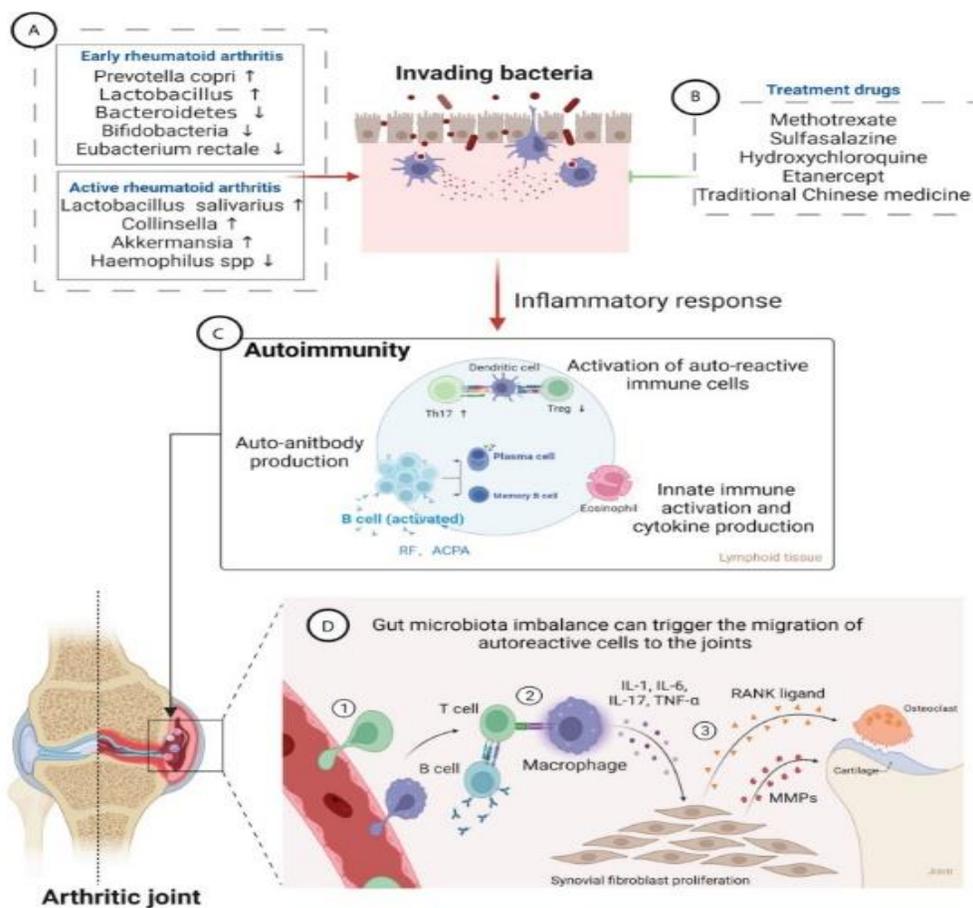


Figure 2 Gut microbiota in the pathogenesis of Rheumatoid Arthritis

- 1 Madhav nidhan 25/5, by madhav; madhudhara comnatory,brhmanand tripathi, Chaukhambha Bharti Academy, Varanasi,
- 2 Madhav nidhan 25/1-4, by madhav; madhudhara comnatory,brhmanand tripathi chaukhmba bharti academy,Varanasi,reprint
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