

## UNDERSTANDING ENDOTOXINS AND THE ROLE OF VAMANA KARMA IN DETOXIFICATION

Dr. Karishma Anwar<sup>1\*</sup>, Dr. Kiran M. Goud<sup>2</sup> and Dr. Shreyas D. M.<sup>3</sup>

<sup>1</sup>PG Scholar, Department of Panchakarma, Sri Kalabhyraveswaraswamy Ayurvedic Medical College, Hospital and Research Centre, Bangalore, Karnataka, India.

<sup>2</sup>Professor, Department of Panchakarma, Sri Kalabhyraveswaraswamy Ayurvedic Medical College, Hospital and Research Centre, Bangalore, Karnataka, India.

<sup>3</sup>Assistant Professor, Department of Panchakarma, Sri Kalabhyraveswaraswamy Ayurvedic Medical College, Hospital and Research Centre, Bangalore, Karnataka, India.



\*Corresponding Author: Dr. Karishma Anwar

PG Scholar, Department of Panchakarma, Sri Kalabhyraveswaraswamy Ayurvedic Medical College, Hospital and Research Centre, Bangalore, Karnataka, India.

Article Received on 20/02/2025

Article Revised on 10/03/2025

Article Accepted on 30/03/2025

### ABSTRACT

*Vamana Karma* is a significant therapeutic procedure in *Ayurveda*, classified under *Panchakarma chikitsa*. It is a Purificatory therapy designed especially to cure the *Kapha pradhana Dosha Vyadhi*<sup>[1]</sup> and thereby helps in restoring the balance of *Tridoshas*. The procedure involves *Poorvakarma*<sup>[2]</sup> (Preparatory measures) such as *Rookshana* (Drying therapy), *Deepana* and *Pachana*, *Snehana* (Oleation therapy), *Swedana* (Sudation therapy), followed by the administration of emetic herbs after assessing *Desha*, *Bala*, *Kala*, *Vaya*<sup>[3]</sup> and certain other factors to induce a controlled vomiting. The concept of deeply embedded toxins (*Ama*) are primarily aimed to expel out from the *sharira*. The concept of *Ama*<sup>[4]</sup> is akin to endotoxins in modern science. Endotoxins are toxic substances that originate within the body often due to factors like *Ajeerna* (Indigestion), Metabolic dysfunction or any microbial activity. These toxins accumulate overtime and lead to various chronic and systemic disorders.

**KEYWORDS:** Endotoxins, *Kapha Dosha*, *Poorvakarma*, *Vamana Karma*, *Ama*.

### INTRODUCTION

*Panchakarma* are the *Sodhana* procedures meant to expel *Prakupita Doshas* from the body. Among the five therapeutic procedures, *Vamana Karma* is considered to be *Aadhya Upakrama*<sup>[5]</sup> before proceeding to rest all *Panchakarmas*. *Charaka* has defined *Vamana Karma* as a process to expel doshas from *Urdhwa sharira*<sup>[6]</sup> (Upper channels i.e. mouth). *Acharya Charaka* mentions as *Shareera mala nirharana*<sup>[7]</sup> (Removal of wastes from body), and if the *Doshas* gets accumulated over a longer duration will invite diseases like *Sthoulya* etc., Such an individual is considered to be *Bheshaja Dweshi*.<sup>[8]</sup> *Poorvakarmas* being of two types namely *Samanya poorvakarma* and *Vishishta Poorvakarma* are decided in accordance to the *Vyadhi avastha* of patient. Further *Snehana* (Oleation) helps in doing *Utkleshana*<sup>[9]</sup> *Vamana Karma*, being considered as *Shodhana roopi Langhana*<sup>[11]</sup>, through its meticulously designed preparatory and emetic stages, targets these toxins.

### POORVAKARMA

The main role of *poorvakarmas* for *Vamana Karma* is to gather the *Upasthita Dosha*<sup>[12]</sup> (Vitiated *Doshas* have

(Exciting) of *Doshas* and *Swedana* (Sudation) aids in *Koshtagati*<sup>[10]</sup> (From peripheral tissues to the gastrointestinal tract) of *Doshas*.

*Ayurvedic* texts described *Ama* as a sticky, undigested metabolic waste that causes *abhishyanda* of *srotas*. Similarly, endotoxins, particularly lipopolysaccharides (LPS) released when bacterial cells die and lyse, although small amounts is also shed during bacterial growth. Contaminated medical devices or pharmaceuticals, Bacterial infections, environmental exposure (air, water dust) can set off inflammation, oxidative stress, immune response, beneficent to conditions like metabolic syndrome, autoimmune disorders and allergies in the present era.

accumulated in the GIT and are ready to get expelled out). This stage is crucial before *Vamana Karma* since it determines the timing, favourable and safe state to expel the *Doshas* out.

*Vishishta Poorvakarmas* are being adopted in order to prevent Lipotoxicity.

Poorvakarma	Indications	Procedures
<b>Samanya Poorvakarma</b>	Indicated in all after doing <i>atura pareeksha</i>	<i>Pachana-deepana, Snehana, Swedana</i>
<b>Vishishta Poorvakarma</b>	<i>Mamsala, Medura, Bhuri Sleshma, Vishama agni</i> <sup>[13]</sup>	<i>Rookshana</i> procedures like <i>Udwartana, Takradhara/ Parisheka/ Bashpa sweda</i> ; followed by <i>Snehana</i> and <i>Swedana</i>

### ASSESSMENT OF KOSHITA

There are three types of *Koshta*<sup>[14]</sup> based on the predominance of *Doshas*. They are *Mrudu, madhyama, Krura Koshtas*.

Preceding to the fixation of *Snehapana matra* (dosage), one should be well acquainted with the *Koshta* of *Rugna*. In case of *Krura Koshta*, advising *Hrasva matra* of *sneha* (smaller dose) is not beneficial since it doesn't bring the *Doshas* to *Koshta* for proper expulsion. In the similar manner *Mridu Koshta* person can't be given *Teekshna* or *Pravara matra* of *Sneha*. *Acharya Charaka* has excluded a *Mridu Koshta* person for the purpose of *Snehapana*.<sup>[15]</sup> In such a case a *Vaidya* using his *yukti* should make the patient fit for the purpose of *Snehapana*. So while deciding the dose, one should investigate thoroughly the *koshta* of *Rugna*.

### SNEHAPANA

*Sneha* is a lipid substance or a fatty substance. Ayurveda conveys that *Purusha* is made up of *Sneha sara*<sup>[16]</sup> predominantly which can be seen under *Meda Dhatu*. This *sneha* should be nourished on regular basis, the biggest share of which comes from the *Aahara* we consume. Qualitatively and Quantitatively surveiled good fats will look over our health and provide immunity against diseases. On the other way, surfeit or slighter or in-discriminated use of unmonitored *sneha* will lead to various diseases. Therefore *Sneha* is required for our health and a healthy living.

The *Shodhananga Snehpana* can be applied by two methods, one is *Accha snehapana*<sup>[17]</sup> and the other is *Vicharana Snehapana*.<sup>[18]</sup>

#### 1. ACCHA SNEHAPANA

*Accha snehapana* refers to the intake of large quantity of *Sneha* without mixing with any other materials and is given especially after considering the fact that previous meal is properly digested.

This is indicated in 3 Conditions<sup>[19]</sup>

- *Snehasatmya* (One who's conducive to intake fats)
- *Klesha saha* (One who can face obstacles)
- *Na ati Ushna sheeta kaala* (Period which is neither too hot nor too cold).

It is essential to consider these three factors before administration of *Snehapana* as giving of sole *Sneha* has adverse effects in some individuals. There is a concept of "Lipid toxicity" also known as **Lipotoxicity** which refers to harmful effects of excess lipid accumulation in the non-adipose layer of tissues, such as heart, pancreas,

liver. This phenomenon occurs when the body's potentiality to store lipids in adipose tissue is exceeded, dominating the lipid deposition in tissues which are not specialized for fat storage. The accretion of toxic lipid intermediates, such as diacylglycerols, ceramides and free fatty acids which will result in disruption of cellular function and viability, giving rise to metabolic diseases and organs dysfunction.

For Instance, In a *vyadhi* like *Prameha* and *Sthoulya*, Bacterial LPS is considered to be a conducive component of the onset of insulin resistance and low grade inflammation respectively. The major metabolic effect of a high-fat diet is that the insulin action and the regulatory mechanisms of body weight are hampered through a well explained "Lipotoxic effect". Lipotoxicity occurs when excess of FFA's and triglycerides accumulates in non-adipose tissue like Pancreas, Liver, muscles. *Prameha* and *Sthoulya* being considered to be *Kapha Dosha* and *Meda Dushya pradhana vyadhis*, there is a high chance of Lipid toxicity in such individuals. Thus the term *Na ati Snigdhan Vishodhayet*<sup>[20]</sup> (Purification without excessive oleation) is mentioned. In such one can choose *Sadhyosnehana* (A quick oleation therapy).

In the current practice *Tila taila* (Sesame oil) is preferred mostly as it is considered to be *Sarva Shreshtha* (Superior) among the *Taila Varga*. For a *Vyadhi*(Disease) like *Prameha* (Diabetes Mellitus), *Taila* is considered to be *shreshtha* for the purpose of *Snehapana*.<sup>[21]</sup> *Prameha* (Diabetes Mellitus) is one such condition where we can co-relate the condition of Lipid toxicity in pancreatic beta cells which impairs the insulin secretion and Insulin resistance in Skeletal muscle and liver. Sesame seeds or sesame seed oil have been considered of as rare causes of food allergy most of which will be IgE dependant. There is a wealth of evidence that anaphylactic reactions can occur to the ingestion of sesame oil. Thus it is required to assess the *Rugna* by taking a detailed history including the foods he/she is allergic to.

#### 2. VICHARANA SNEHAPANA

*Vicharana*- Thoughtful

*Sneha*- fats or medicated fats

Thus, *Vicharana Sneha* means thoughtful or skillful administration of *Sneha*.

Indications of *Vicharana Sneha* are as follows

- *Sneha Dwesha* (Person who is reluctant towards Fats)
- *Sneha Nitya* (One who is habituated to take Fats)

- *Mrudu Koshta* (One who has a gut which causes quick purging)
- *Klesha asaha* (Those who do not tolerate the hardships)
- *Madhya Nithya* (Those who consume Alcohol on a regular basis).

In these group of people, *Sneha* will not be tolerated or it produces some adverse reactions. Therefore, *Sneha* should be intellectually administered by admixing with foods.

Lipids, especially saturated fats, revives the production of bile, which emulsifies fats for absorption. Bile also binds to endotoxins, facilitating their transport through intestinal wall into the bloodstream. Lipids are absorbed via **chylomicrons** which are lipoprotein particles and can also carry endotoxins into systemic circulation.

#### SWEDANA

*Swedana karma* (Sudation therapy) involves inducing sweating and helps in bringing of *Doshas* to *Koshta* by opening up of *Srotas* (Body channels) and promotes the elimination of *Ama* (Toxins).

Endotoxins are derived from the outer membranes of Gram-negative bacteria and are not eliminated directly through sweating. However *Swedana* might support the body's natural detoxification process by stimulating the Circulation in body which will further enhance the delivery of immune cells to the sites where bacterial endotoxins are present. *Swedana* by reducing stagnation and improving circulation, helps in functioning of organs effectively. Thus, *Swedana* along with *Snehana* will help to put together the *Upasthita Doshas* (at present) from *Shakha* to *Koshta* (Periphery to GIT). The term *Koshta* in ayurveda has a broader meaning. It can be co-related to the systemic circulation, which by the process of Vasodilation expresses its action.

#### PRADHANA KARMA (VAMANA KARMA)

*Vamana Karma* is process by which the endotoxins especially the *Kapha* and *Pitta Doshas* which are present in Stomach, in cells and tissues of the entire body are eliminated.

The *Poorvakarma* procedures like *Snehana* and *Swedana* helps in gathering of *Upasthita Doshas* (at present) and further does the *Utkleshana* (Excite) in *Koshta* and thus facilitates the person to undergo a smooth *Vamana* procedure. The *Vamaka dravyas* are imposed with the qualities of *Ushna* (Hot), *teekshna* (Sharp), *Sukshma* (Minute), *Vyavayi*, *Vikashi* and *Urdhwabhaga prabhava*, it induces the *anupravana* (Flow) in *Srotas* (Body channels) and moves the *Utklishta Doshas* from there to *amashaya* and further due to *Vayu* and *Agni mahabhuta* predominance the expulsion occurs from upper GIT.<sup>[22]</sup>

The seat of *Apakwa Kapha* (Crude Kapha) is *urdhwa amashaya* in normal will have the influence of vitiated

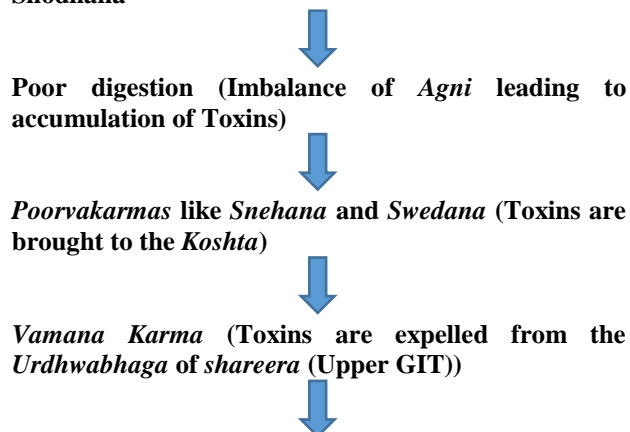
*Bodhaka, Kledaka Kapha* in abnormality. And this can be claimed as heavy metals like Mercury and Lead excretion in Saliva and nitrogenous end products of digestions collected in *amashaya* as an action of *Anupravana*. The modern science explains the secretions from Fundus of stomach apart from mucin are Vasoactive Intestinal peptide (VIP), Gastrin releasing Peptide (GRP) and Somatostatin and this will increase the Gastrin secretion. Likewise Glucagon which regulates the glucose concentration in blood levels have an indirect influence on *Madhuryata of Kapha in Vriddhi* (Increased) state.

Endotoxins are known immunomodulators and is many a time a contaminant in biological preparations. They often arise from bacterial overgrowth or imbalance in the gut (Dysbiosis). *Vamana Karma*, by clearing the stomach and upper GI contents, helps in reducing the bacterial overgrowth and thus creating a wholesome environment for healthy microbial populations to bloom. The process of an induced emesis removes not only the *Ama* and *kapha* but also the potentially harmful bacteria or their byproducts. Thus *Vamana Karma* could act as a “reset” for the gut by allowing the beneficial bacteria to recolonize the gut. A healthy gut microbiota is pivotal for regulating the immune system. By flushing out the toxins and doing *Agnivardhana*<sup>[23]</sup> (Digestion), *Vamana* may indirectly enhance the diversity and flexibility of the gut microbiome, supporting the immune function which is one step ahead.

#### PASCHAT KARMA

After *Vamana karma*, the stomach lining and digestive enzymes need some time to recover. *Samsarjana Krama*<sup>[24]</sup> a diet, ensures the gradual recolonization of beneficial bacteria by providing easily prebiotic rich food. A gradual progression will help to preserve the anatomy of the GIT. By starting with light, easily digestible foods, it is linked in elimination diets used in managing gut inflammation or condition like IBS. It can be concluded that Body needs a recovery after cleansing and thus preserve the gut microbiota health and helps in systemic inflammation management.

#### Flowchart representing the overall process of Shodhana



**Paschat Karma (Body regains the normalcy because of expulsion of Ama (toxins))**



**Achieving of Karya i.e Dhatuamyata<sup>[25]</sup> (A healthy state and balance of all bodily tissues)**

### DISCUSSION

Endotoxins are toxic substances which are obligated to the outer membrane of Gram negative bacteria, chiefly composed of lipopolysaccharides. These molecules are released when bacterial cells multiply or die and thus plays a prime role in causing systemic inflammation and various diseases. The presence of endotoxins can activate a large amount of immune responses leading to inflammation, fever, septic shock and in severe cases organ failure. Modern science look around for the ways to mitigate their harmful effects, and traditional systems like Ayurveda provides a holistic approach with the promotion of therapies like vamana which plays a crucial role in detoxification.

Endotoxins are highly potent in stimulating the immune system. Once they are released into the bloodstream, they bind to immune cells such as monocytes and macrophages, triggers the release of pro-inflammatory cytokines like tumour necrosis factor- alpha (TNF-a) and interleukins. This response is protective in small amounts but can become pathological if the levels are excessive. Conditions such as Leaky gut syndrome, bacterial infections, necessitating effective detoxification strategies. The presence of endotoxins in the blood (referred to as endotoxemia) typically leads to hypotension, respiratory failure and ROS (Reduced oxygen delivery system). A powerful endotoxemia can further lead to sepsis and eventually death.

In Ayurveda, toxins are broadly classified under the heading of *Ama* (endogenous toxins resulting from improper digestion). Endotoxins line up with the concept of *Ama*, as they disrupt homeostasis and lead to systemic inflammation. A controlled therapeutic emesis can reduce gastric endotoxins, reduce gut inflammation and modulate the immune response. Some studies suggest that Panchakarma therapies may improve conditions linked to endotoxemia such as autoimmune diseases, metabolic disorders. Acharya Susruta has quoted as *Vruddhah nirharitavyah and samah paripalayitavyah<sup>[26]</sup>*; Endotoxins in the usual amounts can support the immune system function, but when their levels increase, they can disarray the body's balance and lead to harmful effects. Thus the increased endotoxins should undergo *Nirharana* (Expulsion) and this is possible only through Panchakarma.

Thus an attempt is made to throw a light on the concept of Endotoxins and the role of *Vamana Karma* in detoxification.

### CONCLUSION

Endotoxins are a remarkable concern in both modern medicine and traditional healing systems like Ayurveda. *Vamana*, as a part of Panchakarma therapy, provides a natural and holistic approach for detoxification. By focusing on removal of toxins, it addresses both the root cause and symptoms of endotoxins related disorders. A diet having high-fat, Alcohol consumption and a Sedentary lifestyle are the contributing factors to increase the levels of endotoxins in our body. Chronic conditions like Obesity, Type-II Diabetes mellitus are also associated with higher endotoxin levels and gut barrier dysfunction. Thus exploring such traditional therapies could offer complementary strategies for managing systemic inflammation and thus enhance overall health.

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