International Journal of Ayurveda and Pharma Research

Review Article

CORRELATION OF CONCEPT OF AMA AND FREE RADICAL THEORY

Rohit Ranjan[1*], Sanjay Srivastava[2]

*[1]Lecturer, Dept. of Basic Principle, Sri Sai Ayurvedic Medical College & Hospital (SAMC), Aligarh, Uttar Pradesh, India.

[2]Reader, Dept. of Rog Nidana, Sri Sai Ayurvedic Medical College & Hospital (SAMC), Aligarh, Uttar Pradesh, India.

Received on: 19/03/2014 Revised on: 01/04/2014 Accepted on: 20/04/2014

ABSTRACT

Majority of the endogenous disease begins with the formation of *Ama* in the body. It has tremendous capacity to vitiate the *Doshas* and disturbing the homeostasis *(Dhatu-samya). Ama* is the resultant of improper digestion or partially digestion of the food particle due to hypofunction of *Jatharagni* and also due to accumulation of mala in the body and also considered as *Prathamdoshadusti*. It may be considered as partially or incompletely metabolized *Dhatu* in case of *Dhatvagnimandya.*

In modern parameters, *Ama* is supposed to be deadly Free radical. Free radical is an atom/molecule that contains one or more unpaired electron, which requires neutralization by free radical scavengers. *Ama* is not a single entity but is a generalized term, which can be applied to many malformed substances in the body. This *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. Here we discuss about properties and qualities in both entities, which are similar and dissimilar, also whether free radicals can be considered under *Ama.* The present article attempts to correlate the most recent concept of today's i. e. free radical concept with that of the concept of *Ama*, described in research for remedies from Ayurvedic research, which may be helpful in the presentation and care of free radicals mediated disease.

KEYWORDS: *Ama*, *Free radicals.*

INTRODUCTION

AMA: The term *Ama* is literally means unripped, immature, or incompletely formed is referred in Ayurvedic medicine as the factor, which arise, or event, which follows as consequence of hypo functioning of *Agni*. The substance, which is not properly digested, disintegrated, foul smelling excessive in quantity, slimy in nature and produces stiffness of the whole body is known as *Ama*[1-2]. Not only the food taken in huge quantity but the qualities like *Viruddha ahara*, *Guru, Ruksha, Vistambhi, Snigdha ahar* and *Agnimandata* also cause in the production of *Ama*.[3] Consumption food when individual is afflicted with mental upset due to *Kama, Krodha, Lobha, Moha, Irshaya, Shoka, Bhaya, Lajja, Chinta, Mano Udvega, Manoglani*[4] etc are important factors responsible for cause of production of *Ama* in the body. It possess the property of *visa* or poison or toxic substance and is responsible for variety of local and systematic disorders. Describing *Ama* visa as a serious toxic condition comparable to acute stage of poisoning. *Acharya Vagabhata* observes that it is intensively toxic and may endanger life and as a line of treatment of *Ama dosha* and *visa* are opposite kind; the former has to be treated as one of the fatal prognosis. *Ama* also referred to some such intermediate byproducts of metabolism, which have tendency to create blockage in the micro channels of the body i.e., *Strotoavrodha*. Thus *Ama* is essentially is not a single entity but is a category or condition with some common denominator identifiable at any level of the biological organism.

Free radical

There are some views suggesting those free radicals are pathologically correlated with *Ama*. in this regard it is said that property and manifestation of free radical are similar to those of *Ama*[5]. Free radicals are atoms, ions or molecules that contain an unpaired electron. Thus, they become electrically charged because number of negatively charged electron does not match with positively charged protons. When a molecule looses or gains a single electron in its outer orbit, it becomes free radical. Infact a free radical is defined as "A molecule that can exist independently for a period of time with one or more unpaired electrons." Free radical are unstable chemicals formed in the body during normal metabolism or exposure to environmental toxins such as air, food and water pollution. Free radical helps our body to generate energy and fight infection but when we have too many free radicals they attack healthy cells causing them to age prematurely. These free radicals and other reactive oxygen species such as Super oxides, hydrogen peroxide and hydroxyl radicals are molecular species capable of independent existence that contain an unpair electron in an atomic orbital. They are unstable chemical formed in the body and can cause degenerative changes and other diseases like cancer, myocardial infarction etc[6]. *Free radical* also play an important role in a number biological processes such as intra cellular killing of bacteria by phagocytic cells like granulocyte and macrophage. Superoxide, nitric oxide and their reaction product regulate many processes such as control of vascular tone and then blood pressure. They also play key role in intermediary metabolism of various biological compounds. Such radical can even be messenger in a process dubbed redox reaction[7]. Oxygen and hydrogen peroxide are oxident that are effective bactericidal agent in the conjunction with neutrophils[8]. So above description of free radical show that these species are not only harmful to the body but they are beneficiary too.

DISCUSSION

Now the similarities between the *Ama* and the free radical are as follows :-

Similarities in properties

1. *Free radical* is an atom/molecule that contains one or more unpaired electron, which requires neutralisation by free radical scavengers. Thus it exists in an incomplete metabolic state which is also the state of *Ama* described as *Avipakvam* (incompletely digested/metabolised)[9].
2. Next it is seen that when produed, free radicals are in assimilable to body produced, free radicals are in assimilable to body components and exist in free state. Similar is the case with *Ama* when it is produced it remains in inassimilable state and hence termed *Asamyuktam*[10].
3. Free radicals cause damage to cell membrane and thus the cell is destroyed. This destruction may lead to purification and foul smell generation, which is similar to one of the property of *Ama* described as *durgandham*. [11]
4. Though *Ama* remains in the body as *Asamyuktam*[12], but due to its properties like *Bahupicchilam*[13] etc. it sticks to normal healthy body tissues very quickly, similar is the case with free radical.
5. 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 *sadanamsarvagatranam.*[14]

From above one can observe that properties of free radicals are similar to the properties of *Ama* described in classics.

Similarities in production

Now the process of production of free radicals in body and production of *Ama* would be considered.

1. Such as reduced thiols and flavins, electron transfer etc are few *Free radicals* are said to be produced in the body in abundance when equilibrium between its generation and body's primary defense is disturbed. The primary defense of the body includes the activity of certain enzymes like superoxide dismutase, catalase and glutathione peroxidase. The impairment of these enzymes can lead to production of free radicals. Similarily *Ama* is also being produced whenever there is malfunction of *Agni* in the body[15]. Many modern Ayurvedic scientists consider the action of various enzymes as the action of *Agni* Therefore it may be concluded that impairment of *Angi* at cellular level causes the generation of free radicals.
2. Some exogenous causes are also responsible for *free radical* production like pollutants,

dangerous chemicals, certain food products. All these may be termed under the heading of *Mithyaharavihara.*[16]

3. Certain enzymes produce radicals as intermediary substances, which are supposed to go into further metabolism, but they somehow jump out of the normal metabolic cycle and work as harmful entities. In case of *Ama*, it is seen that *Ama* is also an intermediary metabolite in the process of digestion at different levels and if the process is not completed or *Ama* remains as it is, it becomes harmful to body.
4. Certain toxic substances like heavy metals also produce free radicals*. Ama* is also said to be produced from *Visaja dravyas.*
5. Processes, which are responsible for free radical production, are studied in detail in modern science. Auto-oxidation, consequent inactivation of small molecules such processes. In Ayurvedic classics the term *Agni vikrti* is used to describe processes due to which *Ama* is produced.[17]

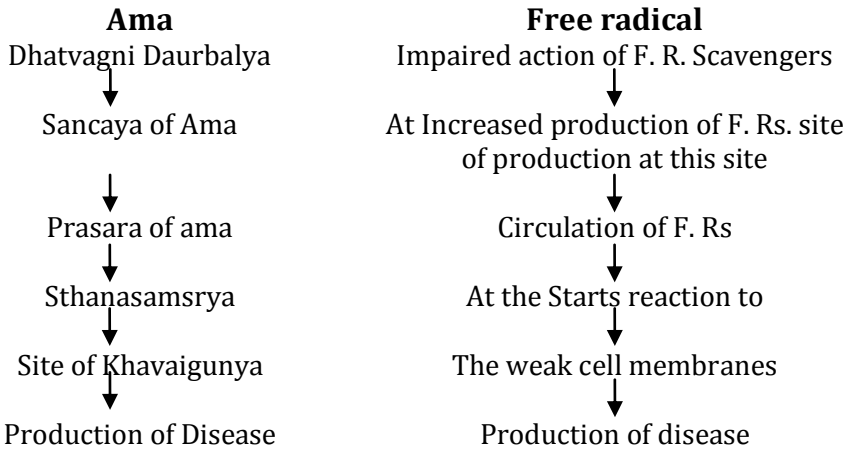
Similarities in Site and Types

Let us consider the site and types of *Ama* and free radicals. Total number of types of free radicals is still not known. Depending upon the site and method of production, many different forms of free radicals are produced. *Ama* also cannot be classified into specific types, as each cell of the body has its own *Agni* and depending upon it, many different types of *Ama* are produced. Also there is no specific site for production of free radicals and *Ama* as well. The body contains 100 trillion cells and Ama well as free radicals can be produced in any of these cell.

Similarities in production of disease

Next important thing is to consider, how does the production of disease occur from both *Ama* and free radicals. According to Susruta, a disease is produced in six steps viz. *Sancaya, Prakopa, Prasara, Sthanasamsrya Vyakti* and *Bhedadvstha*[18]. In case of diseases produced by *Ama, Sancaya* of *Ama* is first step. It happens due to impairment of *Agni* at that place. Similar is the case with free radicals. At certain site due to impairment in action of free radical scavengers, increased production of free radicals takes place. When this *Sancaya* or accumulation is in small amount it does not cause any harmful effects, but if treatment is not given, this *Sancaya* exceeds the threshold. Then it starts producing minimal symptoms, this is the state of *Prakopa.* After this state, *Ama* goes into circulation, same is the case with free radicals. Now this *Ama* requires a site for creating disease in form of *Khavaigunya*[19], which should be considered as weakness in any body tissue where *Ama* may be *Sthanasamsrya*, or many adhere with this tissue or cells. In case of free radicals also, they look for a site, which is weak and can easily take part in electron exchange with them. Therefore depending upon this site of *Khavaigunya* different diseases are produced in different manner from same root cause, i. e. *Ama* or free radicals. This is the stage of *Sthanasamsrya*. Now symptoms of diseases become clear. All pathologies described in modern science are from this stage. In modern science, stages earlier to this are rarely considered. After this stage, pathology at gross level becomes visible. If even at this stage the disease is not treated is not treated it leads to complications, which are described in Ayurvedic classics as *Updravas.*

From above discussion, it becomes clear that the method of production of disease at its basic level is described in similar manner in modern as well as in Ayurvedic literature. The above mentioned process of pathogenesis can be presented in a flow chart as follows:



Similarities in Line of treatment

Now the similarities between line of treatment of two concepts shall be discussed. For *Ama* basically three types of procedures are required. First is the use of *Langhana (Starvation)* which helps in load shedding on *Agni* and production of *Ama* is decreased. Second is the use of *Dipana* dravya, which helps in improving status of *Angi* and enhancing it action. Next is *Pacana*, done with *Pacana dravyas. Pacana dravyas* help in digestion of already produce *Ama.*

In protecting body from free radical damages Antioxident therapy is used which also acts in three ways, as already mentioned, these are :

First is by inhibiting the generation of reactive oxygen species. This can be achieved by removing causative factors and can be taken as *Langhan karma.*

Second is by increasing action of antioxident enzymes like SOD or catalase. This is done by the use of certain drugs, which enhance the action of these coenzymes in other words this may be considered as *Dipana karma.*

Third one is the use of certain substances, which help in neutralising free radicals by either donating or accepting electrons from free radicals. Many vitamins like vitamin C and vitamin E have such properties due to which they can take part in electron transfer reactions and can neutralize free radicals. This activity can be compared to *Pacana*. Therefore, similarity in line of treatment of both concepts is also seen.

CONCLUSION

Summing up above explanation it can be conclude that main factor concerned in the formation of *Ama* is *Mandagni* (Hypo function of digestive faculty of body). Dietetic indiscretion and emotional stresses contribute to the formation *Ama*. This may be impaired the effective functioning of the neuro-humoral mechanism responsible for proper secretion of digestive juices. *Ama* is produces also due to accumulation of byproduct of metabolism as well as metabolic waste not properly eliminated or utilized in the body. Here it is noteworthy that whenever there will be improper metabolism due to impaired functioning of *Agni* then only *Ama* will be formed. In modern parlance, *Ama* may be referred to be free radicals which is intermedially byproduct of metabolism which have tendency block the micro channels of different systems of the body. This can be compared with the accumulation of lipofuscin, amyloid body advanced glycation end product (AGE) and modified protein. This process is an outcome of the derivation of the main metabolic pathway in the direction to form defective metabolism end product. Increase in the normal value of the blood urea, sugar, uric acid etc. may be understood as *Ama* condition.

The entire discussion concludes that various similarities between *Ama* and free radicals in terms of the general definition, properties, types, site of production, mechanism of producing diseases and the line of treatment of the two concepts, can be found.

REFERENCES

1. Acharya Vagbhatta, Editor Atrideva Gupta, Astangahridaya sutrashan, Re edition, chap 8/13-14, Varanasi;chaukhambha Sanskrit Sansthan;2005 P. 75
2. Madhavakara, Editor Yaduanadana Upadhaya, Madhava Nidan, Reprint, Vol. 1 Chap. 25/4 Varanasi;chaukhambha Sanskrit Sansthan;2006 P. 509
3. Madhavakara, Editor Yaduanadana Upadhaya, Madhava Nidan, Reprint, Vol. 1 Chap. 25/1-2 Varanasi;chaukhambha Sanskrit Sansthan;2006 P. 508-509
4. Acharya Charak, Editor Pt. Kashinath Shastri and Dr. Gorakhnath Chaturvedi Chap. Ch. Vi. 2/8 Varanasi; Chaukhambha Bharti Academy;2005
5. Kumar Baldev, Dave Hetal, Kumari Madhuri. Pathological correlation between Ama and free radicals with special reference to Madhumeha. The Journal of Research and Education in Indian medicine 2008; xiv-2:61-64
6. Wikipedia. Radical [Internet] 2013 [Modified on 2013 july 12; cited on 2013 Auguest 8]. Available from: en. wikipedia. org/wiki/Radical _(chemistry)
7. Lobo V, Patil A, Pathak A, Chandra N. Free radical, antioxidants and functional foods: impact on human health. Pharmacognosy Review[Internet] available from: www. ncbi. nlm. nih. gov/pmc/article/pmc3249911 2010;4[8] 118-126.
8. Ganong F William, Review of Medical Physiology. 22 Edition Circulating Body fluid, Chapter 27. New Delhi: Mc Graw Hill;2007. p. 518

9. Madhavakara, Editor Yaduanadana Upadhaya, Madhava Nidan, Reprint, Vol. 1 Chap. 25/1-15 Varanasi;chaukhambha Sanskrit Sansthan;2006 P. 509
10. Ibid
11. Ibid
12. Ibid
13. Ibid
14. Ibid
15. Acharya Vagbhatta, Editor Atrideva Gupta, Astangahridaya sutrashan, Re edition, chap 13/25, Varanasi;chaukhambha Sanskrit Sansthan;2005
16. Acharya Charak, Editor Pt. Kashinath Shastri and Dr. Gorakhnath Chaturvedi Chap. Ch. Chi. 15/42 Varanasi; Chaukhambha Bharti Academy;2005
17. Acharya Charak, Editor Pt. Kashinath Shastri and Dr. Gorakhnath Chaturvedi Chap. Ch. Vi. 2/8 Varanasi; Chaukhambha Bharti Academy;2005
18. Kaya Chikitsa, Editor Prof. Ajay Kumar Sharma Chap. 9/1 Delhi;Chaukhambha Orientalia; 2009 P. 226
19. Kaya Chikitsa, Editor Prof. Ajay Kumar Sharma Chap. 9/1 Delhi;Chaukhambha Orientalia; 2009 P. 231.

Cite this article as:
Rohit Ranjan, Sanjay Srivastava. Correlation of Concept of Ama and Free Radical Theory. Int. J. Ayur. Pharma Research 2014;2(2):9-13.
Source of support: Nil, Conflict of interest: None Declared

Address for correspondence:
Dr. Ranjan Rohit
Lecturer
Dept. of Basic principle
Sri Sai Ayurvedic Medical College & Hospital (SAMC), Aligarh, Uttar Pradesh, India.
Email : rohitranjan.dr@gmail.com
Phone : +919456973861