



CONCEPTS OF CHRONIC RHINOSINUSITIS IN AYURVEDA

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**ABSTRACT**

Chronic rhinosinusitis (CRS) is a multifactorial inflammatory disease of nasal and paranasal sinus mucosa where symptomatology has continued beyond 12 weeks. The symptoms of CRS include nasal obstruction, anterior or posterior nasal discharge, facial pain or pressure, and disturbance of smell. It is one of the most common chronic medical conditions worldwide affecting all age groups and leading to a significant decrease in the quality of life, productivity, and health care spending. The clinical features of CRS can be seen in various *nāsāgata* and *śiro-roḡās*. The analysis of *samprāpti ghataka* of CRS is very essential for proper management. While analysing the pathogenesis it is seen that CRS is a *sannipāta vyādhi* having *vāta kapha* predominance. *Kaphaja pratiśyāya*, *Sannipāta pratiśyāya*, *Apīnasa*, *Bhramśathu*, *Duṣṭapратиśyāya* and *Kaphaja śiraśūla* can be included under CRS. Based on *prakṛiti*, *dośa* predominance, and the various presentations in each individual; diagnosis may vary in each individual. Thus, management can be personalized according to this and can prevent the burden of illness and surgery, thereby quality of life can be enhanced.

Keywords: Chronic rhinosinusitis, CRS, *Kaphaja pratiśyāya*, *Sannipāta pratiśyāya*, *Apīnasa*, *Bhramśathu*, *Duṣṭapратиśyāya* and *Kaphaja śiraśūla*

INTRODUCTION

Ayurveda is an ancient Indian medical system that emphasizes on promotion of positive health and offers a great deal for the physical and mental well-being of an individual. *Śālākya-taṅtra* is an important branch of *Ayurveda* that deals with preventive, protective, and curative aspects of eye, ear, nose, throat, and oro dental diseases. The nose is a sense organ that performs olfactory and respiratory functions. Due to its direct contact with the external environment, it is exposed to a lot of microorganisms and pollutants present in the atmosphere. Changes in mode of life, dietary habits, etc. can lead to alterations in physiological functions of all systems of the body, which can lead to vitiation of doshas and later on producing several diseases. Certain diseases may not be life-threatening but are increasingly annoying and irritating to the individual as it hinders his daily routines. Moreover, when neglected, they may lead to serious complications. Chronic rhinosinusitis (CRS) is one such condition and is becoming increasingly prevalent these days, hence demanding great concern. The signs and symptoms of chronic rhinosinusitis can be seen in various diseases of *nāsa* and *śira*. So, the detailed *Ayurvedic* approach is essential for determining *samprāpti* and *samprāpti ghataka*. This knowledge helps to design appropriate management, prevention of recurrence, and helps to lead a fruitful life, as the presentation may vary in different individuals. So here an attempt is being made to analyze the concept of chronic rhinosinusitis in *Ayurveda* for its better understanding.

MATERIALS AND METHODS: The *Ashtangahridaya*, *Ashtanga Sangraha*, *Susruta Samhita*, and *Charaka Samhita* were scrutinized.

AIMS AND OBJECTIVES

- To analyze the concept of chronic rhinosinusitis in *Ayurveda*.

CHRONIC RHINOSINUSITIS

Chronic rhinosinusitis (CRS) is a multifactorial inflammatory disease of nasal and paranasal mucosa presenting with a variety of symptoms combinations. It may be used to describe conditions ranging from unilateral single sinus disease to widespread sinona-

sal airway inflammation¹. It is closely associated with the development and prognosis of lower airway diseases, including asthma and chronic obstructive pulmonary disease. CRS represents a significant disease burden worldwide, affecting at least 11% of the population and consequently carrying with it a substantial economic burden to healthcare systems, patients, and the economy from loss of productivity in the workplace². It also leads to a significant decrease in the quality of life of patients.

Definition

It is a chronic inflammatory disease of nasal and paranasal sinus mucosa where symptomatology has continued beyond 12 weeks³.

Diagnostic criteria

Clinical consensus diagnostic criteria for chronic rhinosinusitis from the American Academy of Otolaryngology—Head, and Neck Surgery (AAOHN) and the European Position Paper on Rhinosinusitis and Nasal Polyps (EPOS) defined Chronic rhinosinusitis in adults by meeting both patients reported symptom criteria and objective criteria.⁴

Primary symptoms

At least one of the following symptoms should be present, but if both are present it is sufficient to make a diagnosis on the basis of symptoms.

- Nasal blockage/obstruction/congestion
- Nasal discharge (anterior/posterior)

Additional symptoms

At least one is needed if only one of the primary symptoms is present. These include

- Facial pain/pressure
- Hyposmia/anosmia

Objective criteria

Endoscopic findings (Any of these)

- Nasal polyps
- Mucopurulent drainage from the middle meatus (or another sinus outflow)
- Edema or mucosal obstruction in the middle meatus (or another sinus outflow)

Or

Radiographic findings (CT scan)

Mucosal thickening or opacification in the ostiomeatal complex or paranasal sinuses

Duration – more than 3 months

Types of Rhinosinusitis⁵

Based on duration and occurrence, it is categorized as follows:

- Acute rhinosinusitis – lasts fewer than four weeks
- Subacute - lasts between 4 and 12 weeks
- Chronic rhinosinusitis - lasts more than 12 weeks
- Recurrent acute rhinosinusitis (RARS)

It is defined as four or more episodes of acute rhinosinusitis per year each lasting at least ten days without persistent symptoms in between these distinct episodes.

Rhino sinusitis in Ayurveda

Śiras is the *adhīṣṭāna* of *kapha doṣa*, *prāṇa vāyu* and *nāsā* is the opening to *śiras* which is also the communication to the external environment⁶. Hence environmental factors such as humidity, pollution, climatic changes, chemicals, toxins, aeroallergens, smoke, dust, and psychological factors can impair the functions leading to various *śirogata* and *nāsāgata rogās*. In *Ayurveda* classics, *nāsāgata rogās* and *śirogata rogās* have been described very well. The symptoms of rhinosinusitis can be seen in some of these *rogās*.

DISCUSSION

Critical analysis of Chronic rhinosinusitis (CRS)

In Ayurveda: Chronic rhinosinusitis is a heterogeneous disease characterized by prolonged mucosal inflammation of the nose and paranasal symptoms. It can be diagnosed by the presence of either of two symptoms among nasal obstruction, nasal or postnasal discharge, facial pain and pressure, and disturbance of smell.

Etiopathological Factors: It is a multifactorial disease contributed by various *nāsāroga* and *śiroroga nidānās* and other factors. These can be categorized as follows.

1. Beeja duṣṭi or sahaja : These include *mātrija* and *pitrja* factors. There is an increased risk of CRS

among the family members. A genealogical database study found that first-degree relatives of CRS patients⁷.

2. Beejabhāga and beejabhāga avayava duṣṭi

These include genetic factors such as genes related to inflammation, polymorphisms in the major histocompatibility complex, genes necessary for antigen-specific adaptive immune responses, genes involved in innate immunity, genes related to specific inflammatory pathways or mediators (eg: cytokines), and genes involved in the sinonasal mucosal function. Bitter taste receptor T2R38, encoded by the TAS2R38 gene, plays a role in sinonasal epithelial defense against gram-negative organisms (eg, *Pseudomonas aeruginosa*) and mucociliary clearance⁸. Polymorphisms in this gene may affect innate host defense mechanisms and increase susceptibility to biofilm formation. Studies have shown that various cytokines i.e., interleukins such as IL1A (gene rs17561), IL1B (rs16944), and TNFA (rs361525 and rs1800629) were associated with susceptibility to develop CRS⁹.

3. Āhāraja nidānā (Dietary factors)

Anyā vāri pāna (Drinking different types of water at the same time)

According to *Bhāvamiṣra*, water that is taken in its natural form (*sīta jala*) gets digested in two *yāma* (6 hrs), that which is boiled and cooled (*syta sīta jala*) gets digested in 1 *yāma* (3 hrs) and that which is boiled and warm (*uśṇa jala*) in half *yāma* (1 1/2hrs). These when taken together or one after the other before the digestion of previously taken one result in *ajīrṇa* and vitiation of *kapha* and *pitta doṣa*.

Atyambu pāna¹⁰ (Excessive intake of water): Excessive intake of water results in vitiation of *pācaka pitta* and *kledaka kapha* and hence the digestive system cannot function properly resulting in *agnimāndya* and formation of *āma* ultimately resulting in improper *dhatupariṇāma*.

Ajīrna (Indigestion)¹¹: It results from vitiation of *doṣās*, especially *kapha* and *pitta*, and also causes vitiation of *annavaha* and *udakavaha srotas*.

Viṣamāśana¹¹: It causes vitiation of *pacaka pitta* and *kledaka kapha* leading to the formation of *āma*.

Madya pāna¹²: Madya is having *tīkṣṇa*, *uṣṇa* and *rūkṣa guṇās* and *amla rasa*. Therefore, its intake results in *pitta* vitiation.

4. **Vihāraja nidānā (Habitual and occupational factors)**

Avaśyāya-anila niṣevaṇa (Exposure to dew and breeze)¹⁰

Avaśyāya and *anila niṣevaṇa* cause vitiation of *vāta* due to its *sīta* and *rūkṣa guṇās*. It acts as a non-specific stimulus to the nasal mucosa by which sympathetic activity is increased. The airway surface liquid (ASL) is a thin layer of fluid covering the luminal surface of the airway epithelium and plays a key role in airway homeostasis. Mucociliary clearance which is a primary innate defence mechanism of the conducting airways is strongly influenced by the hydration state of the airway lumen. Cold exposure to the airway causes changes in ASL, nasal and oropharyngeal mucosa, smooth vessels, and blood vessels. Activation of the mucosal epithelium generates proinflammatory substances and epithelial injury. Thus, inflammatory cascade occur¹³.

Rajo-dhuma niṣevaṇa¹⁴(Exposure to dust and smoke, inhalant allergens)

Rajo niṣevaṇa causes *udāna* and *prāṇa vāyu kopa* as it irritates the nasal mucosa due to its *laghu* and *rūkṣa guṇa*. The toxic fumes containing inhalant allergens or chemicals cause vitiation of *prāṇa vāyu*, *udāna vāyu*, and *pitta* due to *rūkṣa*, *tīkṣṇa*, and *uṣṇa guṇās*. *Raja* can be pollen grains, dust particles, animal dander, and feather wool. *Dhuma* can be considered as the smoke which may be domestic, automobile, industrial, or tobacco smoke (active or passive). The inspired particles (>10µm) interact with the mucosa through the process of impaction. Once trapped in nasal mucous, these particles are transported posteriorly to the nasopharynx via the mucociliary blanket mechanism. From there they are expectorated. Gaseous or vapour phase air pollutants clearance depends on water solubility, chemical reactivity, and mucosal metabolism. Highly water-soluble and reactive irritants such as chlorine, ammonia, and sulphur dioxide dissolve in mucous membrane water. Some irritants are detoxified via

mucosal metabolism by the action of enzymes such as carboxyl esterase and aldehyde dehydrogenase. Regular exposure or increased duration of exposure causes damage to the nasal mucosa and also triggers the mucosal mast cells with antigen-specific IgE bound to surface receptors resulting in the release of inflammatory mediators resulting in itching, sneezing, and nasal secretion (*pratiśyāya*). The smoke can also damage the cilia of mucosal epithelium thus hampering the mucociliary clearance mechanism¹⁵.

Atiswapna and niśajāgaraṇa (Day sleep and night vigilance)¹⁰

Excessive day sleep causes vitiation of *kapha* and *pitta* due to an increase in *snigdha guṇa*. Awakening at night or sleeping late at night causes an increase in *rūkṣa guṇa* and leads to *vāta kopa*. The sleeping pattern is controlled by the hypothalamus which influences the autonomic nervous system.

Atyamburamaṇa (Excessive indulgence in water as a part of work or for recreation)¹⁰

Excessive indulgence in cold water for a long-time result in vitiation of *vāta* and *kapha doṣa*. It also impairs the temperature regulation of the body which is done by the autonomic nervous system (ANS) and its imbalance cause rhinitis.

Ativyavāya (Excessive indulgence in sexual activities)¹¹ Excessive indulgence in sexual activities leads to *śukraṅśaya* resulting in *vāta kopa* and *ojokṣaya*, which may produce *pratiśyāya*. Sexual arousal is controlled by the autonomic nervous system (ANS). *Ativyavāya* causes the hyperactivity of the parasympathetic nervous system, thereby causing engorgement of erectile tissue around the turbinate resulting in nasal stuffiness.

Śiraso abhitāpa (Discomfort to head)¹⁰ In *Dalhana* Commentary, it is mentioned that *śira abhitāpa* is due to the excessive entry of dust and smoke in the *ghrāṇa mārga*.

Sīta atipratāpa (Excessive exposure to cold and heat)¹⁴

Excessive exposure to cold and heat causes vitiation of *vāta*, *pitta*, *kapha* especially *tarpaka kapha*. In patients who are immunocompromised or already have *khavaiguṇya* (DNS, hypertrophy) and pre-

existing nasal allergy or pathology, any further exposure results in acute manifestation or exacerbation of the disease. Cold exposure triggers an inflammatory process.

Exposure to Ātapa¹²

It causes pitta *duṣṭi* and *vilayana* of *sañcita kapha* in *śiras* due to its *uṣṇa guṇa*.

Utsweda (heavy sweating)¹² Sweda is the *dhātu mala* of *medas*. Sweat glands are regulated by the autonomic nervous system. Heavy sweating may alter this regulation and function of ANS.

Purovāta (eastern breeze)¹² Breeze from the east is having *madhura* and *lavaṇa rasa* and *snigdha, guru guṇa*. It is *vidāhajanana*. When exposed to *kapha prakṛti* persons it exacerbates their diseases¹⁶.

Exposure to Asātmya and duṣṭa gandha¹² It causes *sannipāta doṣa* vitiation and *mithya yoga* of *ghrāṇendriya*, resulting in derangement of its function. The toxins released by them irritate the nasal mucosal epithelium and results in rhinitis.

5. Vegadharana

Bāṣpanigraha¹² The emotions, stress, anxiety, etc are controlled by the autonomic nervous system, which in turn regulates the secretion of the nasal gland.

Suppression of urges for urine and faeces¹⁴

It causes *Pratiśyāya*.

6. Mānasika bhāvās

Excessive *rodana* causes *vāta kopa*. There is a strong relationship between *manas* and *indriyas*. So, any agitation in mind leads to *indriya tāpana*. Usually, mental factors like anger cause the *pitta prakopa*. Excessive anger and unwanted weeping are the major mental factors mentioned in *pratiśyāya nidānā*. Emotions are regulated by the hypothalamus and autonomic nervous system. Emotional stimuli cause hyper reactive parasympathetic system eventually resulting in vasodilation of nasal mucosal vessels and hyper secretion of nasal glands.

7. Kalaja nidānā (Environmental factors)

Ritu vaisamyā¹¹ is a *sannikriṣṭa nidānā* for *pratiśyāya* which causes *sannipāta doṣa kopa*. The seasonal changes provoke *doṣa kopa* resulting in *pratiśyāya*. Humidity is a non-specific stimulus to

which the nasal mucosa becomes hyper reactive causing nasal secretion.

8. Āgañtuja nidānās (Exogenous factors)

These include exposure to cold, dust, inhalant allergen, polluted air, *viṣa*, smoke, and pathogenic organisms such as viruses, bacteria, and fungi¹⁷. These factors trigger the inflammatory process.

9. Ritu vaiṣamyā and Ritu sandhi: This includes a change in climate and humidity of atmospheric air.

10. Swatantra vyādhi

CRS occurs as a *upadrava* of allergic rhinitis and non-allergic rhinitis such as Vaso motor rhinitis (VMR), acute rhinosinusitis, etc.

11. Paratantra vyādhi

CRS is associated with other diseases such as cystic fibrosis, dental infections, asthma etc¹⁷. Among these *nidānās*, *āharaṇa nidānās* are mostly *kapha pittu duṣṭikāraka*, *viḥāraṇa nidānās* constitute *vāta kapha duṣṭi*. *Vegadhāraṇa* causes *vāta* vitiation.

Vyādhi ghatakās of CRS

The disease process of *pratiśyāya* starts by the aggravation of *vāta* and other *doṣās* either individually or in combination and also with *rakta* with a predominance of *vāta* by various causative factors¹⁸. CRS is a *viṣama sannipatha vyādhi* having *vāta kapha pradhana* and *pitta* in *alpatara* state. While analysing the clinical pictures and pathology of CRS we can assume that *vāta uparodha* due to *kupita kapha doṣa* and *kapha sañcaya* as a sequela to *dhātukshayaṇa vāta kopa* occur in a cyclic manner.

- *Doṣa- vāta kapha pradhāna, pitta alpatara*
- *Dushya - rasa, rakta*
- *Srotas - rasavaha, raktavaha, Ghrana bahya srotas*
- *Āma*
- *Dhatvagnimandya* -impairs metabolic action of various enzymes in the nasal mucosa, enhances mucosal epithelial damage
- Decreased *bala - sahaja, kālaja* and *yuktikrita*
- Decreased *vyādhi kṣamatva*
- *Khavaiguṇya* - DNS, turbinate hypertrophy, concha bullosa, impaired nasal cycle

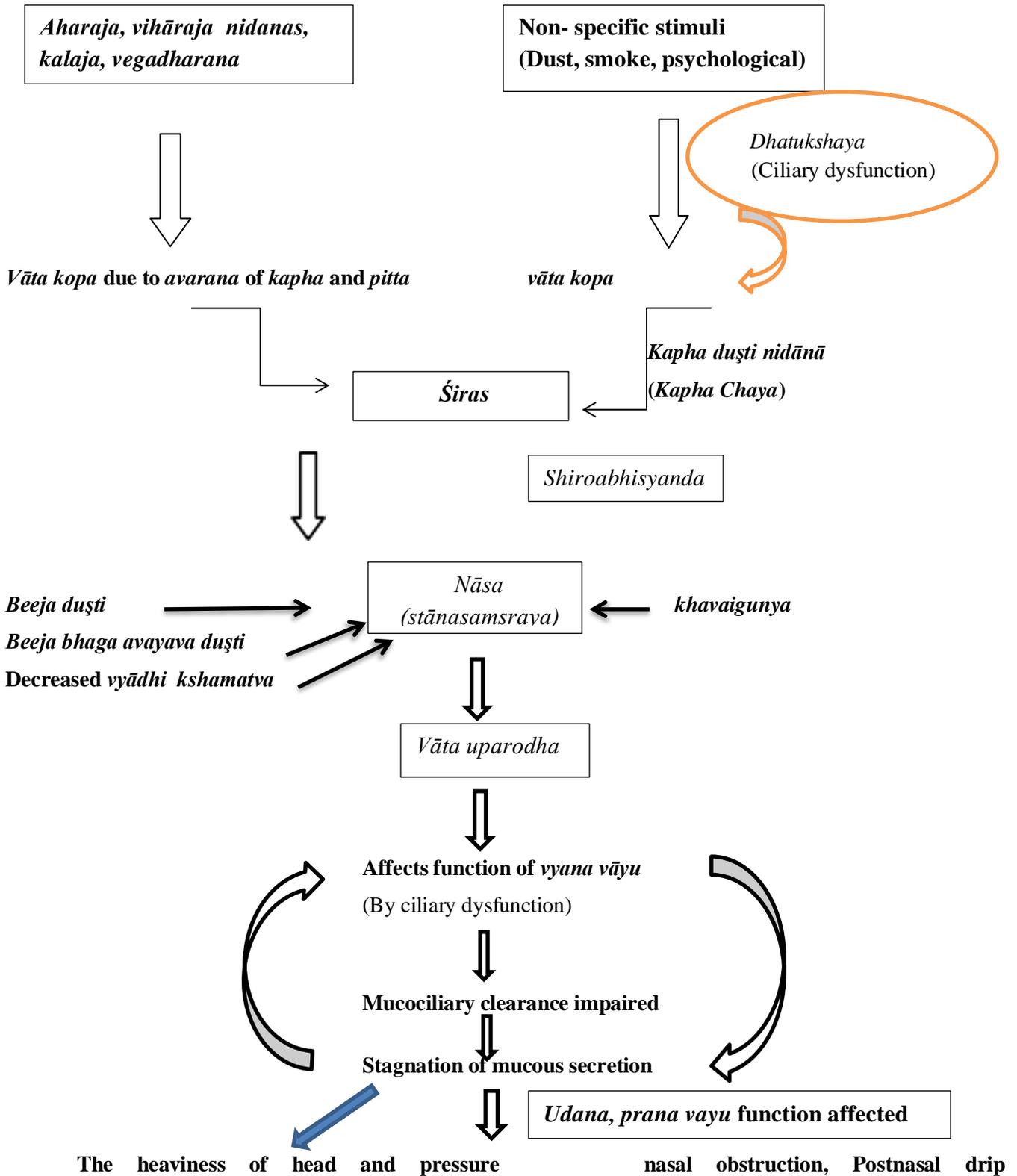
Samprāpti

The *kupita vāta* due to *āvaraṇa* of other *doṣās* reaches *urdhwa* i.e the *śiras* which is the seat of *kapha doṣa*; simultaneously results in *abiṣyañda* in *sūkṣma* and *stūla srotas* of *śiras*. When it gets accumulated in the *nasikāmūla* where *kha vaiguṇya* has already taken place; results in *pratiśyāya*. While analysing the pathogenesis of chronic rhinosinusitis it is seen that the disease is a *vāta kapha pradhāna sannipāta* condition. Here in this disease *vāta uparodha* occurs due to *kupita kapha doṣa* and *dhātukshaya*. The various *āharaḥa*, *viharaḥa*, *kālaḥa nidanās*, and *ritu vaiṣamya* cause *kapha doṣa* vitiation leads to *kapha sañcaya* in its *adhiṣṭāna* i.e *Śiras* and *ghrāna srotha* (*stānasamsraya* in *ghrāna* or *śiras*) which in turn causes *vāta uprodha* by *kapha āvaraṇa*. *Dhātukshaya* can be in the form of nasal mucosal epithelial damage and cilia dysfunction by various etiological factors. By this, the function of *vyana vāyu* i.e., the movement of cilia got affected thus hampering the mucociliary clearance mechanism. As sequelae to this, stagnation of secretion

occurs further leading to impaired mucociliary clearance which in turn damages cilia. In CRS these two ways of *vāta kopa* (*āvaraṇa* and *dhātukshaya*) are interconnected and occur as a vicious cycle. The structural abnormalities (*khavaigunya*) and etiological factors such as *kāla*, decreased *vyādhi kshamatva*, and decreased *rogi bala* favours the pathogenesis. *Vāyu* is inseparably linked to *nāsā* to carryout the physiology of the nose. Thus, the function of *prāṇa* and *udana* got affected i.e *Niśwāsa* and *Uchawasa*. Thus, produce heaviness of the head, nasal discharge, postnasal discharge, and nasal obstruction.

When there is excessive cold exposure, climatic change, and intake of *shleshmala āhāra* in a CRS patient, *kapha vridhi* occurs which in turn causes *vāta uparodha* resulting in acute exacerbation. Recurrent CRS occurs in immuno-compromised individuals, those having structural abnormalities of the nose, allergic rhinitis and already having other nasal pathology.

Pathogenesis of CRS



PRESENTATION OF CRS IN VARIOUS DISEASES

While analyzing the clinical picture of CRS, the same symptoms can be seen in *Pratiśyāya* especially *kaphaja* and *sannipāta pratiśyāya*, *peenasa*, *duṣṭa pratiśyāya*, *bhramasāthu* and also in *kaphaja śiraśūla*.

Kaphaja Pratiśyāya¹⁹: The symptoms include *Sweta srava* from *ghrāna* (muco purulent nasal discharge), *śūnāksha* (periorbital swelling), and *Guru śiras* and *mukha* (heaviness of head and face).

Sannipata Pratiśyāya²⁰: This presents with symptoms of all *pratiśyāya*, mucoid or muco purulent discharge, shows recurrence. (*Bhutva* - It indicates recurrent rhinosinusitis).

Apeenasa²¹: The symptoms include *Nāsā rodha* (Nasal blockage), disturbance of smell, *nāsā srava* like in *Avi* (nasal mucoid discharge), and *pakva peeta sinkāṇaka srāva* (mucopurulent discharge)

Bhramasāthu²²

It presents with *Sañcita kapha* from *śira* flows out through the nose (nasal discharge) and *Sandra vidagdha lavana srāva* (thick discharge).

Kaphaja Śiraśūla²³: The symptoms include *kaphopadigdha gala* (postnasal discharge), heaviness of the head, *śūna akshikoota*, and *vadana* (periorbital and facial swelling). All these *rogās* can be presented with signs and symptoms of CRS.

Duṣṭapraśyāya²⁴

All the varieties of *pratiśyāya* when not treated or due to inappropriate treatment led to *Duṣṭapraśyāya*. The symptomatology broadly extends from sinonasal mucosal inflammation, involvement of the lower respiratory tract, digestive system, all *indriya*, and whole body, and has many complications.

Sino nasal involvement

It comprises *nāsika kleda samśosha* (drying of moisture of nose), *Muhur shuddhirodhakara* (intermittent nasal obstruction and opening), *mukha dourgandhya* (halitosis), *mukha soppa* (swelling of face), *gandha añjāna* (anosmia) and *puya asitasitarakta* and *grathita kapha* (nasal discharge purulent, black, red, and thick).

Lower respiratory tract involvement: It includes *Śwāsa*, *kāsa*, *ura pārśva vedana* and *kshaya*

Digestive system - Agnisāda

Sarvendriya tāpa & Upadrava ādhikya

- Affects all *indriya* – can affect the ear, eyes, orbit, facial nerve, intracranial structures, hearing, and vision
- *Upadravās* includes – *bādhirya*, *āndhya* and *aghrāna*²⁵
- **Others**²⁴
- *Jwara*, *dīrgha*, *snigha*, *sita* and *anu krimi* (development of long, white, minute *krimi*)

These occur in recurrent CRS, chronic rhinosinusitis with polyp (CRSwNP), CRS associated with asthma, and complications of CRS.

CONCLUSION

Diagnosis of chronic rhinosinusitis in *Ayurveda* can be made by analysing signs and symptoms, duration, involvement of *doṣa*, *duṣya*, *srotas*, and *prakriti* of the individual. Besides these, analysis of etiological factors and *samprāpti ghatakās* helps in the proper management. *Kaphaja pratiśyāya*, *Sannipāta pratiśyāya*, *Apīnasa*, *Bhramasāthu*, *Duṣṭapraśyāya*, and *Kaphaja śiraśūla* can be included under CRS based on the various presentations in each individual. Hence diagnosis may vary in every individual. Thus, management can be personalized according to this and can prevent the burden of illness and surgery, thereby quality of life can be enhanced.

REFERENCES

1. Stephan Vlaminc et al. Pathophysiological and Clinical Aspects of Chronic Rhinosinusitis: Current Concepts. *Front. Allergy* 2:741788.doi 10.3389/falgy.2021.741788/frontiers in allergy, 27/10/2021 (Google Scholar).
2. Scott – Brown’s Otorhinolaryngology Head & Neck Surgery, John C Watkinson, Raymond W Clarke, Editor. 8th Edition (e Book). Vol I Basic Sciences, Endocrine Surgery, Rhinology. Boca Raton, CRC Press, 2018, p.1026.
3. P, L Dhingra, Shruti Dhingra. Diseases of Ear, Nose and Throat & Head and Neck Surgery. 7th Edition. Haryana, RELX India Pvt. Ltd.; 2020, p. 217.
4. Ahmed R. Sedaghat et.al, Epidemiology of Chronic Rhinosinusitis: Prevalence and Risk factors. *American Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract* 2022;10:1395-403).

- <https://doi.org/10.1016/j.iaip.2022.01.016> (Google scholar)
5. P, L Dhingra, Shruti Dhingra. Diseases of Ear, Nose and Throat & Head and Neck Surgery. 7th Edition. Haryana, RELX India Pvt. Ltd.; 2020, p. 213.
 4. 6. Sreekumar T, English translation on Ashtanga Hridaya, Principles of Ayurveda. Vol II. Sutrashtana, Nasya vidhi:20,Thrissur:Publication Department, Harisree Hospital; 2008, p. 115
 6. Ahmed R. Sedaghat et.al, Epidemiology of Chronic Rinosinusitis: Prevalence and Risk factors. Americal Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2022;10:1395-403). <https://doi.org/10.1016/j.iaip.2022.01.016> (Google scholar).
 7. Ahmed R. Sedaghat et.al, Epidemiology of Chronic Rinosinusitis: Prevalence and Risk factors. Americal Academy of Allergy, Asthma & Immunology (J Allergy Clin Immunol Pract 2022;10:1395-403). <https://doi.org/10.1016/j.iaip.2022.01.016> (Google scholar)
 8. Claus Bachert et.al. ICON: Chronic rhinosinusitis, World Allergy Organ J. 2014;7(1):25 2014 Oct 27.doi:10.1186/1939-4551-7-25.
 5. (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4213581/>)
 9. Srikantha Murthy K R, English translation on Vāgbhaṭa's Ashtanga Hridayam. Reprint 2002, Vol III, Uttarasthana; Nasa roga Vijnaniya: 19, Varanasi: Krishnadas Academy, Chaukhamba publications, 2002, p. 173.
 10. Agnivesa. Charaka Samhita (Chakrapanidatta, Comme). Trimarmiyam Chikitsitham, 26. Varanasi: Chaukhamba orientalia, 2019, p.604.
 11. Srikantha Murthy K R, English translation on Vāgbhaṭa's Ashtanga Hridayam. Reprint 2002. Vol III, Uttarasthana; Siroroga Vijnaniya: 23, Varanasi: Krishnadas Academy, Chaukhamba publications, 2002, p. 218.
 12. D'Amato, M., Molino, A., Calabrese, G.*et.al.* The impact of cold on the respiratory tract and its consequences to respiratory health. *Clin Transl Allergy* 8, 20 (2018). <https://doi.org/10.1186/s13601-0180208-9>
 13. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Pratisyaya prstishedha 24, Varanasi: Chaukhamba orientalia, 2010, p. 126
 14. Dennis Shusterman. The Effects of Air pollutants and Irritants on the Upper Airway. Proceedings of the American Thoracic Society, Vol 8, Issue 1. www.stsjournals.org
 15. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Third edition, Vol 1. Sutrashtana; Hitahitiya Adhyaya: 20, Varanasi: Chaukhamba orientalia, 2007, p.144.
 16. P, L Dhingra, Shruti Dhingra. Diseases of Ear, Nose and Throat & Head and Neck Surgery. 7th Edition. Haryana, RELX India Pvt. Ltd.; 2020, p. 217.
 17. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Pratisyaya prstishedha 24, Varanasi: Chaukhamba orientalia, 2010, p. 126
 18. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Siroroga Vijnaniya 25, Varanasi: Chaukhamba orientalia, 2010, p. 134.
 19. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Pratisyaya prstishedha 24, Varanasi: Chaukhamba orientalia, 2010, p. 127
 20. Srikantha Murthy K R, English translation on Vāgbhaṭa's Ashtanga Hridayam. Reprint 2002, Vol III, Uttarasthana; Nasa roga Vijnaniya: 19, Varanasi: Krishnadas Academy, Chaukhamba publications, 2002, p. 176.
 21. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Vijnaniya: 22, Varanasi: Chaukhamba orientalia, 2010, p.121.
 22. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Siroroga Vijnaniya: 25, Varanasi: Chaukhamba orientalia, 2010, p.134.
 23. Srikantha Murthy K R, English translation on Vāgbhaṭa's Ashtanga Hridayam. Reprint 2002, Vol III, Uttarasthana; Nasa roga Vijnaniya: 19, Varanasi: Krishnadas Academy, Chaukhamba publications, 2002, p. 174.
 24. Prof Srikantha Murthy K R, English translation on Susruta Samhita. Fourth edition, Vol III. Uttararasthana; Pratisyaya prstishedha 24, Varanasi: Chaukhamba orientalia, 2010, p.

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