



CONCEPT OF AMA: UNVEILING THE ROLE OF FREE RADICALS

K Meera¹, P Pretty²

¹P.G. Scholar,

²Associate Professor,

Department of Shareera Kriya,

Sri Dharmasthala Manjunatheshwara College of Ayurveda & Hospital, Hassan-573201, Karnataka, India

ABSTRACT

INTRODUCTION: The primary objective of Ayurveda is to maintain health of a healthy person and to cure the diseases of sick people. As per Ayurveda, a healthy person will be having equilibrium of Dosha, Agni, Dhatu and regular excretion of Mala. The derangement of Agni in any case will hamper the proper conversion of Ahara rasa into Prasada (sara) and Kitta (mala) parts. This improper metabolism leads to the accumulation of undigested waste products called Ama in the body. A Free radical can be defined as any molecular species capable of independent existence that contain unpaired electrons in the atomic orbital. They are highly reactive species that are capable of damaging DNA, proteins, carbohydrates and lipids.

AIMS AND OBJECTIVES: To understand the concept of Ama with special reference to free radicals.

MATERIALS AND METHODS: Modern texts, review articles, and authenticated sources were scrutinized for understanding the concept of free radicals and Ayurvedic texts were referred for further understanding.

DISCUSSION AND CONCLUSION: As per Ayurveda there are 13 types of Agni (Jatharagni, Bhutagni, Dhatwagni). Its improper functioning can lead to production of various dimensions of Ama. At the present era, free radicals which are responsible for various diseases, can be identified as Ama at the level of Bhutagni i.e at the molecular level. Therefore understanding the concept of Ama and free radicals leads to the scope of using Ayurvedic remedies which may be helpful in prevention and care of free radical medicated diseases.

KEYWORDS: Ama, Free radicals, Agni

INTRODUCTION

Agni is one of the important factors which helps in the maintenance of health of an individual and in prevention of diseases. Ordinarily 'Ama' means unripe, uncooked, undigested substance. Ama is that which arises as a result of derangement in Agni, mainly by Agnimandya. The hypo functioning of Agni causes the accumulation of undigested or waste products called Ama in the body. It is the root cause of various diseases. For the management of this, knowledge of Ama is essential. Free radicals are highly reactive atoms or molecules with unpaired electrons in the outermost orbit. These free radicals can cause damage to cell and tissue leading to various diseases. In the contemporary science Ama can be compared with free radicals that are formed in the body. Understanding the relationship between Ama and free radicals is crucial for maintaining the overall health and wellbeing.

AIMS AND OBJECTIVES

- To review the concept of Ama as per Ayurvedic literatures.
- To review the concept of Free radical in relation with Ama.

MATERIALS AND METHODS

Modern texts, review articles, and authenticated sources were scrutinized for understanding the concept of free radicals and Ayurvedic texts were referred for further understanding.

CONCEPT OF AMA

Due to Alpa bala of Agni, the first Dhathu (rasa) is not properly digested, instead the Annarasa undergoes fermentation being retained in the Amashaya leading to the formation of Ama¹. It is also said as the matter which has not undergone Vipaka, leading to Durgandha (bad smell), which is in large quantity, which is Pichila (sticky) and that which leads to Gatrasadana is called as Ama².

The factors which cause Mandagni are responsible for the production of Ama. Ama and Agnimandhya are interdependent to each other.



Disease formation due to *Ama*:

Agni dushti (Kayagni, Bhutagni, Dhatwagni)



Ama (mixed with Dosha, Dushya and Mala)



Circulates in all *Srotas* and *Kha Vaigunya* at particular site
 (*Samavastha*)



Vyadhi (Shakhaghata, Koshtagata, Marmasthisandhi)

Symptoms produced due to *Ama* includes, *Srotorodha* (obstruction in channels), *Balabhramsha* (lowering of immunity), *Gaurava* (feeling heaviness), *Alasya* (unwillingness to perform duty in spite of capability), *Apakthi* (indigestion), *Nishtiva* (accumulation of excessive saliva in mouth), *Mala sangha* (constipation), *Aruchi* (tastelessness), *Klama*, *Vimutra Nakha* *Chakshupitata/rakthatha/krishnatha*, *Shiroruk* (headache), *Mukhavairasya*, *Jwara* (fever), *Atisara* (loose motion), *Romaharsha*³.

FREE RADICALS

Free radicals are atoms or molecules which are highly reactive due to the presence of unpaired electron in its outermost orbit. It has a constant tendency to become stable by acquiring electron from nearby stable atom leading to free radical chain reaction which in turn leads to increase in the formation of new free radicals⁴.

Free radicals are always present and formed in the body but excess of production than normal limit causes various ill effects in the body. In the body they are produced either by normal cell metabolism (lysosomes, peroxisomes, nuclear endoplasmic reticulum, plasma membrane, phagocytic cells) or from external sources (pollution, cigarette smoking, radiation, medication)⁵. Most of the free radicals present in the body are reactive oxygen species (ROS) and reactive nitrogen species (RNS). They include superoxide anion, hydrogen peroxide, hydroxyl radical, peroxy radical, pernitrous acid, nitric oxide, nitrous oxide, nitroxyl anion. They are highly reactive as it has the potential to oxidise biological molecules like proteins, lipids, nucleic acids etc⁶.

Endogeneous and exogeneous antioxidants act as 'free radical scavengers' by preventing and repairing the damage caused by the accumulated free radicals thereby increasing the immune defense. Endogeneous antioxidants include superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione reductase (GRx). Superoxide dismutase is the first line defense against free radicals. Exogeneous antioxidants includes vitamin E, vitamin C, flavonoids, omega 3 fatty acids, omega 6 fatty acids etc.

The imbalance between the production and accumulation of free radicals and the body's ability to neutralise them leads to a

phenomenon called oxidative stress. Oxidative stress persisting for a long term causes various diseases (free radical mediated disorders) like cancer, Alzheimer's disease, Parkinson's disease, multiple sclerosis, memory loss, depression, arthritis, asthma, glomerular nephritis, IUGR, cataract, cardiomyopathy, ischemia, inflammation, atherosclerosis etc⁷.

DISCUSSION

It is already known that *Ama* is formed due to the impairment of *Agni*. This can be at *Jataragni* level (gastrointestinal level), *Bhutagni* level (molecular level), *Dhatwagni* level (tissue level), so the formation of *Ama* can also take place at these levels. The *Ama* formed at *Jataragni* level i.e. molecular level can be considered as free radicals.

According to Acharya Susruta, there is a six-step process for disease development: *Sanchaya*, *Prakopa*, *Prasara*, *Sthanasamsrya*, *Vyakti*, and *Bhedavastha*. In the case of diseases caused by *Ama*, the initial step is the accumulation of *Ama* (*Sanchaya*) due to impaired *Agni* function. Similarly, free radicals accumulate when the action of free radical scavengers is impaired at a specific site, leading to increased production. Initially, this accumulation may not cause harm, but without treatment, it can surpass a threshold, leading to minimal symptoms (*Prakopa*). Subsequently, *Ama* or free radicals enter circulation, helping the progression of the disease.

Ama requires a specific site with *Khavaigunya* (*sthanasamsrya*), to initiate disease by affecting weak body tissues where it may accumulate or adhere. Similarly, free radicals seek out weak sites for electron exchange. Consequently, diseases manifest differently depending on the location of *Khavaigunya*, arising from the same root cause of *Ama* or free radicals. This marks the stage of *Sthanasamsrya*, where disease symptoms become evident. Following *Sthanasamsrya*, pathology becomes visibly apparent at a macroscopic level (*Vyakthavastha*). If even in this stage treatment is not given, it will lead to the occurrence of *Upadrava* (*Bhedaavstha*)⁸.

From the above discussion, it can be considered that the process of formation of disease is described in similar manner in Ayurveda and modern.



While considering the treatment part, the treatment of *Ama* includes 3 procedure- *Langana*, *Deepana*, *Pachana*. Similarly antioxidant therapy also works in three ways- first by inhibiting the formation of free radical species which can be achieved by removing causative factors and this can be taken as *Langana* therapy. Secondly by increasing the action of antioxidant like SOD or catalase which is achieved by providing certain drugs. This can be taken as *Deepana* therapy. Thirdly by action of certain substances (vitamin E, vitamin C) which can neutralize free radical by donating or accepting electrons. This can be considered as *Pachana*. Hence in treatment aspect also there is similarity between *Ama* and free radicals.

CONCLUSION

From the above explanation, it can be concluded that the main factor responsible for the formation of *Ama* is *Mandagni*. *Ama* is produced by the accumulation of byproducts of metabolism as well as metabolic waste that are not eliminated from the body. *Ama* can be considered as free radical which are also byproducts of metabolism having tendency to block the microchannel in different locations leading to various diseases. Increase in normal value of blood sugar, urea, uric acid, etc can be understood as *Ama*. The whole discussion concludes the various similarities between *Ama* and free radicals. By understanding these similarity, there starts a new scope for Ayurveda in the management of free radical mediated diseases.

REFERENCES

1. Gupta Atrideva. *Ashtanga hridaya. Varanasi: Chaukhambha Sanskrit Sansthana; 2005.p.99*
2. Uphadhaya Yadunandana. *Madhava Nidana. Varanasi: Chaukhambha Sanskrit Sansthan; 2006.p.446*
3. Gupta Atrideva. *Ashtanga hridaya. Varanasi: Chaukhambha Sanskrit Sansthana; 2005. p.98.*
4. Tripathi JS, Singh RH. *Possible correlates of free radicals and Free Radical mediated disorders in Ayurveda with special referance to bhutagni vyapara and Ama at molecular level. Anc Sci Life. 1999;19(1-2):17-20.*
5. *Free radicals, antioxidants in disease and health Lien Ai Pham-Huy et al. Int J Biomed Sci. 2008;*
6. Lobo V, Patil A, Phatak A, Chandra N. *Free radicals, antioxidants and functional foods: Impact on human health. Pharmacogn Rev [Internet]. 2010;4(8):118-26.*
7. Phaniendra A, Jestadi DB, Periyasamy L. *Free radicals: properties, sources, targets, and their implication in various diseases. Indian J Clin Biochem [Internet]. 2015;30(1):11-26.*
8. Munish Kumar, Parvesh Kumar. *Concept of Ama Dosha WSR to Free Radicals. Journal of Applied Pharmaceutical Research, 2016,4(4):1-4*