

UNDERSTANDING THE CONCEPT OF AUTOPHAGY THROUGH LANGHANA

Karunamayi A S¹, Vinaykumar K N², Supreeth M J³

¹P.G scholar, Dr Karunamayi A S, Department of PG Studies in Panchakarma, Sri Kalabyraveswaryaswamy Ayurvedic Medical College, Hospital and P.G Research centre, Vijayanagar, Bengaluru- 560104, India

²Professor, Head of the Department, Department of PG Studies in Panchakarma, Sri Kalabyraveswaryaswamy Ayurvedic Medical College, Hospital and P. G Research centre, Vijayanagar, Bengaluru- 560104, India

³Associate Professor, Department of PG Studies in Panchakarma, Sri Kalabyraveswaryaswamy Ayurvedic Medical College, Hospital and P.G Research centre, Vijayanagar, Bengaluru- 560104, India

Corresponding Author: karunamayias18@gmail.com

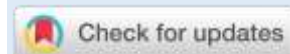
<https://doi.org/10.46607/iamj10p6052022>

(Published Online: September 2022)

Open Access

© International Ayurvedic Medical Journal, India 2022

Article Received: 29/09/2022 - Peer Reviewed: 02/10/2022 - Accepted for Publication: 03/10/2022



ABSTRACT

Ayurveda is not only one of the world's oldest systems of medicine but also is holistic and scientific in nature. *Ayurveda* explains the six basic principles of treatment called *Shadvidhopakrama*. Among the *Shadvidhopakrama* as explained by *Charaka*, *Langhana karma* is one such *upakarma* that brings lightness to the body. The time tested establishes concepts of *Ayurveda* are being scientifically proven through various modern parameters. The concept of Autophagy is one such concept that was very much emphasized through the term "*Langhana*". *Langhana* is one such *apatarpana* modality of *upakrama* playing a pivotal role in the domain of *Shadvidhopakrama*. Though *Langhana* is the one that brings about lightness in the body through *anashana* or *alpathana* resembling the fasting involved in the concept of Autophagy, in a broader sense it encompasses ten different modalities that bring about the *Langhana* effect. These ten different modalities may exert the effect of Autophagy, augment the process of Autophagy or assist the process of Autophagy at different magnitudes. So, in this article, an attempt is made to understand the concept of Autophagy through *Langhana*.

Key words: *Langhana*, *Upavasa*, *Vyayama*, Autophagy, Fasting.

INTRODUCTION

Ayurveda is one of the most traditional systems of medicine. Acharya Charaka explained the Shadvidhopakramas; Langhana, Brihmana, Rukshana, Snehana, Swedana, and Sthambana in Sutrasthana¹. Ayurveda says Langhana as "Langhanam param aushadham", which means Langhana upakarma is the ultimate medicine. Ten different modalities of Langhana upakarma have been described and they are adopted according to the Rugna bala, vyadhi avastha, and rutu anusara². When Upavasa alone is having so much of an effect on Autophagy then, Vamana, Virechana, Basti karma, and Shirovirechana which also involves dietetic restrictions and therapeutic cleansing of the body may augment the process of Autophagy and helps in regulating cellular balance and physiology. The other modalities of Langhana may also directly exert an effect on the process of Autophagy, augment the process of Autophagy, or assist the process of Autophagy. Autophagy means self-eating. It is a natural regulatory mechanism that retains beneficial substances and removes harmful substances from the body, whilst playing a housekeeping role in the elimination of misfolded or aggregated proteins via a degradative lysosomal pathway³. The term Autophagy was proposed by Christian de Duve. Professor Yoshinori Ohsumi got the award of the 2016 Nobel Prize for Medicine or Physiology for his research on the mechanisms of Autophagy and thereby the importance of Autophagy for the human disease was recognized⁴.

MATERIALS AND METHODS-

1. Ayurvedic texts like Brihatrayi and Laghutrayi have been used to study the langhana chikitsa.
2. Different articles on Autophagy and Langhana karma.
3. Available related sources on websites and the internet.

CONCEPT OF AUTOPHAGY-

The word Autophagy is derived from the Greek word Auto + Phagy. The word literally means self-eating. The lysosome is a cellular organelle whose main function is degradation and recycling. The recycled

material can then be used to create new cells. Autophagy occurs at low basal levels in virtually all cells to perform homeostatic functions such as protein and organelle turnover⁵. It is rapidly up regulated when cells need to generate intracellular nutrients and energy for example during starvation and stress conditions.

Types and Mechanism of Autophagy-

Autophagy is broadly classified into Macroautophagy, Microautophagy, and Chaperone-mediated autophagy.

Macroautophagy: It delivers cytoplasmic cargo to the lysosome through the intermediary of a double membrane-bound vesicle, referred to as an autophagosome that fuses with the lysosome to form an autolysosome.

Microautophagy: In this type, the cytoplasmic components are directly taken up by the lysosome membrane. Both macro and micro-autophagy are able to engulf large structures through both selective and non-selective mechanisms.

Chaperone-mediated autophagy: In this method, targeted proteins are translocated across the lysosomal membrane in a complex with chaperone proteins that are recognised by the lysosomal membrane receptor⁶.

Autophagy involves the formation of a double-membrane vesicle, which encapsulates cytoplasm, malformed proteins, long-lived proteins, and organelles and then fuses with lysosomes for degradation. The formation of the double-membrane vesicle is a complex process involving 16 autophagy-related proteins (Atg proteins). The nucleation, expansion, uncoating, and completion of the autophagosome formation then occur, leading it to fuse with lysosomes. In autophagosomes, the process of degradation takes place where they are by forming autophagolysosomes. In autophagolysosomes, the process of degradation takes place where they are degraded into amino acids then amino acids are again re-used to produce proteins.

EFFECT OF LANGHANA KARMA ON AUTOPHAGY-

Langhana is one such *apatarpana* modality of *upakrama* playing a pivotal role in the domain of *Shadvidhopakrama*. According to *Acharya Charaka*, there are ten types of *Langhana*: *Vamana*, *Virechana*, *Basti*, *Nasya*, *Pipasa*, *Maruta*, *Atapa*, *Pachana*, *Upavasa*, and *Vyayama*⁷.

Langhana by its properties like *laghu*, *ushna*, *tikshna*, *vishada*, *ruksha*, *sukshma*, *khara*, *sara*, and *kathina* bring lightness to the body by relieving the obstruction and easing out the morbid matter from the channel. Though *Langhana* is the one that brings about lightness in the body through *Anashana* or *Alpashana* resembling the fasting involved in the concept of Autophagy, in a broader sense it encompasses ten different modalities that bring the *Langhana* effect. These ten different modalities of *Langhana* may exert the effect of Autophagy, augment the process of Autophagy or assist the process of Autophagy at different levels on different magnitudes.

Chatushprakara Samshudhi: *Vamana*, *Virechana*, *Basti*, and *Shirovirechana* are known as *Chatushprakara Samshudhi* which means four modalities of purificatory methods. All these methods along with dietetic restrictions help in normalizing the imbalance of doshas and removing toxic materials from the body through the nearest possible routes. Similar functions can be seen in the process of Autophagy where it helps in degrading the old cells and unused proteins and debris in the body during starvation and under stress. By this, we can consider that *Chatushprakara Samshudhi* augment the process of Autophagy.

Pipasa- Withholding the urge to drink water is called *pipasa*. It improves *Agni* and dries up *kleda* and *abhishyandi* conditions in the body. By this *shamana* of the *doshas* takes place. It results in the depletion of *Kapha* and *Pitta* dosha. There is an involvement of the water molecules in insulin formation. Water molecules play a significant role in keeping the insulin molecules together and it stabilizes the structure of insulin for storage in the body⁸. As insulin suppresses the activation of the process of

Autophagy, we can consider that *Pipasa* directly exerts an effect on Autophagy.

Maruta Sevana- According to *Acharya Charaka* *vayu* has *ruksha*, *sheeta*, *laghu*, *sukshma*, *chala*, *vishada*, and *khara* properties, by which it decreases the *snigdha*, *guru*, *Sthira*, and *mrudu* properties of *ama* and *kapha*. Hence helps in the lightness of the body and clearing the *ama* from the body. Forest bathing is a type of healing process which is having an effect on the immune system of the body and mind⁹. Exposures to nature for a certain period of time along with some dietetic restrictions help in stabilizing the mind and balancing the *doshas* of the body. By this, we can consider *Maruta Sevana* to assist the process of Autophagy.

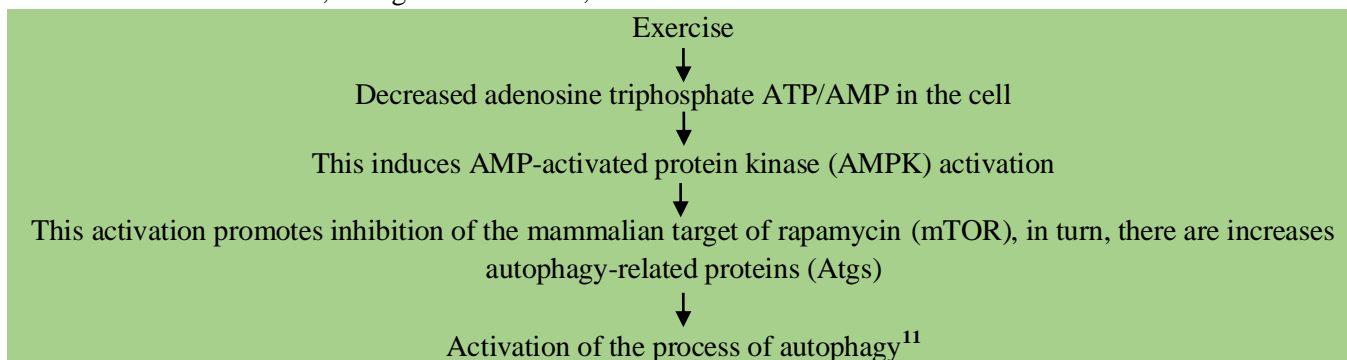
Atapa Sevana- *Acharya Vagbhata* states that *atapa* does *shamana* of mainly *kapha dosha* and brings *laghuta* into the body. Autophagy is an intracellular degradation phenomenon that is initiated to degrade metabolic wastes following UV exposure. UV radiation modulates the autophagy process via multiple signalling pathways. These signals converge on mTORC1, which co-ordinately modifies the ULK complex to affect the early steps of the autophagosome process¹⁰. So, we can consider *Atapa Sevana* along with dietetic restrictions to assist the process of Autophagy.

Pachana- In *langhana karma*, *Agni* starts digesting *ama dosha* and clears all blockages of channels in the body. Similarly, *Pachana karma* also does the *ama pachana* in the body. *Pachana* procedure is defined by *Acharya Sharangadhara* as drugs that catabolize the undigested food but do not kindle the digestive fire known as *Pachana*. Some of the food items like Ginger, Garlic, Turmeric, Green tea, and Coffee with dietetic restriction help in digesting the undigested food materials also found to be effective in inducing Autophagy. By this, we can consider that *Pachana* augments the process of Autophagy.

Vyayama- It is a type of *Niragni sweda*. *Vyayama* creates *ushna* in the body and turns causes *Agnideepana* and *amapachana*. Along with dietetic restrictions it brings about *laaghavata*, *medokshaya*, and *agnideepti*, these qualities which are antagonistic

to *ama* and helps in the digestion of the *ama*. Exercise initiates a cascade of events, which leads to increased oxidative stress, energetic imbalance, and

misfolded proteins can induce Autophagy activation in the followings steps



By this, we can consider that *Vyayama* along with dietetic restrictions augments the process of Autophagy.

Upavasa- *Upavasa* is derived from ‘*vas*’ *dhatu* meaning to dwell and ‘*ghnya*’ *prataya* and starts with ‘*Upa*’ *Upasarga* (*upa+vas+ghnya*) meaning towards, near to, by the side of. In *Ayurveda*, it is stated that “*aho ratribhajana abhavaha*” which means the condition of withdrawal of food for a night. Fasting/*Upavasa* is a type of *adravya aushadha*. Fasting, in the absence of food in the viscera, brings about the digestion of metabolic toxins, kindles the digestive fire, removes the blockages in the channels, and thereby aids in minimising the disease. *Upavasa* is indicated in the *madhyama dosha avastha*. It stimulates digestive power and normalizes the functions of *vata dosha*. By this, we can consider that *Upavasa* may directly exert an effect on the process of Autophagy.

DISCUSSION

Langhana is the best modality of treatment in conditions like *ama dosha* by removing blockages of channels and bringing lightness to the body. The *Trividha langhana* concept encompasses the role of *Langhana* by bringing lightness to the body in case of *alpa bala rogi* and *roga avastha*, *Langhana pachana* by the destruction of the unwanted substance like *Ama* in case of *madhyama bala rogi* and *roga avastha* and *Doshavasechana* by removing out the toxic materials from the body in case of

pravara bala of *rogi* and *roga avastha*. By this we can consider all the three modalities of *Langhana* mentioned under the concept of *Trividha Langhana* may directly exert an effect on the process of Autophagy, augment the process of Autophagy, or assist the process of Autophagy. *Panchakarma*, the five modalities of treatment also has a similar action to Autophagy by eliminating and recycling toxins at a cellular level for restoring health. The concept of *Langhana karma* is found to be following for many ages and a similar concept called Autophagy emerged later having very much scope in the field of research for further in detail study. Both *langhana* and Autophagy mechanisms seem to be intended for the same objective of removing or degrading harmful substances which can potentially act as the survival system. So, in this regard, an attempt is made to throw light on understanding the concept of Autophagy through *Langhana*.

CONCLUSION

Ayurveda is considered one of the oldest traditional systems of medicine. *Ayurvedic* management is not only concerned with the cure of the diseased person but is also meant to maintain the health of the healthy person because it is used for *dhatu-samya*. *Langhana* is the prime tool in the process of *dhatu-samya*. After accessing the benefits obtained from both Autophagy and *langhana* we can consider the concept of Autophagy and *langhana* are quite similar. Autophagy work has been done on fasting and

exercise; there is the scope of doing other *langhana karmas*. The role of *dashavidha langhana* is of most importance in exerting the effect on the process of Autophagy, augmenting the process of Autophagy, or assisting the process of Autophagy at different levels on different magnitudes. There is still more scope for research in context to similar objectives of both Autophagy and *Langhana karma* in removing the toxic materials, unwanted proteins, and debris from the body at the cellular level and helping in maintaining homeostasis.

REFERENCES

1. Agnivesha, Charaka, Drudabala, Chakrapanidatta. Sutrasthana, Chapter.22 Langhanabrumhaniyam Adhyaya. In: Acharya YT (Edi.), Charaka Samhita with Ayurveda Deepika Commentary. Reprinting Edition: 2015. Varanasi: Chaukhambha Surabharathi Prakashana; 2015.
2. Agnivesha, Charaka, Drudabala, Chakrapanidatta. Sutrasthana, Chapter.22 Langhanabrumhaniyam Adhyaya. In: Acharya YT (Edi.), Charaka Samhita with Ayurveda Deepika Commentary. Reprinting Edition: 2015. Varanasi: Chaukhambha Surabharathi Prakashana; 2015.
3. Rekha Khandi, Maryam Dadar and Wangen Chaicumpa. A Comprehensive Review of Autophagy and its various Roles in infectious, Non-infectious, and Lifestyle Diseases: Current Knowledge and prospects for Disease Prevention, Novel Drug Design, and Therapy. *Cells*. 2019 Jul;8(7): 674
4. Klionsky, 2007; Maiuri et al., 2007a; Mizushima and Klionsky, 2007; Rubinsztein et al., 2007).
5. Sarbari Sahaa, Debasna P. Panigrahaia, Shankargouda Patil b, Sujit K. Bhutia. Autophagy in health and disease
6. Danielle Glick, Sandra Barth, and Kay F. Macleod. Autophagy: cellular and molecular mechanisms. *The Journal of pathology*. 2010 May;221(1): 3-12
7. Agnivesha, Charaka, Drudabala, Chakrapanidatta. Sutrasthana, Chapter.22 Langhanabrimhaniya Adhyaya. In: Acharya YT (Edi.), Charaka Samhita with Ayurveda Deepika Commentary. Reprinting Edition: 2015. Varanasi: Chaukhambha Surabharathi Prakashana; 2015.
8. What Gives an Insulin Hexamer Its Unique Shape and Stability? Role of Ten Confined Water Molecules
9. Margaret M. Hansen, Reo Jones, and Kirsten Tocchini. Shinrin-Yoku (Forest Bathing) and Nature Therapy: A State-of-the-Art Review. *Int J Environ Res Public Health*. 2017 Aug; 14(8): 851
10. Zhang J. A., Zhou B. R., Xu Y., et al. MiR-23a-depressed autophagy is a participant in PUVA- and UVB-induced premature senescence. *Oncotarget*. 2016;7(25):37420–37435. doi: 10.18632/oncotarget.9357
11. Jens Frey Halling and Henriette Pilegaard. Autophagy-Dependent Beneficial Effects of Exercise. *Cold Spring Harb Perspect Med*. 2017 Aug; 7(8): a029777.

Source of Support: Nil

Conflict of Interest: None Declared

How to cite this URL: Karunamayi A S et al: Understanding the Concept of Autophagy Through Langhana. *International Ayurvedic Medical Journal* {online} 2022 {cited September 2022} Available from: http://www.iamj.in/posts/images/upload/3691_3695.pdf