

## **PATHOLOGICAL CORRELATIONS BETWEEN AMA AND FREE RADICALS WITH SPECIAL REFERENCE TO DIABETES MELLITUS**

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### **ABSTRACT**

Nearly all diseases as per the Ayurvedic view have their origin from *Amadosha* which is clearly indicated by the synonym of *vyadhi* i.e. *Amaya*. Majority of the endogenous diseases actually begin with the formation of *Ama*, which has tremendous capacity to vitiate *dosha* and disturbing the equilibrium of the body. *Ama* is the substance which is not digested properly and needs further digestion. *Ama* can be described as raw, uncooked, unripe, immature, undigested or incompletely oxidized / metabolized or similar to a poisonous substance. The spectrum of diseases occurs due to *Ama* ranging from acute one to chronic one. *Diabetes Mellitus* is one among them which is caused as the result of *Ama sanchaya*. Various similarities are found between *Ama* and free radicals theory in terms of definition, properties, and mechanism of producing disease. Free radicals exist in an incomplete metabolic state which is also the state of *Ama*. In the same way various other similarities are also found among them. *Ama* has great significance in the field of diagnosis and treatment, if this is not kept in mind during treatment the desired result cannot be achieved.

**Keywords:** *Ama*, Free radicals, *Prameha*, *Jatharagni*, Immune complex, *Diabetes Mellitus*

**INTRODUCTION:** Diabetes Mellitus comprises a group of common metabolic disorder. Health is defined in Ayurveda as balanced *doshas* (humors), healthy Agni (digestive and metabolic fires), a good state of *dhatu*s (all seven tissues) and *malas* (their metabolic end products) lead to a balanced state of senses, mind and body, all which lead to good health<sup>1</sup>. In case a man undertakes tasks beyond his capacity, eats beyond his own power of digestion or follows other such adverse conducts and regimens, he falls prey to many diseases.<sup>2</sup> Nearly all diseases as per the Ayurvedic View have their origin from *Amadosha* which is clearly indicated by synonyms of *vyadhi* (disease) i.e. *Amaya*.<sup>3</sup> Majority of the endogenous disease actually begin with the formation of the *Ama*, which has tremendous capacity to

vitate *doshas* and thus disturbing the homeostasis.<sup>4</sup> *Ama* is linked to uncooked, unripe food items which get absorbed into the system without proper digestion. Commonly, low *jatharagni* (*mandagni*) is the cause of the formation of *Ama*, which after absorption vitiates *rasadhatu* and gets spread throughout the body channels (*srotas*). Such partly digested material cannot be used by the system and acts mainly to clog it, eliciting an immune reaction. This results in formation of antibodies by the defense cells of the body. *Ama* and antibody interact with each other to form immune complex. The spectrum of diseases that occur due to *Ama* ranges from acute one to chronic one. Signs and symptoms of *Ama* are blockage in the body channels, loss of energy, heaviness, obstruction in vessels, lethargy, accumulation of waste materials, loss of taste and appetite, indigestion, coated

tongue, bad breath, lack of concentration, depression, irritability, loss of clarity etc. In this way *Ama* has great significance in the field of diagnosis and treatment. In this is not kept in mind at the time of treatment, the desired result cannot be produced and complications may arise simultaneously.

#### AIMS AND OBJECTIVES:

- To evaluate the concept of *Ama* as per Ayurveda.
- To evaluate the concept of free radical theory.
- To establish the relation of *Ama* and free radical theory.
- To understand the pathogenesis of *Diabetes Mellitus* by *Ama*

#### MATERIAL AND METHOD:

Literary reference from Ayurveda and modern medical science were collected and analytically reviewed to establish pathological correlation between *Ama* and free radicals w.s.r. to *Diabetes Mellitus*.

**OBSERVATION:** *Ama* is the substance, which is not digested properly and needs further digestion. *Ama* can be described as raw, uncooked, unripe, immature, undigested or incompletely oxidized/metabolised or similar to a poisonous substance.<sup>6</sup> Charaka has mentioned the indirect reference of *Ama* in *Grahani-chikitsa adhyaya* while describing pathogenesis (*samprapti*) of *grahani roga*. Due to *nidana sevana* (etiological factors) when *Agni* is vitiated it becomes incapable in digesting the ingested food and this undigested food after getting fermented turns into poisonous substance (i.e. *Ama*).<sup>7</sup>

All *Acharyas* were having the same opinion that *Ama* is the root cause of many diseases. In *Charaka Samhita* few properties and *Ama* are also described, though no direct definitions of *Ama* is

given i.e. *dravatva* (liquidity), *picchilavta* (sliminess), *snighdtha* (unctuousness), *tantumatta* (stickiness), *asamyuktata* (inassimilable), *anekavarnayuktata* (multicolored appearance), *durgandha* (foul smell), *guruta* (heaviness), *avipak vata* (undigested)<sup>8</sup> when *Ama* gets aligned with *doshas* or *malas*, it is called as *Sama* and when it gets detached, it is known as *Nirama*. Clinical features of *sama* and *nirama doshas* and *malas* are described by Ayurvedic texts in details. Symptoms described by Vagbhatta in *Asthang Hridaya* are-*srotorodha* (obstruction in channels), *balabhransa* (loss of energy), *gaurva* (heaviness), *anilamudtha* (reverse peristalsis), *alasya* (lassitude), *apakti* (indigestion), *nisthiva* (excessive salivation), *malasanga* (constipation), *aaruchi* (tastelessness), *klama* (mental tiredness).<sup>9</sup> After carefully analyzing the above mentioned references of *Ama* as given by different *Acharyas*, the following facts become clear i.e.-

- Feeble action of *Agni* is the root cause of its production.
- *Ama* is produced from *ahar rasa* (absorbed food particles) when it is not properly digested.
- Place of origin of *Ama* is given as *amashaya* but considering the presence of *Agni* at different levels *Ama* may be produced at different sites in the body.

Concept of free radicals and their role to impair the human body have been considered the biggest advancement. Today, free radicals are known to be involved in the pathophysiology of so many acute and chronic diseases like IBS, Heart disease Arthritis etc.

A free radical is an atom or molecule that

contains one or more unpaired electrons and discontented with such a configuration.<sup>10</sup> It will try to seek stability either by donating its electron to other molecule or acquiring an extra electron from adjacent molecules. Thus free radicals are highly reactive. Free radicals are very unstable and react quickly with other compounds, trying to capture the needed electron to gain stability. Generally, free radicals attack the nearest stable molecule which loses its electron and it becomes a free radical itself, thus begins a chain reaction, once the process is started, it can cascade finally, resulting in the disruption of a living cell.

Free radical damage may involve any cellular content. These include mitochondria, peroxisomes, lysosome, as well as sites within the cytosole. All are the vital for the normal metabolic functions of the cell ultimately, it disrupt the cell, then tissue and there after the body.

**Pathological correlation between Ama and free radicals :** *Ama* is responsible for the production of various diseases. In the same way free radicals are also found to be the root cause of many diseases. The nature and properties of *Ama* are very much similar to the nature and properties of free radicals

One or more unpaired electron present in free radical requires neutralization by free radical scavengers. Thus it exists in an incomplete metabolic state which is also the state of *Ama* described as *avipakvam* (incompletely digested/metabolized).

Free radicals are inassimilable to the body components and exists in free-state. Similarly is the case with *Ama* when it is produced it remains in inassimilable state and hence termed as *asamyuktam*.

- Free radicals cause damage to the cell

and thus cell is destroyed. This destruction may leads to putrid and foul smell generations which is similar to one of the property of *Ama* described as *durgandham*.

- Though *Ama* remains in the body as *asamyuktam*, but due to its properties like *bahupichilam* (excessive slimyness) etc. it sticks to normal healthy body tissues very quickly. Similar is the case with free radicals. To seek stability in their structure they quickly attack the healthy molecules of the body and thus setting a chain reaction.

The cells throughout body are continuously exposed to these damaging molecules. Same has been described for *Ama* as *sadanam sarvagatranam* (body ache). Free radicals which are said to be produced in the body in abundance when equilibrium between its generation and body defence is disturbed. The primary defence of the body includes the activity of certain enzymes like superoxide dismutase, catalase and glutathione peroxidase. The impairment of these enzymes can leads to production of free radicals. Similarly *Ama* is also being produced whenever there is malfunction of Agni in the body. Many modern and Ayurvedic scientists consider the action of various enzymes as the action of various of Agni. Therefore it may be concluded that impairment of Agni at cellular levels causes the generations of free radicles.

#### **Role of Ama in Diabetes Mellitus:**

*Ama* is the etiopathogenetic factor of *prameha* (diabetes) as described by Charaka.<sup>10</sup> According to Sushruta, the excessive indulgence in the etiological factors related to *prameha* results into *aparipakva vata*, *kapha* and *meda* (inassimilable), which further proceed

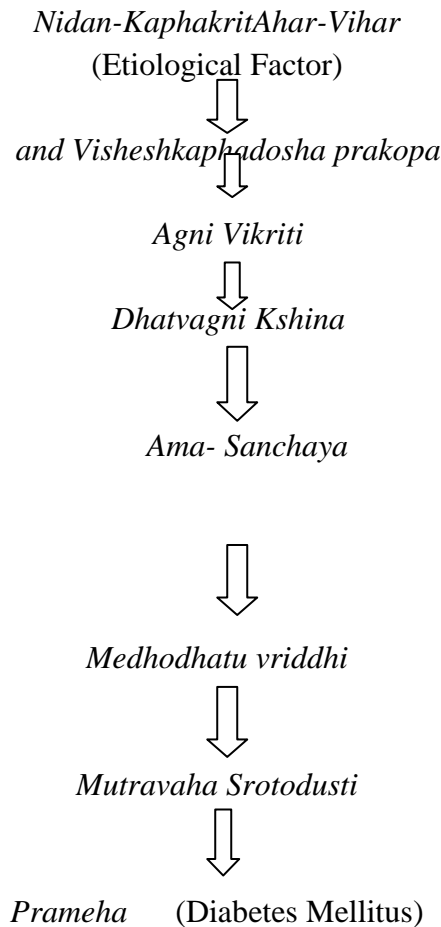
downward through the *Mutravaha srotasa* (urinary system) to get localized at *basti mukha* (opening of urinary bladder) and thus leading to disease *prameha*<sup>11</sup> Dalhana interprets the term *aparikva* as

*Ama*.

Other *Acharya* also mentioned that *Ama* has the potent role in pathogenesis of *prameha*. This can be understood easily by flow chart given below .

### *Nidan and Samprapti of Prameha*

The excessive intake of *kaphakrit ahar-vihar*, *Kaphadosha prakopa* takes place. These causes *vikritagni* and because of *vikratgni dhatvagni kshinatva* occur. These result *ama sanchaya* when this *ama* lodged into *mutravaha srotas*, they vitiated *medodhatu*, ultimately causes *prameh*



### **CONCLUSION:**

- *Ama* is a generalized term which refers to various substances produced in the body which are harmful.
- It is the root cause of almost all diseases produced in the body.
- Various Properties like *avipakwam asamyuktam* etc. are found in *Ama* which makes it the pathogenic factor.
- Free radicals are known to be involved in pathophysiology of many diseases.

- Free radical can damage any cell of the body and may involve any other cellular content.
- Various similarities in terms of definition properties, mechanism of producing diseases can be found in *Ama* and free radical.
- Pathogenesis of *Diabetes Mellitus* *Ama* has the definite and vital role.

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