

## Ayurvedic Concept of Ama and Its Pathophysiological Correlation with Systemic Inflammation: A Comprehensive Integrative Review

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### ABSTRACT

*Ama* is an important concept in Ayurveda that refers to harmful substances formed when digestion and metabolism are not functioning properly due to weakened *Agni*. Classical texts such as Charaka Samhita, Sushruta Samhita, and Ashtanga Hridaya describe *Ama* as a major factor responsible for the development of many systemic diseases. It develops when both digestive processes (*Jatharagni*) and tissue metabolism (*Dhatvagni*) are impaired, leading to the buildup of toxic substances in the body. These substances circulate through the system, block bodily channels (*Srotas*), and disturb normal physiological functions.

Symptoms of *Ama* include heaviness, tiredness, loss of appetite, indigestion, general discomfort, joint stiffness, and weakness, indicating metabolic imbalance. When *Ama* combines with *Doshas*, it forms *Sama Dosha*, which results in more severe disease conditions.

In modern medicine, systemic inflammation is recognized as a key factor in chronic diseases such as diabetes, heart disease, metabolic disorders, autoimmune conditions, and neurodegenerative diseases. It involves immune activation, release of inflammatory markers like TNF- $\alpha$ , IL-6, and CRP, along with oxidative stress and metabolic disturbances.

The similarities between *Ama* and systemic inflammation suggest a strong connection. *Ama* may be understood as a broader concept that includes toxins, inflammation, and immune dysfunction. Ayurvedic treatments like *Deepana*, *Pachana*, *Langhana*, and *Shodhana* may help reduce inflammation and restore balance.

**Keywords** - Ama, Agni, Systemic inflammation, Ayurveda, Gut microbiota, Immune dysregulation, Integrative medicine

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### INTRODUCTION

Ayurveda, a traditional system of medicine, provides a comprehensive understanding of health and disease based on the principles of *Dosha*, *Dhatu*, *Mala*, and *Agni*. Among these, *Agni* plays a central role in maintaining physiological balance and proper metabolism. *Agni* is responsible for the digestion, absorption, assimilation, and transformation of nutrients at both gastrointestinal and cellular levels. Proper functioning of *Agni* ensures the formation of healthy

*Dhatu*s (body tissues), supports *Ojas* (vital essence), and helps maintain overall health.[1] Conversely, impairment of *Agni* leads to faulty digestion and metabolism, resulting in the formation of *Ama*, which is considered a key pathological factor in the initiation and progression of diseases. A vitiated *Jatharagni* (digestive fire) is unable to properly digest even light food. The undigested food turns *Shukta* (acidic) and becomes as harmful as poison. This is known as *Ama-visha*. [2]

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## Aim and Objectives

### Aim

To review the concept of Ama in classical Ayurvedic texts and correlate it with systemic inflammation in modern medicine.

### Objectives

1. To analyze the definition and formation of Ama according to Samhita.
2. To describe the types, properties, and pathophysiology of Ama.
3. To identify clinical features of Ama in Ayurvedic literature.
4. To correlate Ama with systemic inflammation and its biomarkers.
5. To explore the clinical relevance of Ama in inflammatory disorders.

### Materials and Methods

This study is a narrative review based on classical Ayurvedic texts and modern medical literature.

### Ayurvedic Sources

- Charaka Samhita
- Sushruta Samhita
- Ashtanga Hridaya
- Madhava Nidana

### Modern Sources

- PubMed indexed journals
- Immunology and inflammation textbooks
- Peer-reviewed articles on systemic inflammation, cytokines, metabolic endotoxemia

### Definition of Ama

*Ama* is a toxic metabolic by-product formed due to improper digestion of food. When *Agni* becomes weak (*Mandagni*), the digestive system fails to completely process ingested food. As a result, partially digested substances accumulate in the gastrointestinal tract and circulate throughout the body in a harmful form known as *Ama*. [3]

***Ushmnoalpabalatwena Dhatumaadyamapaachitam. Dushtaamaashayagatam Rasamaamam Prachakshate.* (Ashtang Hriday Sutra Sthana 13/25)**

*Ama* is described as a thick, sticky, foul-smelling, and obstructive substance. It circulates throughout the body via the *Rasavaha Srotas* and accumulates in different tissues, leading to blockage of physiological channels (*Srotorodha*), disturbance in tissue metabolism, and imbalance of *Doshas*. These changes initiate pathological processes that eventually manifest as clinical diseases. [4]

Classical Ayurvedic texts explain *Ama* not only as undigested food but also as a complex pathological entity with systemic effects. It interferes with normal cellular and tissue functions, weakens immune defense, and increases susceptibility to diseases. *Ama* plays a key

role in the development of various disorders such as *Amavata* (rheumatoid arthritis), *Jwara* (fever), *Grahani Dosha* (digestive disorders), and several metabolic and autoimmune conditions. The concept of *Sama Dosha*, where *Dosha* is associated with *Ama*, represents a more severe condition characterized by inflammation, obstruction, and widespread dysfunction.

In modern medicine, systemic inflammation is increasingly recognized as a major underlying factor in many chronic diseases. It involves continuous activation of the immune system, leading to elevated levels of inflammatory mediators such as cytokines, chemokines, and acute-phase proteins. These mediators disturb normal metabolism, impair mitochondrial function, and increase oxidative stress, resulting in tissue damage and disease progression. Chronic low-grade inflammation is now considered a significant contributor to conditions like metabolic syndrome, type 2 diabetes, cardiovascular diseases, autoimmune disorders, neurodegenerative diseases, and cancer. [5]

### Acharya Vagbhata states:

***“Rogah Sarvepi Mandeagnao” (Ashtang Hriday Nidana Sthana 12/1)***

According to Ayurveda, the weakening of *Agni* (digestive fire) is the root cause of most diseases, as it leads to improper digestion and the formation of *Ama*. [6] *Ama* is more than just undigested food; it's a pathogenic entity with systemic implications such as channel obstruction, immunological dysfunction, and inflammatory reactions. Modern medicine acknowledges systemic inflammation as a fundamental underlying mechanism in chronic diseases such as diabetes, cardiovascular disease, autoimmune disorders, and metabolic syndrome. The similarities between *Ama* and systemic inflammation point to an essential conceptual link that can connect Ayurvedic and current medical paradigms. [7]

### Agni: The Metabolic Regulator

What Ayurveda recognizes:

1. Jatharagni - Primary gastrointestinal digestion,
2. Bhutagni - processing of elemental metabolism
3. Dhatvagni - metabolic change at the tissue level
4. Any degree of impairment can result in *Ama*.

### Metabolic Failure and Mandagni

***Mandagni* results in:**

- Inadequate digestion of macronutrients
- Intermediate metabolite formation
- Putrefaction and fermentation
- Malabsorption of nutrients
- Production of toxins

### Contemporary Metabolic Correlation

***Mandagni* could be equivalent to:**

- Inefficiency of the mitochondria

- Dysfunction of enzymes
- Resistance to insulin
- Dysbiosis
- Oxidative phosphorylation impairment
- Therefore, *Ama* development can be understood as toxic buildup due to metabolic failure.

**Traditional characteristics:**

- *Guru* (heavy)
- *Picchila* (slimy)
- *Snigdha*, or Sticky
- *Sthira* (stable)
- *Durgandha* (unpleasant odor)
- *Sheeta* (chilly)
- *Srotorodhaka* (blocking of channels). [8]

**Ama's Guṇa (Properties) and Symbolic Meaning**

Ayurvedic Property	Functional Interpretation
<i>Guru</i> (heavy)	Slowed metabolism, Fatigue, heaviness
<i>Snigdha</i> (sticky)	Lipid mediated inflammation
<i>Sheeta</i>	Reduced enzymetic activity
<i>Picchila</i> (slimy)	Mucosal inflammatory exudate
<i>Durgandha</i> (foul smell)	Putrefactive metabolites
<i>Srotorodhaka</i>	Microvascular dysfunction

**Types of Ama**

**1. Jatharagni Mandya Janya Ama**

Formed due to impaired digestive fire in the gastrointestinal tract.

**2. Dhatvagni Mandya Janya Ama**

Formed due to impaired tissue metabolism.

**3. Bhutagni Mandya Janya Ama**

Formed due to improper elemental metabolism.

**Causes of Ama formation** - The primary cause of Ama is Mandagni (weak digestive fire). Ama originates from all etiological factors associated with Agnimandya.

Dietary Causes-	Lifestyle Causes	Psychological Causes
Eating on indigestion	Day sleep	Anger
Overeating	Lack of exercise	Fear
Heavy, Dry, cold, rough, unpleasant incompatible foods	Sedentary lifestyle	Stress
Irregular eating habits	Suppression of natural urges	Greediness
Drinking excessive water		Depression
		Jealousy

. [9]

**Pathogenesis of Ama**

- *Nidana Sevan* (causative factors)
- *Agnimandya* (impaired metabolism)
- Improper digestion
- Formation of *Ama*
- Circulation in the body
- *Srotorodha* (blockages of channels)
- Disease manifestation

**Systemic Inflammation: Modern Perspective**

Systemic inflammation refers to a chronic, low-grade inflammatory response characterized by continuous activation of immune pathways. It involves:

- Elevated cytokines (IL-6, TNF- $\alpha$ )
- Increased acute-phase proteins (CRP)
- Activation of immune cells

**Clinical Features of Ama (*Sama Dosh*)**

- Fatigue (*Alasya*)
- Heaviness (*Gaurava*)
- Loss of appetite (*Aruchi*)
- Indigestion
- Blockage of Channels (*Srotorodha*)
- Body ache (*Angamarda*)
- Coated tongue
- Joint stiffness

**Causes**

- Gut dysbiosis
- Obesity
- Chronic infections
- Environmental stress

**Pathophysiological Mechanisms**

- Oxidative stress
- Mitochondrial dysfunction
- Immune dysregulation
- Endotoxemia

. [10]

These symptoms closely resemble systemic inflammatory symptoms.

Systemic inflammation is now considered a unifying factor in chronic diseases .[11]

### Correlation Between Ama and Systemic Inflammation

#### Ama as Metabolic Toxin

*Ama* can be interpreted as a metabolic toxin analogous to endotoxins and inflammatory intermediates produced due to incomplete digestion .[12]

#### Gut-Origin Hypothesis

Ayurveda identifies the gastrointestinal tract (*Amasaya*) as the primary site of *Ama* formation. Modern science

similarly recognizes the gut as a central player in inflammation via microbiota imbalance and increased intestinal permeability .[13]

#### Immune Dysregulation

*Ama* may act as an antigenic substance, triggering immune responses and leading to chronic inflammation, similar to autoimmune reactions .[14]

#### Chronic Inflammatory State

Persistent presence of *Ama* correlates with chronic low-grade inflammation, contributing to disease progression.

### Correlation Between Ama and Systemic Inflammation

Ama Concept	Modern Correlation
<i>Agnimandya</i>	Metabolic dysfunction
<i>Ama</i> formation	Metabolic toxins
<i>Srotorodha</i>	Microvascular dysfunction
<i>Ama</i> circulation	Systemic inflammation
<i>Ama Lakshana</i>	Inflammatory symptoms
<i>Sama Dosh</i>	Immune activation
<i>Nirama</i> state	Resolution of inflammation

### Role of Ama in Disease Pathogenesis

*Ama* plays central role in:

Metabolic Disorders	Autoimmune Disorders	Gastrointestinal Disorders	Cardiovascular Disorders
Diabetes mellitus	Rheumatoid arthritis (Amavata)	IBS	Atherosclerosis
Obesity	Autoimmune thyroid disease	Dysbiosis	Endothelial dysfunction

### Immunological Correlation

*Ama* may be correlated with:

- Cytokine activation
- Endotoxemia
- Oxidative stress
- Immune dysregulation

*Ama* resembles:

- Lipopolysaccharides
- Inflammatory mediators
- Metabolic waste products

- Disease diagnosis
- Treatment planning
- Prognosis

Ayurvedic treatment principles include:

#### Langhana (Fasting)

Reduces *Ama* load

#### Pachana (*Ama* digestion)

Improves metabolism

#### Deepana (*Agni* stimulation)

Improves digestion

#### Shodhana (Detoxification)

Removes *Ama*

### Clinical Importance of Ama Assessment

Assessment of *Ama* helps in:

**Table 1. Classical Definitions of Ama in Ayurvedic Samhitas**

S. No.	Samhita	Reference	Definition	Interpretation
1	Ashtang Hridaya	Sutra sthana 13/25	<i>Ushmnoalpabalatwena Dhaturaadyamapaachitam .</i>	<i>Ama</i> is improperly digested metabolic product due to weak <i>Agni</i>
2	Charaka Samhita	Chikitsa Sthana 15/44	<i>Ama</i> results from impaired digestion and metabolism	<i>Ama</i> represents toxic metabolic intermediates
3	Madhava Nidana	Amavata Nidana 25/2	<i>Ama</i> combines with <i>Dosha</i> to produce disease	<i>Ama</i> contributes to inflammatory disease

**Table 2. Causes of Ama Formation and Modern Correlation**

Ayurvedic Cause	Description	Modern Correlation
<i>Agnimandya</i>	Impaired digestion	Metabolic dysfunction
<i>Viruddha Ahara</i>	Incompatible diet	Gut dysbiosis
<i>Ati Bhojana</i>	Overeating	Metabolic overload
<i>Divaswapna</i>	Day sleep	Reduced metabolism
Sedentary lifestyle	Lack of physical activity	Insulin resistance
Stress	Mental disturbance	Cortisol-mediated inflammation
<i>Mandagni</i>	Weak cellular metabolism	Mitochondrial dysfunction

**Table 3. Properties of Ama and Their Biomedical Interpretation**

Property of Ama	Ayurvedic Description	Modern Biomedical Interpretation
<i>Guru</i>	Heavy	Metabolic sluggishness
<i>Picchila</i>	Sticky	Biofilm, inflammatory deposits
<i>Snigdha</i>	Oily	Lipid accumulation
<i>Avila</i>	Turbid	Metabolic toxicity
<i>Durgandha</i>	Foul smelling	Toxin formation
<i>Srotorodhakara</i>	Channel blocking	Microvascular dysfunction

**Table 4. Pathogenesis of Ama and Systemic Inflammation Correlation**

Ayurvedic Pathogenesis	Description	Modern Equivalent
<i>Agnimandya</i>	Impaired digestion	Enzyme dysfunction
<i>Ama</i> formation	Toxic metabolite formation	Metabolic endotoxins
<i>Ama</i> circulation	Systemic distribution	Cytokine circulation
<i>Srotorodha</i>	Channel obstruction	Microvascular inflammation
<i>Dhatu Dushti</i>	Tissue damage	Cellular injury
Disease manifestation	Clinical symptoms	Chronic inflammatory disease

**Table 5. Clinical Features of Ama and Systemic Inflammation**

Ama Lakshana	Ayurvedic Description	Modern Correlation
<i>Angamarda</i>	Body ache	Inflammatory myalgia
<i>Gaurava</i>	Heaviness	Fatigue syndrome
<i>Aruchi</i>	Loss of appetite	Cytokine-induced anorexia
<i>Alasya</i>	Lethargy	Chronic fatigue
<i>Jwara</i>	Fever	Inflammatory response
<i>Malasanga</i>	Constipation	Gut dysfunction
<i>Sandhi Shoola</i>	Joint pain	Inflammatory arthritis

## DISCUSSION –

*Ama* is a key pathological concept in Ayurveda that links impaired digestion, metabolism, immunity, and disease development. According to Ayurvedic texts, *Ama* forms due to *Agnimandya* (weak digestive and metabolic fire). When digestion is incomplete, food and nutrients are not properly transformed, resulting in toxic intermediate substances known as *Ama*. These substances circulate throughout the body and obstruct *Srotas* (microchannels), disrupting tissue nourishment and the removal of metabolic wastes. This obstruction gradually contributes to the development of various diseases. From a modern biomedical perspective, the concept of *Ama* can be compared to **systemic inflammation and metabolic**

**dysfunction.**

Systemic inflammation involves persistent activation of the immune system and increased production of inflammatory mediators such as tumor necrosis factor-alpha (TNF- $\alpha$ ), interleukin-6 (IL-6), interleukin-1 $\beta$  (IL-1 $\beta$ ), and C-reactive protein (CRP). These inflammatory molecules disturb cellular metabolism and tissue homeostasis, leading to chronic disease progression. In this sense, *Ama* may correspond to metabolic toxins, inflammatory cytokines, oxidative stress products, and incompletely metabolized intermediates circulating in the body.

Another important parallel is **metabolic endotoxemia**, where gut dysbiosis and increased intestinal permeability allow bacterial toxins such as lipopolysaccharides (LPS) to enter the bloodstream and trigger inflammatory responses. This resembles the Ayurvedic description of *Ama* spreading through the body and causing disease. Similarly, *Rasavaha Srotas*

**Dushiti** may correlate with endothelial dysfunction and impaired microcirculation.

*Ama* is described as heavy, sticky, and channel-blocking, which resembles the accumulation of inflammatory proteins, immune complexes, and oxidized lipids seen in modern diseases like cardiovascular disorders. Chronic inflammation also weakens immunity, similar to *Ama* reducing *Vyadhikshamatva*. Ayurvedic therapies such as **Langhana, Deepana, Pachana, and Shodhana** aim to restore digestion and remove toxins, paralleling modern approaches like dietary regulation, caloric restriction, microbiome balance, and anti-inflammatory treatments

#### CONCLUSION-

*Ama* is a fundamental pathological concept in Ayurveda that refers to toxic substances formed due to improper digestion and incomplete metabolism caused by impaired *Agni* (digestive and metabolic fire). Classical Ayurvedic texts describe *Ama* as an important causative factor in the development of many systemic diseases. When *Ama* forms in the body, it disturbs normal physiological balance by blocking *Srotas* (body channels), interfering with tissue nourishment, weakening immunity, and gradually leading to disease. The mechanisms explained for *Ama* in Ayurveda show strong similarities with the concept of **systemic inflammation** in modern biomedical science. Systemic inflammation involves metabolic imbalance, immune system activation, oxidative stress, mitochondrial dysfunction, and the buildup of inflammatory mediators. These processes closely resemble the Ayurvedic explanation of *Ama* formation, its circulation in the body, and its role in disease development. In modern terms, *Ama* may be related to metabolic endotoxins, inflammatory cytokines, immune complexes, and oxidative metabolic byproducts that contribute to chronic inflammatory disorders.

Viewing *Ama* from an integrative perspective helps improve understanding of the pathophysiology of many chronic conditions, including metabolic syndrome, autoimmune diseases, cardiovascular disorders, and other inflammatory illnesses. Ayurveda strongly emphasizes maintaining a balanced *Agni*, preventing the formation of *Ama*, and removing accumulated toxins to protect health and prevent disease.

Therapeutic measures described in Ayurveda such as **Deepana** (enhancing digestion), **Pachana** (digesting *Ama*), **Langhana** (therapeutic lightening or fasting), and **Shodhana** (detoxification therapies) aim to restore metabolic balance, reduce toxin accumulation, and support immune function. These approaches are comparable to modern strategies that focus on improving metabolism and controlling inflammation.

Therefore, combining the Ayurvedic concept of *Ama* with modern scientific knowledge of systemic inflammation may provide a useful framework for integrative medicine, supporting better prevention, early detection, and holistic management of chronic inflammatory diseases.

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