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Rajayakshma Nidana: An Endeavour Towards Comprehension

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Abstract*:* *Rajayakshma*, classified as one of the *Ashtamahagada* in *Ayurveda*, represents a complex group of disorders characterized by vitiation of *Tridosha* and *Saptadhatu*. The *Chathurvidha Nidana* plays an important role in the manifestation of disease. *Sahasa*, *Vegadharana*, *Kshaya*, and *Vishamashana*. Each of these factors finds clinical relevance in contemporary medicine. *Sahasa* corresponds to pulmonary tuberculosis precipitated by physical strain. *Vegadharana* reflects sustained sympathetic overactivity, compromising immune function. *Kshaya* parallels the pathogenesis of HIV/AIDS, marked by immune depletion. *Vishamashana* aligns with primary intestinal tuberculosis, wherein malnutrition and impaired gut immunity facilitate infection. Here in this article an attempt is made to understand the current clinical relevance of *Chathurvidha Nidana* of *Rajayakshma*.

Index Terms - Rajayakshma, Sahasa, Vegadharana, kshaya, Vishamashana, Pulmonary Tuberculosis, AIDS,

I. INTRODUCTION

Rajayakshma is a complex group of disorders characterized by the vitiation of *Tridosha* and *Saptadhatu1*. *Acharya Charaka* has classified *Rajayakshma* under the category of *Ashtamahagada* highlighting its progressive and debilitating nature[2]. *Acharya Sushruta*, recognizing its communicable aspect, has described it as an *Aupasargika Roga3*. Due to its multisystemic involvement and frequent association with other systemic conditions such as *Shwasa*, *Kasa*, and *Atisara*, *Rajayakshma* is often referred to as the "king of diseases."

II. MATERIALS & METHODOLOGY

A comprehensive literature review of classical Ayurvedic texts to understand the *Chaturvidha Nidana* of *Rajayakshma*, in contemporary science

III. NIDANA OF RAJAYAKSHMA

In different classical Ayurveda texts Acharya's has explained about 4 *Nidana* of *Rajayakshma*:[4]

1. ***SAHASA***
2. ***VEGASANDHARANA***
3. ***KSHAYA***
4. ***VISHAMASHANA***

A unique narration of *Nidana* is found in the disease *Rajayakshma*. *Chaturvidha Nidana* are the factors attributed to *Rajayakshma* as *Vyadhi Hetu* and they contribute in the genesis of the disease.

SAHASA[5]

Among the four primary *Nidanas* of *Rajayakṣma*, *Sahasa* is prominently recognized across classical *Ayurvedic* literature as the foremost etiological agent. Terms such as *Ayathabalarambha, Balavidgraha, Sanghata,* and *Aghata* are frequently employed synonymously to denote the concept of *Sahasa*, each reflecting the notion of exertion or strain exceeding one's physical or mental capacity.

Sahasa is broadly defined as any form of excessive and strenuous activity undertaken beyond an individual's innate strength. Such exertion leads to physiological disequilibrium, with a predilection for disturbing the *Uras*, thereby contributing to the development of systemic disorders. *Charaka* in the *Nidana Sthana,* enumerates various manifestations of *Sahasa* and their contributory role in the pathogenesis of *Rajayakṣma*. These include:

Langhana – Prolonged fasting undertaken beyond one's tolerance.
Adhyayana – Continuous vocal exertion through loud recitation or extended speech.
Plavana – Long-distance swimming resulting in physical overexertion.
Adhva – Excessive walking or prolonged travel on foot.
Bharavahana – Lifting or carrying burdens exceeding one's strength.
Patana – Physical trauma caused by falling from a height.
Abhighata – Injury resulting from physical trauma or assault.

Notably, the concept of *Sahasa* in the context of *Rajayakṣma* extends beyond mere physical strain. It also encompasses sustained vocal and cognitive efforts, such as uninterrupted speaking, intense studying, or prolonged mental engagement. These actions, when performed excessively, are believed to disturb the homeostasis of *Tridoṣa* and *Dhathu*, thereby playing a critical role in disease manifestation.

SAMPRAPTI

Indulgence in exertional activities exceeding one's inherent strength results in the aggravation of the *Tridoshas* causing *Urakshatha*. Once vitiated, these *Doshas* disseminate throughout the body, moving in upward, downward, and lateral directions. As the vitiated *Doshas* circulate throughout the body, they eventually localize in *Sandhi, Amashaya, Kanta* and produce symptoms like *Jrumba, Angamarda, Jwara, Swarabedha, Arochaka, Urasyaroga*. These vitiated *Doshas* also affect the *Pranavaha Srotas*, leading to the manifestation of *Shwasa* and *Pratishyaya.* Injury to the chest can result in persistent *Kasa*, accompanied by *Shonita Steevana*, and *Shosha*, ultimately culminating in *Sahasajanya Rajayakshma.*

PULMONARY CONTUSION[6]

Pulmonary contusion is a non-penetrating injury to the lungs where the alveoli and small blood vessels get damaged, leading to bleeding and swelling within the lung tissue.

CAUSES

- Chest trauma
- Falls from great height
- Penetrating lung Injuries

As someone exerts an activity which is beyond their capacity or got some blunt trauma to the chest will increase the level of stress hormones in the body. As a result, there will be formation of immature leucocytes from the bone marrow, which ends up in suppression of immune activity of alveolar macrophages. Macrophages are capable of inhibiting growth of the bacilli through phagocytosis which gets suppressed in chest injuries. The immunosuppression is associated with an increased susceptibility to infectious complications like pulmonary Tuberculosis with clinical symptoms of cough, dyspnea, fever, hemoptysis, weight loss etc.

SAHASAJANYA RAJAYAKSHMA[7]	**PULMONARY TB**[8]
Kasa	Cough
Swasa	Dyspnea
Shonithasteevana	Hemoptysis
Prathisyaya	Headache
Jwara	Fever
Sosha	Weight loss
Angamarda	Malaise

VEGADHARANA[9]

The integrity of the human body relies on both mental and physical well-being, and preserving this balance is one of the fundamental goals of *Ayurveda*. *Ayurveda* elaborates clearly on *Dinacharya, Ritucharya and Avega Dharana*. The suppression of biological activities is called as *Vegadharana*. It is clearly stated that only the suppression of the urges for *Mutra, Pureesha and Vata Vega* are to be considered as causative factors for *Rajayakshma*.

SAMPRAPTI

Suppressing the natural urges for *Vata, Mutra* and *Pureesha* results in *Malasanchaya*, which provokes the *Apana Vata*, followed by vitiating *Pitta* and *Kapha* leads to *sosha* and finally manifesting *Vegadharanajanya Rajayakshma*.

Due to demanding work schedules, individuals often suppress the natural urges for micturition, defecation, and the passage of flatus. Prolonged suppression of these natural urges increases sympathetic nervous system activity, resulting in elevated secretion of stress hormones such as cortisol, epinephrine, and norepinephrine. Stress hormones signals primarily through the β2-adrenergic receptors present on innate and adaptive immune cells which are critical in responding to infections caused by pathogens. In general, this adrenergic input, particularly chronic stimulation, suppresses lymphocytes, paving the way for infectious diseases[10].

KSHAYA[11]

क्रियाक्षयकरत्वाच्च क्षय इत्युच्यते पुनः

The loss of the body's ability to perform a function is referred to as *Kshaya*, or in other words, it can be described as depletion.
Kshaya is classified into two types:

i. Anuloma Kshaya
ii. Pratiloma Kshaya

The sequential depletion of all *Dhatus*, starting from *Rasa Dhatu* and progressing up to *Shukra Dhatu*, is known as *Anuloma Kshaya*.

When the *Dhatus* are depleted in reverse order, beginning from *Shukra Dhatu* and moving towards *Rasa Dhatu*, it is termed as *Pratiloma Kshaya.*

SAMPRAPTHI

Due to abnormal sexual activity, *Vata Dosha* becomes aggravated, resulting in the discharge of semen mixed with blood. This leads to physical debility and may give rise to *Kshayaja Rajayakshma.*

AIDS[12]

Acquired Immunodeficiency Syndrome (AIDS) is caused by the infection from the virus HIV. HIV mainly attacks immune system of the body and makes it weak.

HIV is transmitted through:

- Semen
- Breast milk
- Vaginal fluid
- Blood

HIV primarily targets the immune system, specifically affecting CD4+ T cells, macrophages, and dendritic cells, ultimately resulting in severe immunosuppression. HIV infection induces chronic immune activation and dysregulated cytokine release, which can contribute to arthralgia and HIV-associated arthritis resulting in joint. The persistent activation of the immune system leads to the secretion of pro-inflammatory and pyrogenic cytokines such as IL-1, TNF-α, and IL-6, resulting in recurrent episodes of fever. Elevated levels of TNF-α and related catabolic cytokines also drive proteolysis and muscle wasting, thereby contributing to progressive weight loss. In addition, opportunistic pulmonary infections caused by bacterial, fungal, or other pathogens frequently lead to chronic cough in individuals with advanced HIV disease.

KSHAYAJA RAJAYAKSHMA[13]	AIDS[14]
Sandhi shola	Joint pain
Kasa	Cough
Kshaya	Weight loss
Jwara	Fever

VISHAMASHANA[15]

If a person consumes food in accordance with the principles of *Aṣtahara Vidhi Visheshaayatana*, it leads to good health. However, if these guidelines are neglected, it may result in the development of disease.

Food consumed in inconsistent or irregular quantities is referred to as *Vishamashana*.

SAMPRAPTHI

Improper consumption of food, without following the principles of *Aṣtahara Vidhi*, leads to the vitiation of *Tridoṣas*. These aggravated *Doṣhas* accumulate at the *srotomukha*, causing obstruction. Due to this blockage, *Dhathuposhana* is impaired, resulting in *Sosha* and eventually manifesting as *Vishamashanajanya Rajayakshma.*

Micronutrients such as vitamins and minerals are essential for the optimal functioning and regulation of the immune system. Micronutrients support the cells, enzymes, and neurotransmitters involved in producing gastric secretions. Irregular eating patterns, binge eating, and poor dietary habits disrupt gastrointestinal secretions by lowing the acid-enzyme output, ultimately impairing nutrient absorption and leading to malnutrition. When the body lacks essential nutrients, it compromises humoral immunity, thereby increasing susceptibility to infections. Upon exposure to Mycobacterium tuberculosis, the bacilli may enter the gastrointestinal tract. The ensuing infection triggers the release of pro-inflammatory mediators, leading to increased vascular permeability and vasodilatation, which manifest as mucosal hyperemia and edema. This is followed by exudation of plasma proteins, lymphocytes, macrophages, and fibrin into the intestinal lumen and interstitial spaces. Activated macrophages, together with sensitized T-lymphocytes, organize into epithelioid cell granulomas. The central regions of these granulomas undergo caseous necrosis because of hypoxic conditions and enzymatic degradation, producing the characteristic "cheese-like" appearance. Progressive necrosis compromises the overlying mucosa, giving rise to transverse ulcers along the intestinal wall. These ulcerative lesions frequently manifest as abdominal pain and diarrhea, resulting from mucosal irritation, inflammatory exudation, and reduced absorptive capacity. Persistent mucosal damage further contributes to malabsorption, anorexia, and progressive weight loss. Chronic ulceration may subsequently result in fibrosis, stricture formation, or intestinal perforation in advanced disease. This results in swelling and redness in the intestinal wall., ultimately resulting in primary intestinal tuberculosis.[16]

VISHAMASHAJANYA RAJAYAKSHMA[17]	PRIMARY INTESTINAL TB[18]
Shoola	Abdominal pain
Atisara	Diarrhea
Arochaka	Aversion towards food
Sosha	Weight loss

IV. DISCUSSION

This study demonstrates that the contemporary understanding of *Rajayakshma* extends far beyond a single disease entity, representing instead a spectrum of immunocompromised diseases, manifest through different pathophysiological mechanisms.

The relationship between *Sahasajanya Rajayakshma* and pulmonary tuberculosis after chest injury like pulmonary contusion supports the Ayurvedic idea that physical stress and strain can trigger disease. The current clinical understanding of stress-induced immunosuppression through increased stress hormones and suppression of alveolar macrophage function aligns remarkably with *Sahasa* leading to *Urakshata* and subsequent *Pranavaha Srotodusti*. The *Ayurvedic* recognition of *Sahasa* could predispose to respiratory infections demonstrates an intuitive understanding of the relationship between physical stress, immune function, and infectious disease susceptibility.

The concept of *Vegadharana* as a causative factor in *Rajayakshma* offers profound insights into the mind-body connection in disease pathogenesis. The suppression of natural urges like *Vata*, *Mutra*, *Pureesha* leading to *Malasanchaya* and subsequent *Apana Vata* vitiation can be understood through the lens of chronic sympathetic nervous system activation, particularly relevant in current clinical practice, where occupational demands often necessitate suppression of biological urges. The resulting immunosuppression creates a fertile ground for opportunistic infections, significantly influence disease susceptibility.

The concordance between *Kshayaja Rajayakshma* and HIV/AIDS presents one of the most clinically significant parallels in the context of pathophysiological and immunological analysis. Abnormal sexual activity resulting in *Shukra Dhatu Kshaya*, which causes systemic debility and immune suppression, closely parallels the contemporary understanding of HIV transmission through sexual contact and the subsequent depletion of CD4+ T cells.

The connection between *Vishamashanajanya Rajayakshma* and primary intestinal tuberculosis highlights the critical role of nutrition in immune function. The progression from irregular eating patterns to gastrointestinal dysfunction and eventual susceptibility to intestinal tuberculosis demonstrates that the micronutrient deficiencies are recognized as major predisposing factors for infectious diseases.

IV. CONCLUSION

Rajayakshma is disease which has afflicted the mankind from pre-historic times. A set of 4 *Nidana's* are described in the manifestation of *Rajayakshma*; *Sahasa, Vegadharana, Kshaya*, *Vishamashana*. The four *Nidanas* of *Rajayakshma* collectively represent different pathways to immunocompromise, each targeting distinct aspects of physiological function:

1. ***Sahasa*** - Physical stress pathway affecting respiratory immunity
2. ***Vegadharana*** - Neuropsychological pathway affecting systemic immunity
3. ***Kshaya*** - Reproductive pathway affecting cellular immunity
4. ***Vishamashana*** - Nutritional pathway affecting mucosal immunity

This multifactorial approach to disease etiology anticipates modern concepts of multisystem organ failure and the recognition that immune dysfunction can result from various upstream causes.
So, hereby conclude that *Nidana* of *Rajayakshma* extend beyond just Tuberculosis, encompassing a wide spectrum of diseases.

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