

# The Concept of Langhana in Ayurveda with special reference to Autophagy

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**Abstract:** *Langhana therapy produces Laghuta (lightness) and also leads to Aampachan (conversion of undigested food material to digested) in the body .It is indicated in the diseases (e.g. Medoroga ie obesity) where there is increase in Guru (heaviness) Guna (property) due to Agnimandya generated by our bad habits of life style .Upavasa (fasting) is one of the ten types of Langhana described in Charaka Samhita .Langhana is a body cleansing therapeutic measure that eliminates vitiated Dosha.It may be Dravyabhuta (with medicines) or Adravyabhuta (without medicines) . Autophagy is a recently recognized body cleansing mechanism found to have therapeutic value in certain diseases like cancer. It is a self-degradative process having significant role in important balancing sources of energy at critical times in development and in response to nutrient stress. Researches have shown that fasting helps to induce autophagy. Thus latest researches also approve the effectiveness of therapeutic measures developed by ancient Ayurvedic scholars.*

**Short Running Title:** *Langhana and Autophagy*

**Key Words:** *Autophagy, Langhana,Upavasa,Fasting*

## Introduction

*Ayurveda*, the ancient most science of life considers *Dosha* (functional constituents ie *Vata, Pitta, Kapha*), *Dhatu* (structural constituents ie *Rasa, Rakta, Mamsa, Meda, Asthti, Majja* and *Shukra* ) and *Mala* ( excretory products ie *Mutra, Purisha* and *Sweda* ) as principle constituents of the body. The integrity and functioning of these constituents in harmony with each other is the key to the Healthy Life. Food materials taken orally are transformed into bodily components with the help of *Agni*. For health, equilibrium in harmony of all the constituents is required. Deviation of body constituents from their normal levels leads to various diseases and the purpose of treatment is to achieve natural values of body constituents by using *Ahar* (diet), *Vihar* (life style) and *Aushadh* (Medicine).<sup>1</sup>

There are 6 methods of treatment described in *Charaka Samhita* *Langhana* , *Brimhana*, *Rukshana*, *Snehana*, *Swedana* and *Stambhana* .<sup>2</sup> *Langhana* treatment brings lightness in the body and drugs having properties *laghu* (light), *Ushna* (hot) ,*Tiksna* (sharp), *Vishada* (Non slimy), *Ruksha* (dry) , *Sukshma* (subtle), *Khara* (rough) , *Sara*(mobile) and *Kathina* (hard) are used for this purpose . Further ten types of *Langana* have been described in *Ayurvedic* texts viz, *Vamana* (emesis), *Virechana* (purgation), *Niruha* (decoction enema), *Nasya* (nasal therapy), *Pipasa* (thirst), *Vayu* (exposure to air) , *Dhupa* (exposure to Sun) , *Pachana* (administration of food and medicines that help in digestion) , *Upvasa* (Fasting) and *Vyayama* (exercise).<sup>3</sup> In *Charaka Samhita* ,it has been clearly mentioned that the main aim of *Ayurveda* is creation of equilibrium of *Dhatu*s . '*Dhatuamyakria chokta tantrasya prayojanam*'.<sup>4</sup> Different types of food taken by mouth are acted upon by *Jatharagni* ,*Pancha Mahabhutagni* and seven *Dhatwagni* providing nutrition and luster to whole body. It has been stated that *Dhatu*s get nourishment from their previous *Dhatu* in the sequence of '*Dhatu Poshana Nyaya*' and maintain their normal status. - '*Dhatavo hi Dhatwaahara Prakritimanuvartante*'<sup>5</sup>. This principle helps to explain eating away of imbalanced *Dhatu* by respective *Dhatwagni* in case of non availability or scanty supply of its substrate part of *Dhatu*.<sup>6</sup>

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 human disease was recognized.<sup>7</sup>

In the context of *Dhatu Poshana* , *Dhatu* has been described as the *Ahar* (raw material ) for the production of the next *Dhatu* in the process of their formation . Based on this principle the therapy of *Langhana* has been utilized for creating *Laghuta* (lightness) in the body by depriving from *Ahar* especially in the process of *Upavasa* a type of *Langhana* which leads to lesser formation of *Rasa dhatu* and *Rakta* ,*Mamsa*, *Meda* etc in that order .The same process is also followed in the digestion of *Aam* (undigested food particle ) ie at the level of *Jatharagni* and the *Rasagni* , *Raktagni* and so on<sup>8</sup>.The concept is similar to autophagy which helps cells to maintain intracellular homeostasis and in the state of stress responding by degrading various cellular components , proteins, organelles etc via the lysosome. Autophagy acts as a cellular response to the deprivation of nutrient and oxygen supply which results in recycling of nutrients like amino acids, lipids and so on .The defect in the processes controlling autophagy have been associated with human diseases such as neurological diseases, autoimmune disease, metabolic disorders and cancer. These facts can be utilized for appropriate therapeutic interventions for boosting or inhibiting autophagy to treat or prevent diseases<sup>9</sup> In the extreme case of starvation, the breakdown of cellular components by autophagy helps cellular survival by maintaining cellular energy levels.<sup>10</sup>

## Objectives

1. To study the concept of *Langhana* in Ayurvedic classical texts.
2. To study the relation of *Langhana* with autophagy.

## Materials and Methods

The concept of *Langhana* available in Ayurvedic classical books was examined and literature regarding autophagy was also studied and collected from various books and internet. The concept of *Langhana* and autophagy were critically analyzed.

## The Concept of *Langhana*

*Langhana* implies use of *Aushadh*, *Ahar* and *Vihar* that increase *Laghu* (light) property in the body and reduce *Guruta* (heaviness). It includes ten measures ie *Vamana* (emesis), *Virechana* (purgation), *Niruha* (decoction enema), *Nasya* (Use of drug through nasal route), *Pipasa* (thirst), *Vayu* (exposure to air), *Dhupa* (exposure to Sun), *Pachana* (administration of food and medicines that help in digestion), *Upvasa* (Fasting) and *Vyayama* (exercise). These ten measures can be grouped as *Dravyabhuta* (where *Aushadhi* or medicine is used) and *Adravyabhuta* (where *Aushadhi* is used). Out of these, 5 measures i.e. *Pipasa* (thirst), *Vayu* (exposure to air), *Dhupa* (exposure to Sun), *Upvasa* (Fasting) and *Vyayama* (exercise) are *Adravya bhuta* while remaining 5 are *Dravyabhuta*. *Langhana* is not merely *Upavasa* (fasting).<sup>11</sup> Shodhana for the purpose of *Langhana* is indicated in patients with large and strong bodies having features of increased *Shleshma*, *Pitta*, *Rakta* and *Mala* along with *Vata*. *Pachana* is used in patients having predominance of *Kapha* and *Pitta* like *Vamana* (vomiting), *Atisar* (diarrhea), *Jwara* (fever) and so on. *Upavasa* and *Pipasa Nigraha* (deprivation of water) is advised in patients suffering from diseases similar to those described in *Pachana* but with less strength. *Vyayama*, *Dhupa Sevana* and *Maruta Sevana* is used in patient's good strength and in diseases of medium strength.<sup>12</sup> All these measures help to reduce body weight as there is greater consumption of calories in comparison to supply. When diet with lesser calories is supplied, the storage form of energy (glycogen, fat etc) are utilized to compensate the requirement hence resulting in decreased body weight ie *Laghuta*. Similar effects are obtained when there is increased utilization of energy such as by increasing exercise keeping the food supply constant.

In the process of digestion and metabolism different types of *Agni* perform their physiological functions i.e. digest food and metabolize *Dhatu* as per *Dhatu Poshana Kram* (process metabolism of structural constituents) ie action of *Jatharagni* on food particles, action of *Rasagni* on *Rasa Dhatu* and so on.<sup>13</sup> When food is not available as in case of *Upavas* (fasting), *Agni* in the body start acting on increased *Dosha* and *Dhatu*. After depletion of *Dosha*, *Dhatu* and other components get digested.<sup>14</sup> This concept has been utilized for treating diseases requiring *Langhana*. It has similarity with the concept of autophagy.

## The Concept of Autophagy

Autophagy is the cellular catabolic degradation response to starvation or stress is called as autophagy in which cellular proteins, organelles and cytoplasm are engulfed, digested and recycled in order to sustain cellular metabolism.<sup>15</sup>

Autophagy has three types ie macroautophagy, microautophagy and Chaperone mediated autophagy, these are mediated by the autophagy-related genes and their associated enzymes. Macroautophagy is the main autophagy which is used to eradicate damaged cell organelles or unused proteins. First of all the material to be degraded, is engulfed by the phagophore forming a double membrane called as an autophagosome which travels through the cytoplasm of the cell to a lysosome, leading to fusion of two organelles. In the lysosome, the contents of the autophagosome are degraded via acidic lysosomal hydrolase.

In Microautophagy, there is direct engulfment of cytoplasmic material into the lysosome. Chaperone-mediated autophagy, or CMA, on the other hand is a very complex and specific pathway, involving the recognition by the hsc70-containing complex. CMA translocates protein material in a one by one manner, thus it is extremely selective about the material which crosses the lysosomal barrier.<sup>16</sup>

## Discussion

Imbalance of *Tridosha* ie (*Vata*, *Pitta* and *Kapha*) is the main cause of diseases which in turn is produced by dietary and lifestyle factors as well as environmental factors. There are two types of therapies described in *Charaka Samhita* viz *Langhana* and *Brimhana*. *Langhana* is used in diseases arising from *Samtarpan* producing etiological factors like intake of sweet and fatty diets and sedentary lifestyle while *Brimhana* is used in diseases caused by *Apatarpana* like fasting for longer duration. Out of ten types of *Langhana*, *Upavasa* (fasting) has been found recently to be associated with autophagy. *Upavasa* is a well recognized religious practice in ancient India and its importance as a therapeutic measure has been well described in *Charaka Samhita*.<sup>17</sup>

Autophagy is a highly regulated process. Total depletion of amino acids is found to be a strong signal for autophagy. On fasting for a specific duration there is depletion of carbohydrate reserves leading to utilization of protein and fat for providing energy required for the body.

In the initial stages of starvation, amino acid levels start to increase and these amino acids derived from autophagy are delivered to the liver for gluconeogenesis.

When old junky proteins accumulate, it may lead to – Alzheimer's Disease (AD) and cancer. In Alzheimer's Disease there is accumulation of abnormal protein – either amyloid beta or Tau protein. The process like autophagy having the ability to clear out old protein could prevent the development of AD.

Eating. Glucose, insulin (or decreased glucagon) and proteins all turn off the self-cleaning process of autophagy. In this way, the process of autophagy is unique to fasting which may not be possible with simple caloric restriction or dieting.<sup>18</sup> Regular exercise increases calorie utilization and helps to cleanse the body.<sup>19</sup>

Autophagy also has housekeeping role in removing the aggregated proteins, clearing damaged organelles like mitochondria, endoplasmic reticulum and peroxisomes, as along with the elimination of intracellular pathogens.<sup>20</sup>

All these evidences support the therapeutic efficacy of *Langhana* Therapy described in *Ayurvedic* texts long before the recognition of this important area of therapeutics.

## Conclusion

*Apatarpana thrarapy* or *Langana* has been used as a therapeutic measure in *Ayurveda* since ancient times. Fasting a type of *Langhana* therapy had been practiced as a part of religion in India since time immemorial and not only deprivation from food but also from water has been practiced in certain types of *Upavasa* (fasting). Autophagy is a catabolic process facilitating nutrient recycling via degradation of damaged organelles and proteins through lysosomal mediated degradation. Autophagy has been recently found to have therapeutic value in cancer and certain types of diseases like neuropathies (Huntington's, Alzheimer's and Parkinson's diseases) and ischaemic heart

disease. Autophagy helps to eliminate 'toxic assets' and promotes cell viability. *Langhana* involves various measures of food deprivation. Fasting, a type of *Langhana* has been found to stimulate autophagy.

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