

A CRITICAL APPRAISAL OF *LANGHANA* (DEPLETION THERAPY) THERAPY IN AYURVEDA WITH SPECIAL REFERENCE TO AUTOPHAGY: CELLULAR AND METABOLIC PERSPECTIVES

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<https://doi.org/10.70057/ijaar.2025.70105>

ABSTRACT: Ayurveda describes *Langhana* (depletion therapy) as a set of therapeutic procedures that induce lightness in the body by promoting movement and restricting or lightening food intake. It includes methods to reduce bodily heaviness and restore internal balance, aiming at detoxification and metabolic correction. Classical texts categorize *Langhana* into *Shodhana* (eliminative) therapies—such as *Vamana* (emesis), *Virechana* (purgative), and *Basti* (enema) and *Shamana* (palliative) therapies like *Pachana* (digestion of non-digested substance), *Deepana* (stimulation of digestion power) *Kshuda* (fasting) and *Vyayama* (physical exercise). These procedures eliminate *Ama*, stimulate of *Agni*, and pacify vitiated *Doshas* (body humor), thereby maintain metabolic imbalances. In modern science, autophagy is recognized as a crucial cellular mechanism that eliminates damaged organelles and misfolded proteins, thereby maintaining cellular and metabolic homeostasis. Despite differing conceptual frameworks, *Langhana* and autophagy share similar physiological objectives: internal detoxification, energy efficiency, and restoration of homeostasis. This study aims to critically review the concept of *Langhana* in Ayurveda and compare it with autophagy from a cellular and metabolic perspective. A descriptive and analytical review was carried out using classical Ayurvedic sources as Charaka Samhitha, Sushruta Samhitha, Ashtanga Hridaya Samhitha and recent biomedical research. The study mapped physiological functions and therapeutic goals of *Langhana* practices with known autophagic mechanisms. Findings reveal that Ayurvedic interventions like *Upavasa* (fasting), *Laghubhojana* (light dietary intake), and *Vyayama* (exercise) correspond to known inducers of autophagy in modern science. Both systems improve mitochondrial function, reduce inflammation, and promote cellular regeneration. Moreover, *Langhana*'s actions can be conceptually linked with activation of AMPK, inhibition of mTOR, and up regulation of autophagy pathways. Therefore, it can be concluded that, *Langhana* and autophagy converge as complementary mechanisms for internal cleansing and metabolic regulation. This integrative perspective strengthens the scientific validity of Ayurvedic practices and encourages further interdisciplinary research to harness their combined potential in lifestyle disease management and health promotion.

Keywords: Ayurveda, *Langhana*, *Shodhana*, Autophagy, Metabolism

INTRODUCTION: Ayurveda promotes longevity and well-being through individualized regimens that include diet,

lifestyle, and therapeutic interventions. One of the core principles of Ayurvedic treatment is the balance between *Vṛinhana*

(nourishing or anabolic therapy) and *Langhana* (reducing or catabolic therapy), which are also referred to as *Santharpaṇa* (anabolic therapy) and *Apatharpaṇa* (catabolic therapy) respectively. ^[1, 2]

Among the six basic treatment modalities (*Ṣaṭ-Upakrama*) described by *Acharya Charaka*, *Langhana* is placed foremost, highlighting its clinical importance. ^[3]

Acharya Vāgbhaṭa further classifies *Langhana* into two broad categories: *Śodhana* (purification therapies such as *Vamana*, *Virechana*, *Niruha*, *Śirovirechana*, and *Asruvisravana*) and *Shamana* (palliative measures like *Deepana*, *Pācana*, *Upavāsa*, *Vyāyāma*, *Ātapa*, and *Māruta*). ^[4]

Langhana therapy aims to eliminate accumulated *Doshas* and reduce excessive nourishment, thereby restoring digestive fire (*Agni*) and metabolic balance. It brings about a state of lightness (*laghutva*) and is used especially in conditions of *Ama* (undigested substances) accumulation, metabolic sluggishness, or excessive *Kapha* dominance. ^[3]

Modern biomedical science recognizes a similar catabolic process known as autophagy, a cellular mechanism that involves the degradation and recycling of damaged cellular components. Autophagy plays a vital role in maintaining cellular health, especially during fasting, caloric restriction, or metabolic stress—conditions that align closely with Ayurvedic *Langhana* practices such as *Upavāsa* (fasting) and *Vyāyāma* (exercise). Emerging research suggests that controlled activation of autophagy contributes to detoxification, improved metabolism, delayed aging, and disease prevention—paralleling the therapeutic goals of *Langhana*.

This article aims to critically explore the concept of *Langhana* in Ayurveda and its parallel understanding with autophagy in modern science, providing a comparative insight into their mechanisms, indications, and potential health benefits.

Literary meaning of *Langhana*

The term *Langhana* is derived from the Sanskrit roots “*Laghu*” (light) and “*Gatau*” (movement), which together suggest the concepts of lightness and abstinence from food. In Ayurvedic practice, *Langhana* refers to therapeutic procedures that aim to create a sense of lightness by alleviating excess heaviness or metabolic burden. The word *Langhana* can be broken down as “*Laghu*” (light) + “*Ghan*” (heavy), implying the process of reducing bodily heaviness or *Abhojana* (non-consumption of food). The term *Abhojana* itself consists of *Na* (denoting negation) + *Bhojana* (food), where *Na* signifies a degree of minimalism or lightness, aligning with the concept of light food or restricted intake. ^[5] Therefore, in Ayurvedic literature the terms *Langhana*, *Apatarpaṇa*, & *Upavasa* literally express more or less the same meaning.

Types of *Langhana*: According to *Acharya Charaka*, *Langhana* is classified into several types: *Chatushprakara Samshuddhi* (four elimination therapy), *Pipasa* (thirst), *Maruta* (expose to wind), *Atapa* (expose to the sun), *Pachana* (digestive therapy), *Upavasa* (fasting), and *Vyayama* (exercise). *Chatushprakara Samshuddhi* refers to the four elimination therapies—*Vamana* (emesis), *Virechana* (purgation), *Basti* (medicated enema), and *Nasya* (nasal administration). Chakrapani, in his commentary on this classification, states that all *Shodhana* (purificatory) therapies, except *Anuvasana Basti*,

constitute *Langhana* therapy. *Anuvasana Basti* primarily nourishes the *Shareera* and does not eliminate *Doshas*, which is why it is not considered a *Shodhana* therapy^[3]

In *Ashtanga Hridaya* and *Ashtanga Sangraha*, *Langhana* is broadly classified into two types: *Shodhana* and *Shamana*. *Shodhana Langhana* eliminates vitiated *Doshas* from the body through procedures such as *Niruha Basti* (cleansing enema), *Vamana*, *Kayavirechana* (purgation), *Shirovirechana* (nasal cleansing), and *Asravistruti* (bloodletting). In contrast, *Shamana* type *Langhana* does not directly eliminate *Doshas* but instead brings them to a state of equilibrium state within the body.^[4]

Shamanarupi Langhana consists of seven methods: *Pachana* (digestion promotion), *Deepana* (appetite stimulation), *Kshuda* (therapeutic fasting), *Trishna* (controlled thirst), *Vyayama* (exercise), *Atapa* (sun exposure), and *Maruta Sevana* (air exposure). These therapies help regulate metabolic processes and restore balance without expelling *Doshas*.^[6]

Thus, the concept of *Langhana* can be implemented in two forms—*Shodhanarupi Langhana*, which focuses on purification by removing *Doshas*, and *Shamanarupi Langhana*, which aims to restore balance without elimination *Dosha* and through the pacification. This classification provides a structured understanding of *Langhana* and its therapeutic significance in Ayurveda^[6].

Shodhanarupi Langhana^[7]

According to *Acharya Charaka*, *Samshodhana* is undertaken, when *Dosha* are in highly provoked stage, and also the patient is physically and mentally fit for *Shodana Karma*. This *Shodana karma* (*Pancha Karma*- five folds of elimination

therapy) is done with due consideration needing a lot of preparation methods are called “*Purva Karma*” and post procedures are named as “*Paschat Karma*” or “*Samsarjana Karma*”.

1. *Vamana*

Vamana is described in Ayurveda as a therapeutic procedure intended to eliminate vitiated *Doshas*, particularly *Kapha*, through the upper pathways of the body, primarily by inducing controlled emesis. *Acharya Chakrapani* commented on *Urdhwabhaga* (head or above the clavicle) mentions that” elimination of *Dosha* from the mouth is considered as *Urdhwabhaga*. *Vamana* therapy refers a *Shodhana roopi - Langhana* brings the lightness in the body by eliminating the *Dosha*.

2. *Virechana*

The procedure which eliminates the *Dosha* from *Adhobhaga* of the body is called as *Virechana*, *Acharya Chakrapani* has considered *Adhobhagahara* as elimination through *Guda*. In *Virechana* therapy, the vitiated *Pitta Dosha* is primarily expelled, followed by the elimination of *Kapha* and *Vata* in a sequential manner, resulting in a sense of bodily lightness and improved physiological balance.

3. *Basti*

Administration of *Aushadhi Dravyas* through *Guda* is *Basti Chikitsa*, *Chakrapani* while commenting on “*Chatusprakara Somshuddhi*” says that all the elimination therapies except the *Anuvasana* type of *Basti* is included under *Shodana* therapy, because *Anuvasana Basti* does not eliminate the *Dosha* from the body, instead helps in nourishing the same. *Basti* is regarded in Ayurveda as the most effective therapeutic approach for

regulating and maintaining the balance of *Vata Dosha*.

4. *Shirovirechana*

Nasya is often used synonymously with *Shirovirechana*, a procedure described in classical Ayurvedic texts for the administration of medicated substances through the nasal route. The *Rechana Nasya* specifically facilitates the expulsion (*Karshanata*) of accumulated *Doshas*, particularly in disorders involving the head. *Shirovirechana* is primarily indicated in conditions dominated by *Kapha Dosha* such as heaviness of the head (*Shirogourava*), headache (*Shirashoola*), and chronic nasal congestion (*Peenasa*). A comparative study of classical definitions suggests that *Shirovirechana* serves to eliminate morbid *Doshas* from the cranial region through nasal administration of specific therapeutic agents.

Shamanaroopi Langhanas ^[8]

1. *Pipasa*

In Ayurveda, the conscious restraint from quenching thirst is described under the concept of *Pipasa Nigraha*, referring to the deliberate withholding of water intake despite the sensation of thirst. While it is a recognized therapeutic approach, it should not be practiced to an extent that leads to adverse effects such as dryness of the mouth (*Mukha Shosha*), throat dryness (*Kantha Shosha*), depletion of blood (*Rakta Shosha*), or discomfort in the cardiac region (*Hridaya Vyatha*). When practiced appropriately, *Pipasa* enhances digestive fire (*Agni*) and helps reduce excessive moisture (*Kleda*) and conditions associated with fluid accumulation (*Abhishyandhi*). It is particularly recommended in correcting *Atyambupana*—the excessive intake of

water—which is known to weaken *Agni* and promote the formation of *Ama* (metabolic toxins). Through the proper management of thirst, *Pipasa* facilitates *Dosha* pacification and contributes to a feeling of lightness in the body.

2. *Maruta*

This has been considered as *Shamanaroopi Langhana*. *Maruta*, which is a synonym for *Vata Dosha* within the body, plays a crucial role in maintaining *Agni* and facilitating *Pachana Karma* (digestive activity) under normal physiological conditions. However, in this particular context, *Maruta* refers to the external *Vayu* (wind). Ayurveda describes different types of *Maruta*, where certain winds from specific directions are considered disease-causing, while others are regarded as beneficial to health.

Dushta Maruta (impure air) is said to contribute to *Janapadodhwamsa Roga* (epidemic diseases), highlighting the importance of clean and fresh air in maintaining overall health. Additionally, *Vata* stimulates *Jatharagni* (digestive fire), aids in *Amapachana* (digestion of toxins), and imparts a sense of lightness to the body. Chakrapani, in his commentary on *Maruta*, states that exposure to wind induces lightness in the body. However, if the wind is excessively cold, it does not produce the same beneficial effects.

3. *Atapa*

This method is also classified as a *Shamana*-type *Langhana* and is recognized as one of the ten types of *Niragni Sweda* (non-thermal sudation therapies). In *Sharadrutu* the *Suryataptajala* is told to be *Hamsodaka* and *Amritopama* and *Nirdosha*. This reference of *Vagbhata* states that *Atapa* does *Shamana* of mainly *Kaphadosha* and

brings *Laghuta* in the body. In Atharvaveda we find extensive use of sunrays in treating various disorders like *Hridroga*, *Vrikkroga*, *Vakratroga* etc. By looking into all these references it is very much evident that it can be used in many metabolic and digestive disorders caused by *Ama*.^[6]

4. Pachana

Pachana refers to the process that digests *Ama* (undigested metabolic waste) without stimulating *Agni* (digestive fire), as stated in the verse: “*Pachatyāmam na vahnimcha kuryādyattad dhi pachanam.*” The *Deepika* commentary elaborates on this by explaining that *Ama Pachana* involves performing *Rookshana Karma* (drying therapy) on *Sama* (vitiated) *Dosha*, *Dhatu*, and *Mala*. Classical Ayurvedic texts list a considerable number of *Pachana Dravyas* (digestive agents), with *Chitraka* regarded as one of the most potent among them. When administered appropriately in conditions of *Sama Dosha*, these substances help eliminate *Ama*, leading to a sensation of lightness in the body. *Pachana* therapy is particularly indicated in *Madhyabala Rogas*—moderate strength diseases—such as *Hridroga* (cardiac disorders), *Visuchika* (gastroenteritis), *Alasaka* (intestinal obstruction), *Jwara* (fever), *Vibandha* (constipation), *Gourava* (heaviness) etc.

5. Deepana

Deepana is defined as the therapeutic approach that enhances the function of *Agni* (digestive fire) without directly digesting *Ama*, as illustrated by the classical statement: “*Pachennāmam vahni kriyā na dīpanam tadyathā mishi.*” In conditions such as *Jwara* (fever), *Grahani* (malabsorption syndrome), *Rajyakshma* (tuberculosis), and *Atisara* (diarrhea),

numerous *Deepana* drugs have been indicated. These agents are known to stimulate *Agni* not only at the level of *Jatharagni* (primary digestive fire), but also at the levels of *Bhutagni* (elemental metabolism) and *Dhatwagni* (tissue metabolism). By restoring proper digestive and metabolic function, *Deepana* therapy plays a crucial role in correcting the underlying *Agnimandya* (weakened digestion) and thereby assists in the resolution of *Ama*-related pathologies.

6. Upavasa

Upavasa refers to the practice of either consuming a very minimal quantity of food or complete abstinence from food, even when hunger is present. In classical Ayurvedic texts, *Upavasa* is often recommended as a form of *Langhana* (lightening therapy) for the treatment of conditions such as *Jwara* (fever), *Visuchika* (gastrointestinal disorders), *Alasaka* (intestinal stasis), and *Medoroga* (obesity-related disorders). This practice is generally followed until the patient experiences a sense of lightness and therapeutic benefit. However, it is essential to avoid suppressing natural hunger urges (*Kshudha Vegadharana*), as this can lead to negative effects. Conditions caused by the vitiation of *Kapha* and *Pitta* doshas, especially those of mild to moderate severity (*Alpabala*), such as *Chardi* (vomiting), *Atisara* (diarrhea), *Hridroga* (cardiac ailments), *Hrillasa* (nausea), *Visuchika*, *Alasaka*, *Jwara*, *Vibandha* (constipation), *Gourava* (heaviness), and *Udgara* (belching), are effectively treated through a combination of *Pipasa Nigraha* (controlled thirst), *Upavasa*, and mild *Vyayama* (exercise).

7. Vyayama

“Shareerayasajanajam karma vyayam iti uchyate,” which means an action that induces tiredness in the body is called Vyayama. It is important to note that Vyayama should be performed only up to half of one's strength (Ardhshakti). Vyayama is classified as a type of Niragni Sweda (non-thermal sudation therapy), and both Sweda (sweating) and Vyayama generate heat (Ushna) in the body, which in turn stimulates digestive fire and aids in digestion of undigested metabolic products.

Through Vyayama, the body achieves Laghavata (lightness), Medokshaya (reduction of excess fat), and Agnideepthi, qualities that counteract Ama and support its digestion, preventing its reformation. Conversely, Asanashukha (lack of exercise) or Avyayama (inactivity) leads to Ama accumulation, which in turn causes Santarpanajanyavikaras (conditions caused by excessive nourishment), such as Prameha (diabetes), Kotha (swelling), and Kandu (itching). In cases of Urusthamba (hip stiffness) and Jalabhisarana (water retention), Vyayama is advised as part of the therapeutic regimen, as well as in the management of Sthoulya (obesity).

Indications of Langhana karma in Ayurveda

Langhana is considered the most effective approach for the management of Ama (undigested metabolic waste). Despite this, Charaka also recommends Langhana in the treatment of Samavata (balanced vata) and Kaphapittaja (kapha and pitta dosha imbalance) disorders. It is emphasized that Samadosha (balanced dosha) cannot be eliminated unless Ama has reached its mature or Pakwa (digested) form. Therefore, Langhana is seen as the optimal therapy to facilitate this process. However,

Langhana is contraindicated in conditions where Vata, a primary factor in many disorders, is involved, as it can aggravate Vata imbalances. However care should be taken that Langhana is stopped as soon as Nirama vata is achieved. Also indicated in some of the diseases like Chardi, Atisaar Hridroga, Visuchika, Alasaka Jvara, Vibhanda, Arochaka, etc.^[3]

In Jvara chikitha suthra clearly mentioned that the treatment protocol for Jvara should be started from the Langhana.^[10]

According to the Astanga Samgraha, Langhana Karma (lightening therapy) should be performed daily for individuals suffering from conditions such as diabetes, Ama (endogenous toxins), excess moisture in the body, fever, stiffness in the thighs, leprosy, and other skin diseases, Visarpa (erysipelas), abscesses, splenic disorders, and diseases of the head, throat, and eyes. It is also recommended for those who are obese and even for others during the Sisira (winter) season.^[11]

Therefore, Acharya Vagbhata has added few more diseases to Charaka's examples; Urustamba, Visarpa, Vidradhi, Pliha Shiro roga, etc. This Langhana is also enlisted under the 3 types of Apatarpana they are Langhana, Langhanapachana, and Doshavasechana Application of 3 types of Apatarpana.

Langhana is useful in Ksheenabala dosha Avastha. By fasting there's aggravation of Agni and Vata. As small quantity of water gets absorbed by heat of sun and wind, similarly Dosa get subsided by aggravation of Agni and Vata due to Langhana.^[3]

Langhanapachana are useful in Madyabala Dosha Avastha. When the same water is stagnated to moderate quantity, along with heat of sun and wind

we need to sprinkle some ashes and dust for its drying.

Doshavasechana refers to the process of expelling aggravated *Doshas* from the body. Just as it is impossible to dry up a pond without breaking its boundary walls, similarly, when *Doshas* are strongly aggravated in the body, they must be expelled to restore balance. This expulsion is essential to reduce the excess *Doshas* and achieve health.

Langhana is better than Bhrunghana

According to Ayurveda emaciation is better than corpulence, there is no treatment for the obesity, and for neither *Bhranghana* nor *Langhana* are enough to vanquish excess of fat, digestive activity and *Vata*.^[12]

Results of Athilanghana (Excessive Lightning therapy): Profound emaciation gives giddiness, cough, sever thirst, anorexia, loss of moistness and digestive power, sleep, vision, hearing, semen, *Ojas*, hunger and voice, pain in the bladder, heart, head and calves, thigh, upper shoulders and flanks, fever, delirium, belching, exhaustion, vomiting, cutting pain in the joints and bones, non-elimination of faces and urine.^[3]

Benefits and Therapeutic approaches of Langhana

According to the *Astanga Samgraha*, the benefits of *Langhana* therapy include the sensation of hunger and thirst, clarity of mind, improvement in belching and voice, reduction in the severity of the disease, increased enthusiasm, and the disappearance of stupor. Additionally, the *Astanga Hridaya Samhita* mentions other benefits of *Langhana*, such as enhanced sensory perception, expulsion of bodily wastes (*Mala*), a feeling of lightness in the body, and improved taste perception.^[14]

While *Apatarpana* is primarily indicated for *Vruna* (ulcers) it can also be applied to certain surgical conditions, such as *Arbuda* (tumors). Modern research supports the idea that fasting, a form of *Apatarpana*, may help eliminate preneoplastic cells from the body, thus highlighting its relevance in contemporary medical practices as well.^[15]

Establishment of energy balance by way of *Apatarpana Chikitsa* is rational in *Vatavyadhi* caused by *Margavarana* (obstruction of *Srotas*). *Margavarana* is due to *kapha* and *Medas* that should be treated by *Rukshana* (roughness) and *Apatarpana*. When there is an excessive intake of sweet and fatty foods, it leads to an imbalance in the body, causing the channels (*Srotas*) to become coated, a condition known as *Srotolepa*. Specifically, when *Srotolepa* affects the vascular system, particularly the *Rasa* and *Raktavaha Srotas*, it has serious health implications, leading to a condition known as *Margavarana* (blockage of the channels), which can severely impact overall health. As the vascular system is distributed in whole body *Margavarana* may affect every organ of our body. Depending on the organ involved the illness is named accordingly ie *Vatavyadhi*, *Hridroga Vatarakta Gulma* etc.^[16]

As the cause is *Margavarana* the 1st choice of treatment is *Langhana*. In *Vatarakta* as the pathology creates obstruction of *Raktamarga* (blood vessels) among which the accumulation of *kapha* and *Medas* is major phenomenon (obstructive arterial disease) so in such conditions *Langhana* is choice of treatment. Some of the other *Margavarana Janya Rogas* nothing but *Santarpanotta*

Nidana Janya Vyadhis like *Hridroga* (IHD) *Pliharoga* (Splenomegaly due to Lipoproteinemia) *Gulma* and *Atisara* (ischemic colitis) the *langhana* can be implemented. Pathogenesis of *hridroga* varies acc to pathology. As per *Santarpana nidana* is concerned accumulation of *kapha* with in *Srotas* hampering circulation of *rasa* and aggravation of *Vata* results in *Hridroga*. So here *Srotoprasadan* is best achieved by *Sodhana* and *Apatarpana*.^[17]

When we go to the psychological illness it is categorized into organic and psychogenic. In the causes of these entities cerebral atherosclerosis is the commonest cause. This may lead to conditions like dementia anxiety depression etc. So this pathology holds similar to *Unmada* (psychological disorders) due to *Margavarana*.^[18]

The coating of *Kapha* and *Medas* inside of *Srothas* is known to cause *Margavarana* (blockage of channels). In such cases, treatment for both *Unmada* (mental disorders) and *Margavarana* should be planned together. The treatment of *Margavarana* involves both *Sodhana* (purification) and *Apatarpana* (depleting therapy). In conditions like *Sthulapramehi* (obesity), the morbidity caused by *Medas* is best addressed through *Apatarpana*, which includes both *Sodhana* and *Shamana* (pacifying treatments). Therefore, in the treatment of these diseases, a combination of *Shamana* medicines with the *Apatarpana* approach for *Margavarana* is considered a rational and effective strategy. This approach is likely to provide maximum benefit, both in remitting existing conditions and in preventing further manifestations of *Margavarana*.^[19]

Ayurvedic Insight into Autophagy through *Langhana Chikitsa*

Autophagy, originating from the Greek terms 'auto' (self) and 'phagy' (to eat), refers to a vital cellular mechanism through which cells break down and repurpose their own malfunctioning or redundant elements. This self-renewal system is crucial for preserving internal cellular balance and safeguarding the cell against damage caused by various forms of physiological stress.^[20]

This process is essential for numerous physiological functions, including cellular quality control, metabolic regulation, immune responses, and maintaining cellular integrity under stress. Autophagy is regulated by several pathways, primarily involving the autophagy-related genes (ATGs) and the mTOR (mechanistic target of rapamycin) signaling pathway. The process occurs in a series of steps, beginning with the formation of a phagophore, which elongates and engulfs the cargo to form an autophagosome. The *autophagosome* subsequently fuses with a *lysosome*, where its contents are broken down, and the components are recycled for reuse by the cell. In Ayurveda, this process can be compared to *Langhana Chikitsa*, particularly practices such as *Upavāsa* (therapeutic fasting), *Pachana* (measures for digesting *Ama*), and *Deepana* (therapies for stimulating *Agni*). These approaches focus on eliminating or metabolizing undesirable, toxic, or unprocessed substances (*Ama*) from the body, thus restoring *Agni* (digestive and metabolic fire) and bringing the body back into balance.

In healthy cells, autophagy is constantly active at a basal level to eliminate damaged organelles and proteins that may

otherwise accumulate, leading to cellular dysfunction and disease. However, autophagy's role becomes especially significant under stress conditions, such as nutrient deprivation, hypoxia, or infections. For example, during starvation, autophagy is up regulated to provide essential nutrients by degrading cellular components.^[21] This mirrors the Ayurvedic concept that during periods of fasting or restricted intake, Agni becomes stronger, and the body utilizes internal reserves to maintain balance and remove *Sama Dosha* (*Dosha* which are not fully metabolized). *Langhana* therapies are prescribed in conditions of *Ama* accumulation, where reduced food intake and metabolic stimulation are used to remove obstructions from bodily channels (*Srotas*), and a process conceptually similar to cellular detoxification through autophagy. Moreover, just as autophagy supports immune defense through clearance of pathogens, Ayurveda describes the *Ama Pachana* process as critical to restoring *Ojas* and boosting *Vyadhi Kshamatva* (immunity).^[22]

Deregulated autophagy has been implicated in a variety of diseases. In neurodegenerative diseases like Alzheimer's, Parkinson's, and Huntington's, impaired autophagy leads to the accumulation of misfolded proteins and dysfunctional organelles, contributing to neuronal cell death.^[23] Ayurveda too associates such degenerative conditions with *Majja Dhatu Dushti* and *Vata vitiation*, and recommends *Rasayana* (rejuvenation) therapies and *Langhana* to cleanse and restore tissue-level integrity.^[22]

Similarly, autophagy dysfunction is associated with various cancers, as both

excessive and insufficient autophagic activity can promote tumorigenesis. While autophagy can suppress tumor initiation by preventing the accumulation of damaged proteins and DNA, once a tumor is established, cancer cells may hijack autophagy to enhance their survival under stress, particularly during treatment.^[24] This parallels the Ayurvedic view that improper elimination of *Dushtas* (toxins) and uncontrolled cell growth due to *Vikrita Dhatu* formation can lead to *Arbuda* (tumors), where purification and regulation of metabolism through *Langhana* are essential parts of treatment.^[25]

Autophagy has also been linked to metabolic diseases. In obesity and type 2 diabetes, impaired autophagic activity in adipocytes and pancreatic cells can exacerbate the accumulation of toxic proteins and dysfunctional organelles, leading to insulin resistance and glucose intolerance.^[24] This concept is analogous to Ayurvedic descriptions of *Medo Roga* and *Prameha*, where improper metabolism and the accumulation of *Ama* in the *Meda Dhatu* disrupt the body's physiological balance. *Langhana* therapies, such as *Upavāsa* (therapeutic fasting), *Vyāyāma* (exercise), and *Pachana* (*Ama*-digesting treatments), are emphasized for managing these conditions. They work through the gradual elimination of *Ama* and the rekindling of *Agni*, which functionally parallels the enhancement of autophagy activity in modern science.^[22]

Furthermore, autophagy has been suggested as a therapeutic target for metabolic syndrome, as enhancing autophagy could potentially improve insulin sensitivity and reduce the burden of metabolic diseases.^[26] These modern observations reinforce the relevance of

traditional Ayurvedic principles, particularly the use of *Apatharpana* (depletion therapy) for treating diseases arising from *Santarpana* (excessive nourishment).

Autophagy also plays a crucial role in the aging process, as it helps maintain cellular health by clearing damaged components and promoting the renewal of cellular structures. With aging, the efficiency of autophagy decreases, leading to the accumulation of damaged proteins and organelles, which contributes to age-related diseases and the overall decline in cellular function. A decline in autophagic activity has been observed in tissues like muscle, liver, and brain in older individuals. Enhancing autophagy has been proposed as a potential strategy to delay aging and age-related diseases. For example, studies on caloric restriction and autophagy-inducing compounds like spermidine have shown promising results in extending lifespan and improving health span in model organisms. [27] Ayurveda similarly advocates *Langhana*, *Rasayana*, and *Dinacharya-Ritucharya* regimens to maintain *Dhatu Saamya* (tissue equilibrium), sustain *Agni*, and promote *Jeevana* (longevity), echoing the protective and rejuvenate effects observed through autophagy in modern biomedical science.

DISCUSSION: *Langhana* therapy and autophagy share common metabolic and cellular pathways, particularly in their ability to reduce excess tissue accumulation and improve metabolic efficiency. Fasting is a central component of *Langhana* therapy and is known to induce autophagy through the nutrient-sensing pathways involving mTOR. When the body experiences caloric restriction or

fasting, mTOR signaling is down regulated, leading to the activation of autophagy. This is similar to the Ayurvedic principle of *Langhana*, where fasting or the reduction of food intake is used to reduce *Kapha* (which governs fat accumulation) and *Ama* (which represents metabolic waste). Both approaches stimulate the breakdown of stored fat and dysfunctional cellular components to improve metabolic health. [28]

When considering the metabolic reprogramming, the role of *Langhana* in improving digestion and metabolism aligns with autophagy's cellular function. By eliminating toxic metabolic by-products and improving digestive fire (*Agni*), *Langhana* enhances the body's ability to detoxify and optimize energy utilization. Autophagy, at the cellular level, is similarly involved in maintaining metabolic homeostasis, particularly in adipocytes and liver cells, where it helps regulate lipid metabolism and insulin sensitivity. [29, 30]

Autophagy also plays a protective role by eliminating damaged mitochondria and proteins that could contribute to oxidative stress. Therefore, both *Langhana* and autophagy contribute to reducing the damaging effects of free radicals, thus improving cellular and systemic health.

From a modern clinical perspective, *Langhana* therapy can be understood as a therapeutic intervention for managing metabolic diseases such as obesity, type 2 diabetes, and hyperlipidemia. These conditions are characterized by impaired autophagic function and a reduced capacity to clear damaged cells and excess fat. In this context, *Langhana* therapy can be seen as a way to restore the balance of

Agni and support the natural process of autophagy.

Obesity is closely linked to deregulated autophagy, particularly in adipocytes, where impaired autophagy leads to the accumulation of damaged proteins and mitochondria. Studies have shown that autophagic dysfunction in fat cells can exacerbate insulin resistance and contribute to metabolic syndrome. By employing *Langhana* therapy, especially through fasting and diet modifications, the body may activate autophagy, promoting fat breakdown and improving insulin sensitivity.^[30]

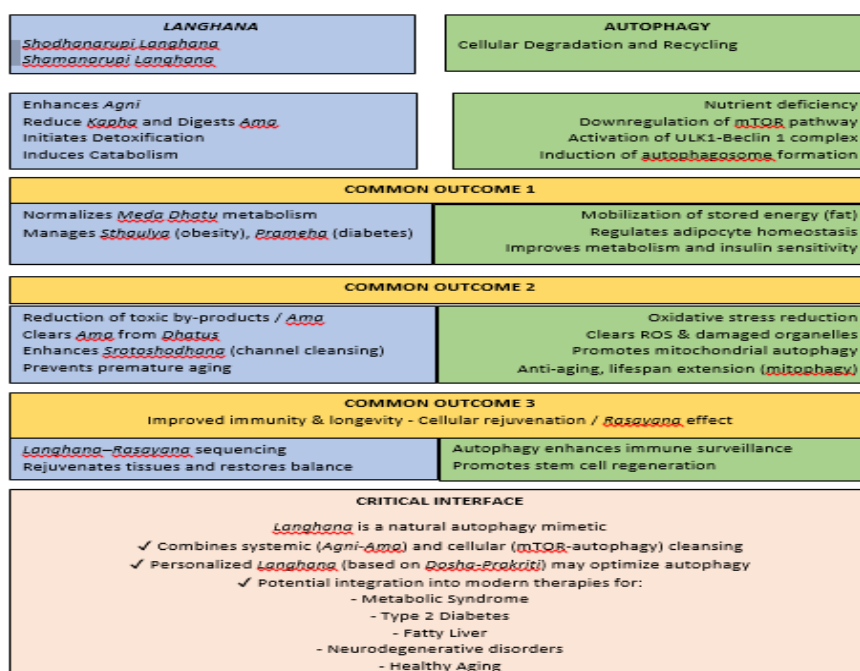
In type 2 diabetes, reduced autophagic activity leads to the accumulation of toxic cellular components, particularly in pancreatic beta cells. This contributes to insulin resistance and pancreatic dysfunction. *Langhana* therapy, by improving digestive function and promoting detoxification, could theoretically help restore autophagic

activity, thus improving insulin sensitivity and glucose metabolism. Clinical studies support the idea that caloric restriction and intermittent fasting can enhance autophagic activity, reduce inflammation, and improve insulin sensitivity.^[31]

Aging is associated with a decline in autophagic efficiency, leading to the accumulation of cellular damage and contributing to age-related diseases. *Langhana* therapy, particularly fasting, is believed to delay the onset of aging and age-related disorders by stimulating autophagy and promoting cellular rejuvenation. Modern studies have shown that caloric restriction, a form of *Langhana*, can extend lifespan in various model organisms by enhancing autophagy and improving mitochondrial function.^[25]

The Ayurvedic principle of rejuvenation (*Rasayana*) could thus be correlated with the modern understanding of autophagy's role in extending lifespan and maintaining cellular health.^[25, 26]

Chart 01: *Langhana* Therapy vs. Autophagy Pathways and Their Therapeutic Convergence
While there is substantial evidence supporting the correlation between *Langhana* therapy and



autophagy, several limitations should be considered:

Individual Variability: Ayurveda emphasizes the importance of personalized treatment based on *Prakriti* and *Doshas*. The effects of *Langhana* therapy can vary significantly based on an individual's constitution and health condition. This variability poses a challenge in standardizing *Langhana*-based interventions in clinical practice.

Over activation of Autophagy: In some cases, excessive autophagy can lead to autophagic cell death, particularly under prolonged nutrient deprivation or stress. Thus, *Langhana* therapy, if misapplied or overextended, could have detrimental effects, highlighting the need for balanced and guided interventions.

CONCLUSION

In conclusion, this review establishes a profound connection between the Ayurvedic concept of *Langhana* and the modern scientific mechanism of autophagy, highlighting their mutual significance in maintaining physiological equilibrium and promoting health.

Langhana, traditionally employed to eliminate *Ama*, stimulate *Agni*, and pacify aggravated *Kapha*, mirrors the objectives of autophagy at the cellular level, which functions to remove dysfunctional organelles, misfolded proteins, and metabolic waste through lysosome degradation pathways.

Both processes are inherently self-cleansing and energy-regulating, activated during states of caloric restriction and fasting. They not only optimize energy utilization but also restore systemic and cellular homeostasis, contributing to the prevention and management of chronic inflammatory and metabolic disorders.

The comparative framework utilized in this study connects classical Ayurvedic physiology with modern cellular biology, facilitating a translational understanding through functional mapping. In this model, *Ama* is likened to cellular waste, *Agni* corresponds to metabolic enzymes and regulators, and *Srotas* are analogous to cellular transport systems. Furthermore, scientific investigation into *Langhana* reveals its potential to modulate key molecular pathways such as AMPK, mTOR, and SIRT, which are central to autophagy regulation.

Thus, from both a cellular and metabolic perspective, *Langhana* and autophagy converge as synergistic mechanisms, offering promising insights into integrated therapeutic approaches for lifestyle-related diseases, enhancing immunity, supporting tissue regeneration, and contributing to healthy aging and longevity. This conceptual synergy invites interdisciplinary research, fostering a holistic model of health that unites ancient wisdom with modern science.

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Source of support: Nil Conflict of interest: None Declared

Cite this Article as : [S.P.A.S. Nishan et al : A Critical Appraisal of Langhana (Depletion Therapy) Therapy in Ayurveda with Special Reference to Autophagy: Cellular and Metabolic Perspectives] www.ijaar.in : IJAAR VOL VII ISSUE I MARCH - APRIL 2025 Page No: 38-51