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## TITLE

### Perspective of Inflammation through Ancient and Modern Parlance

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# Perspective of Inflammation through Ancient and Modern Parlance

**ABSTRACT**

**Background:** Inflammation is a complex biological response of body tissues to harmful stimuli [pathogens, damaged cells, or irritants] and a protective response involving immune cells, blood vessels, and molecular mediators. The function of inflammation is to eliminate the initial cause of cell injury, clear out necrotic cells and tissues damaged from the original insult and the inflammatory process, and initiate tissue repair. According to Ayurveda, inflammation is known by different names - *Shotha*, *Shopha*, *Svayatu*, *Utsedha* and *Samhata*. **Aim:** the review is aimed at generating basic knowledge of inflammation as per Ayurveda, which can be applied in both preventive as well as therapeutic purpose. **Materials & Methods:** The present literary review is based on the references available in basic Ayurveda classics & relevant modern texts. **Observations:** Chronic inflammation is a cardinal sign of chronic degenerative disorder. Inflammation and oedema associated with it is duly recognised in Ayurveda as a pathological manifestation. While modern medicine considers inflammation as a symptom or rather as a healing response of the body in wounds. Ayurveda treats the concept of inflammation as (a) symptom of a disease (b) an independent disease and (c) a complication of diseases. Degenerative diseases share a common pathological feature of inflammation. The disturbances in micro channel circulation in inflammation are due to *Sroto Dushti* (clogging of channels) by *Aama* (toxic waste of metabolism). Preventing *Aama* formation could prevent many chronic degenerative disorders. **Conclusion:** The study concludes that the understanding of concept of inflammation is compulsory to prevent and treat various medico-surgical conditions in clinical practice and especially of chronic degenerative disorders.

**Keywords:** *Ayurveda, Aama, Chronic Degenerative Disorders, Inflammation, Shotha, Sroto Dushti*

**Introduction**

In *Brihat Trayeeas* [Three major Ayurveda treatises] as well as in *Laghutrayee*, [Three minor Ayurveda treatises] there are lot description of *Vranashotha* i.e. inflammation. It is known by different names in different contexts namely *Shotha*, *Shopha*, *Svayathu*, *Utsedha* and *Samhata*. It is characterised by elevation, oedema, heaviness and pain. Inflammation has been dealt with as a disease, as a symptom and also as a complication of diseases. In modern science, inflammation is characterised by its four cardinal signs rubor (redness) calor (increased heat), tumour (swelling) and dolour (pain) and the fifth sign function laesa (loss of function). Today inflammation has been recognised as a healing response of the body to cell injury due to trauma or infection, a complex network of molecular and cellular interactions is directed to return to homeostasis. If tissue health is not restored, inflammation becomes a chronic condition that damages the surrounding tissue. [1]

Inflammation is part of the complex biological protective response of body tissues to harmful stimuli, such as pathogens, damaged cells, or irritants involving immune cells, blood vessels and molecular mediators. The function of inflammation is to

eliminate the initial cause of cell injury, clear out necrotic cells and tissues damaged from the original insult and the inflammatory process, and initiate tissue repair. Inflammation is a generic response considered as a mechanism of innate immunity, as compared to adaptive immunity, which is specific for each pathogen. [2] Inflammation could lead to progressive tissue destruction by the harmful stimulus (e.g. bacteria) and compromise the survival of the organism. In contrast, chronic inflammation may lead to a host of diseases, such as hay fever, atherosclerosis, rheumatoid arthritis, and even cancer. Inflammation is therefore normally closely regulated by the body. A series of biochemical events propagates and matures the inflammatory response, involving the local vascular system, the immune system, and various cells within the injured tissue. Prolonged inflammation, known as chronic inflammation, leads to a progressive shift in the type of cells present at the site of inflammation, such as mononuclear cells. [3]

Hence considering the relevance, the present study was aimed at reviewing the basic concepts of inflammation as per Ayurveda as well as modern view.

## Materials & Methods

The present literary review of basic consideration of inflammation has been done incorporating important Ayurveda texts/Samhita like Charaka, Sushruta and Ashtanga Samgraha for the different aspects associated with inflammation and a possible correlation was attempted with the subject of inflammation by referring Robins and Cotran's Pathological basis of Diseases. [4] *Shotha* or any other symptoms mentioned frequently with degenerative disorders were also noted.

## Observations

Chronic inflammation is a cardinal sign of chronic degenerative disorders. A low grade chronic inflammation is also the symptom of most ageing and degenerative diseases. Most of the age related diseases such as Arthritis, Diabetes, Osteoporosis, Atherosclerosis, Parkinson's disease and Alzheimer's disease are underlined by chronic inflammation. Unfortunately, chronic inflammation precedes most cancers. Rudolf Virchow, the German physician in the 19<sup>th</sup> century suggested a link between inflammation and cancer, cardiovascular diseases, diabetes and other chronic diseases. Recently, observations have been confirmed and a molecular basis of most chronic diseases and the associated inflammation has been identified as suggested by Virchow. [5]

According to Ayurveda, inflammation can be considered as a vascular and cellular reaction. Any disturbances or vitiation in the channels of microcirculation (*Srotodushti*) leads to

- (a) Excessive functioning
- (b) Obstruction or inadequate activity
- (c) Tumour or new growths and
- (d) Movements in unnatural directions. [6]

The first inflammatory response is usually increased activity (vascularity) in the form of excessive exudates and protein release into the extracellular matrix. Then there is obstruction leading to change in the rate of diffusion of nutrients, oxygen and wastes. The hampered diffusion leads to oedema, tumours. Movement in unusual direction may be due to reverse osmosis as a result of electrolyte differences. All the clogging of the micro-channel has been attributed to *Aama* which is the toxic by-product of improper digestion. *Aama* is considered as the pre and post inflammatory waste and the chief contributor to *Srotodushti* (vitiating of body constitution). [7] It is interesting to note that there have been suggestions to quantify and qualify *Aama* according to its description in Ayurveda.

That the *Aama* status of a person in a very personalised form of treatment could actually be regarded as a biomarker for chronic inflammation leading to metabolic syndrome and cancer will perhaps pave the way for preventive oncology and prevention of life style disorders. [8] According to Ayurveda, *Granthi-Arbuda* or tumour formation is considered as a form of inflammation. [9] The exact knowledge of inflammation can be significantly used in surgical practice.

## Discussion

Inflammation can be acute and chronic. It is body's response to trauma or infection. In fact, it is one of the mechanisms of healing process in which microbiological interactions are directed to facilitate a return to physiological homeostasis and tissue repair. The response is composed of both local events and a systemic activation mediated by Kinin and Cytokines. If tissues health is not restored inflammation becomes chronic and continually damages host tissue. [10] Chronicity always leads many complications like non healing wound, excessive fibrosis, callosity, tumours etc.

Ayurveda considers inflammation either as a cause, symptom or complication of many degenerative conditions. Inflammation is a reply, response or answer given by our body to trauma, injury, infection or ischemia. Inflammation can be acute, subacute and chronic. Also it could be severe or mild/low grade. The phenomenon is concerned with almost every disease. So it becomes mandatory to understand basic understanding of inflammation. The description of inflammation in the Samhitas gives better idea about the subject.

In most of the Ayurveda texts, inflammation is mentioned as a pathological condition. Also inflammation has been described as an independent disease. The disease *Shotha* includes both oedema and oedematous inflammation. In *Samhitas*, there are separate chapters covering *Shotha/Shophya* as a disease. [11]

In Charaka Samhita, *Shotha* is classified as

1. *Ekanga* (localised)
2. *Ardhanga* (regional)
3. *Sarvanga* (general)

*Shotha* also has been mentioned as an independent disease in Charaka Samhita. Inflammation associated with oedema has been treated as an independent disease. *Shotha* as a disease indicates oedematous condition with general symptoms of heaviness, instability, an elevation of heat, thinning of veins and discolouration. [12]

Symptoms akin to increased vascularity like increase in temperature and increased venous pressure have been considered as the prodromal symptoms of *Shotha*.<sup>[13]</sup> The classification of *Shotha* is based on aetiology of two types.

- (1) *Nija* (endogenous-intrinsic factors) and
- (2) *Agantuja* (exogenous-extrinsic factors)

The description of *Shotha* is quite complete and proves the extent and depth of knowledge of this pathological condition in India since ancient time.

As *Acharya* Sushruta considered *Rakta* (blood) as a fourth *Dosha* (humour) and being from *Dhanwantari Sampradaya* (surgical discipline), he has classified *Shotha* slightly differently and has mentioned *Raktaja Shophā* (inflammation due to disorders in blood) and *Vranashotha* i.e. inflammation in wounds.<sup>[14]</sup> *Shotha* is also described as a complication of diseases- Charaka described seven inflammatory swelling that arises as complications of uncontrolled diabetes where as Sushruta and Vagbhatta listed these as ten.<sup>[15]</sup> Charaka also mentioned inflammatory swellings occurring in the absence of Diabetes, but with obesity as a triggering factor.<sup>[16]</sup>

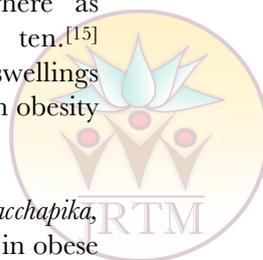
Inflammatory swellings such as *Sharavika*, *Kacchapika*, *Jalini*, have been explained as difficult to treat in obese persons.<sup>[17]</sup> Prognosis of inflammation has been linked to obesity. This establishes the awareness of the relationship between inflammation and metabolic disorders. All the *Acharya* of Ayurveda have considered *Vidradhi* or abscess as one of the 10 inflammatory swellings.<sup>[18]</sup> This could occur externally and also internally (in vital organs).<sup>[19]</sup> Inflammation has been understood as a symptom of an abscess.<sup>[20]</sup> Neoplasia (*Granthi*) has been considered as a form of hard elevation occurring due to non-resolving of oedematous inflammation which is a result of chronic inflammation.

All degenerative disorders like Diabetes, Atherosclerosis, Parkinson's syndrome, Alzheimer disease, osteoarthritis and rheumatoid arthritis involves a common pathological feature of inflammation<sup>[21]</sup> and a low grade chronic inflammation is seen in obesity, ageing and various metabolic syndrome. Inflammation also precedes most cancers and is considered a hall mark of the neoplastic process.<sup>[22]</sup> There is a common consideration of inflammation according to Ayurveda and modern science in regards to the disturbance in flow of body fluid through various systems and their pathways. By toxic waste materials of metabolism

(*Aama*), there is obstruction of micro channels which is responsible for loss of homeostasis, inflammation and tissue damage.<sup>[23]</sup> Ayurveda strongly believes in *Aama* is the root cause of metabolic and degenerative disease since it blocks *Srotas* or micro channels that nourish tissues. *Aama* is believed to have antigenic and pro inflammatory properties.<sup>[24]</sup> Hence *Panchakarma* i.e. detoxification or purification procedures can be practised for clearing clogged channels which are both gross and subtle.

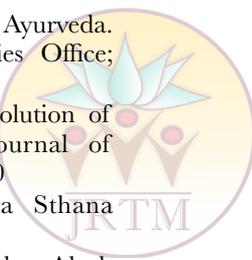
## Conclusion

After detailed study of *Shotha*, it can be correlated it with inflammation. The condition is well described in Ayurveda as well as modern medical science in similar manner with language and technical difference. The basic knowledge of *Shotha* is definitively fruitful to understand disease process and to prevent as well as to treat the inflammatory conditions.



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