

“Tamaka Shwasa (Bronchial Asthma): A Review of Classical Ayurvedic Literature and Recent Scientific Evidence”

Dr. Anil Kumar¹, Dr. Rekha Phull²

¹ Ph.D. Scholar, Department of Kayachikitsa, Faculty of Indian Medical Sciences, SGT University, Gurugram, Haryana, India.

² Professor and Head, Department of Kayachikitsa, Faculty of Indian Medical Sciences, SGT University, Gurugram, Haryana, India.

Corresponding Author:

Dr. Anil Kumar

Ph.D. Scholar, Department of Kayachikitsa, Faculty of Indian Medical Sciences, SGT University, Gurugram, Haryana, India.

Cite this paper as: Dr. Anil Kumar, Dr. Rekha Phull (2024) “Tamaka Shwasa (Bronchial Asthma): A Review of Classical Ayurvedic Literature and Recent Scientific Evidence” .*Frontiers in Health Informatics*, Vol.13, No.2, 1252-1258

ACCEPTANCE DATE-12 DEC. 2023

PUBLICATION DATE-18 JAN 2024

ABSTRACT:

Background: Tamaka Shwasa is one among the five varieties of Shwasa Roga mentioned in Ayurveda, clinically resembling with bronchial asthma with recurring bouts of dyspnea, wheezing, cough, chest tightness and respiratory distress. This is mostly a Vata-Kapha predominate disease affecting the Pranavaha Srotas. Bronchial asthma continues to be a serious public health problem globally, due to its chronic inflammatory nature, growing prevalence, recurring exacerbations and effect on quality of life. The classical Ayurvedic texts have described the etiology (Nidana), pathogenesis (Samprapti), clinical features (Lakshana), prognosis and management of Tamaka Shwasa in detail. The recent scientific studies have been done on the pharmacological and clinical efficacy of Ayurvedic interventions in the management of asthma. Objective: The present study attempts to critically assess the ancient Ayurvedic description of Tamaka Shwasa and link with the contemporary knowledge of bronchial asthma. It also examines current scientific evidence on the usefulness of Ayurvedic herbal medicines, Panchakarma treatments, food management and life style interventions. Methods: Classical literature of Ayurveda including Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya and other relevant Nighantus were used for systematic narrative review. The recent scientific literature was obtained from the peer reviewed journals and electronic databases of PubMed, Google Scholar, Scopus, AYUSH Research Portal and other indexed sources. Review of the important research on the biology, pharmacology, clinical effectiveness and integrative therapy of bronchial asthma. Results: The review shows a tight association between Tamaka Shwasa and bronchial asthma in terms of genesis, symptomatology, course of the disease and its recurring character. The Ayurvedic management emphasizes on Nidana Parivarjana, Agni correction, Ama elimination, Dosha balance restoration, Shodhana therapies like Vamana and Shamana medications like Vasa (Adhatoda vasica), Pippali (Piper longum), Kantakari (Solanum xanthocarpum), Pushkaramoola (Inula racemosa), Yashtimadhu (Glycyrrhiza glabra) and classical formulations like Sitopaladi Churna, Talisadi Churna and Agastya Haritaki Avaleha.....

Keywords: Ayurveda, Tamaka Shwasa, Bronchial, Shwasa Roga, Pranavaha Srotas.

INTRODUCTION

Tamaka Shwasa is a type of Shwasa Roga (respiratory disorder) that impacts the Pranavaha Srotas and is characterized by Pratiloma Vayu (prolonged expiration), Ghurghuraka (wheezing), and Ativa Tivra Vegam Shwasam Pranapradakam (dyspnea of exceptionally rapid onset, which is severely detrimental to life), among other symptoms. The condition known as Tama manifests during episodes of dyspnea, which become so intense that the patient perceives a descent into darkness. Tamak shwasa is a chronic condition that is challenging to treat, although it mostly affects the Pranavaha srotas [respiratory system], other srotas are also implicated. 1 Bronchial asthma is a chronic inflammatory condition of the lung airways, marked by bronchial hypersensitivity and varying.

degrees of airway blockage. The interplay between environmental and genetic factors induces airway inflammation, restricting airflow and causing functional and structural alterations in the airways, such as bronchoconstriction, augmented mucus secretion, mucosal edema, cellular infiltration, and desquamation of inflammatory and epithelial cells.²

Bronchial asthma is one of the most prevalent chronic respiratory diseases impacting all age groups and exerting a significant cost on healthcare systems globally. It is characterized by inflammation of the airways that continues over time, bronchial hyper-responsiveness, reversible airflow restriction and recurring bouts of wheezing, dyspnea, chest tightness and coughing, especially at night and in the early morning.³ Asthma is a substantial source of morbidity and affects more than 260 million people worldwide (Global Initiative for Asthma [GINA], 2019). Despite breakthroughs in diagnosis and treatment, asthma remains a major cause of morbidity. The rise of asthma, especially in the developing world, has been attributed to environmental pollution, exposure at work, tobacco smoke, respiratory infections, allergens, climate change, urbanization, genetic susceptibility and poor lifestyles. While traditional pharmacotherapy is efficacious in controlling symptoms and reducing exacerbations, issues of long-term dependency on inhaled corticosteroids and bronchodilators, coupled with concerns of side effects, have rekindled interest in alternative and integrative treatment options.⁴

AIM AND OBJECTIVES

1. To comprehend bronchial asthma using Ayurvedic principles.
2. To examine Tamaka Shwasa's pathophysiology, causes, and available treatments.

Ayurvedic Review

Tamaka Shwasa is one among the five varieties of Shwasa Roga as mentioned in Ayurveda. It is classified as one of the chronic disorders of Pranavaha Srotas. It is mainly a vata-kapha condition in which increased kapha obstructs the natural movement of vata (kapha-āvrta vata) leading to difficulties in breathing, wheeze, cough, chest tightness and recurring respiratory discomfort.⁵ The disease is well elaborated in Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Ashtanga Sangraha, Madhava Nidana, Sharangadhara Samhita and Bhavaprakasha with detailed descriptions of its etiology (Nidana), pathogenesis (Samprapti), clinical manifestations (Lakshana), prognosis (Sadhya-Asadhyata) and management (Chikitsa).⁶

Ayurveda says obstruction in the respiratory passageways (Pranavaha Srotas) and the hampering of the normal flow of Vata Dosha are the main pathogenic factors in Tamaka Shwasa. These abnormalities are caused by the vitiation of Kapha Dosha. This blockage leads in anomalous upward migration of Vata (Pratiloma Gati) resulting in dyspnoea, wheezing, recurrent cough and respiratory discomfort. Classical writings also highlight the significance of Agnimandya (impaired digestive fire) and Ama (metabolic poisons) in onset and progression of the illness. These symptoms are often exacerbated with the change of season, especially in cold and wet seasons.⁷

Types of Tamaka Shwasa

Charaka has described two linked conditions of Tamaka Shwasa classified as two forms or additional complication of sickness proper i.e., Pratamaka and Santamaka. Sushruta and Vagbhata have mentioned the term as Pratamaka exclusively which includes clinical manifestation of Santamaka.⁸

Pratamaka Shwasa

Pratamaka Shwasa is the term used when patients with Tamaka Shwasa experience fever and fainting. It suggests that Pittadosha was involved in Pratamaka Shwasa. Udavarta, dust, indigestion, humidity (Kleda), inhibition of natural impulses, Tamoguna, and darkness all increase it; cooling regimes instantly relieve it. In actuality, one of the causes of Tamaka Shwasa is a cooling regimen; yet, in Pratamaka Shwasa, the patient receives relief via the use of cooling substances since Pitta Dosha is involved.⁹

Santamaka Shwasa

Santamaka Shwasa is the term used to describe Pratamaka Shwasa patients who feel completely enveloped in darkness. Although Chakrapani has referred to these two as synonyms, Charaka describes them as two distinct illnesses that reflect two distinct Tamaka Shwasa states; yet, the intensity of assault distinguishes these two disorders from one another.¹⁰

Nidana-

The table below shows comparison between five treatises regarding presence of various risk factors.¹¹⁻¹⁴

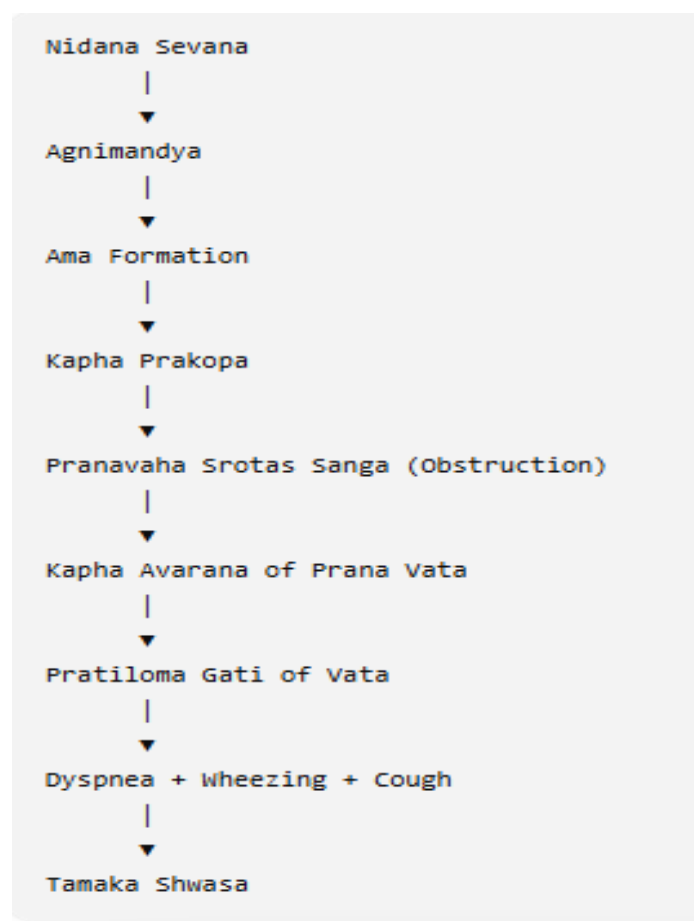
Primary Nidana	Effect on Pathogenesis
Kapha-provoking diet (<i>Guru, Snigdha, Madhura Ahara</i>)	Increases Kapha, causing obstruction of the respiratory channels (<i>Pranavaha Srotas</i>)
Agnimandya	Leads to improper digestion and <i>Ama</i> formation
Ama	Obstructs <i>Srotas</i> and aggravates Kapha

Dust, smoke, cold wind	Trigger bronchospasm and aggravate Vata-Kapha
Day sleep (<i>Diwaswapa</i>)	Increases Kapha accumulation
Excessive exertion (<i>Ativyayama</i>)	Aggravates Vata and precipitates dyspnea
Emotional stress	Disturbs Vata and precipitates asthma attacks
Seasonal changes	Cause recurrent exacerbations, particularly in cold and humid weather

Samprapti –¹⁵

Tamaka Shwasa is a Vata-Kapha predominate condition of Pranavaha Srotas (respiratory channels) as per Ayurveda. The condition is caused by the concomitant aggravation of Kapha and Vata, in which Kapha plays the major role by blocking the respiratory passageways while Vata produces irregular respiratory movements. The basic pathology is Kapha Avarana of Prana Vata, where the exacerbated Kapha hinders the natural movement of Prana Vata causing dyspnea, wheeze, cough and recurring respiratory discomfort.

The pathogenesis begins with exposure to different Nidana (causative factors) such as excessive intake of heavy, cold, oily and Kapha promoting foods, exposure to dust, smoke, cold wind, pollen, excessive physical exertion, suppression of natural urges, irregular dietary habits and psychological stress. These variables impact Jatharagni (digestive fire), causing Agnimandya (lower digestibility). Thus, the undigested food turns into Ama which percolates through the body and causes Srotorodha (obstruction of bodily channels).



Purvarupa of Tamaka Swasa¹⁶

S. No.	Purvarupa (Ayurvedic Term)	Description	Modern Correlation
1	Hridgraha	Feeling of heaviness or tightness in the chest	Chest tightness
2	Parshva Vedana	Mild pain or discomfort in the flanks/chest	Chest discomfort
3	Kantha Kandu	Itching or irritation in the throat	Throat irritation
4	Kantha Shosha	Dryness of the throat	Dry throat
5	Kasa	Mild or intermittent cough	Early cough
6	Arochaka	Loss of appetite	Reduced appetite
7	Agnimandya	Impaired digestion	Indigestion

Rupa¹⁷

The term "Rupa" in Ayurveda describes the distinctive clinical symptoms that show up when the illness has fully progressed (Vyakta Avastha). Recurrent episodes of dyspnea brought on by the blockage of Pranavaha Srotas as a result of exacerbated Kapha and aberrant Prana Vayu movement are the hallmark of Tamaka Shwasa. Wheezing, dyspnea, coughing, chest tightness, orthopnea, and repeated episodes are among the unique symptoms described in classical Ayurvedic writings that closely mimic the clinical presentation of bronchial asthma.

Cikitsa Sutra (Principle of Treatment)¹⁸

In the classical texts of Ayurveda, the approach of treatment has been made in the following way.

1. Nidana Parivarajan: Nidana Parivarjan, or avoiding all kinds of precipitating or predisposing conditions, must be rigorously adhered to in all four patient categories for the therapy. The Doshas involved in the pathogenesis will worsen and the prognosis will be poorer if the triggering or predisposing circumstances are not avoided.

2. Samsodhana: Charaka asserted that patients with a robust constitution, characterized by predominant Kapha and Vata, should undergo Samsodhana treatment, namely Vamana and Virecana, as required. (C.S.Ci.17/89). The author of Yogaratnakar states that, with the exception of Sneha Basti, all other techniques of Sodhana Chikitsa should be utilized in Tamaka Swasa (Y.R.Swa.Ci.1).

Samsodhana Karma should be performed in following steps.

a. Snehana: A mixture of oil and salt should be carefully rubbed onto the chest to alleviate the stubborn mucus in the channels. (C.S.Ci.17/71)

b. Swedana: The Swedana procedure, utilizing the Nadi, Prastara, and Sankara methods, facilitates the dissolution of inspissated Kapha within the patient's body. This process softens the bodily Srotas, therefore restoring the natural circulation of Vata. (C.S.Ci.17/71-72)

c. Vamana: To expel or eradicate the disturbed Kapha, Vamana should be administered using an appropriate approach using substances that are not antagonistic to Vata. Following appropriate Swedana, Snigdha Odana (rice), accompanied with a broth of fish or pork and the supernatant of curds, may be administered to patients for the Utklesana of Kapha. The Vamana procedure should then be conducted with the assistance of Madanaphala. Pippali combined with Saindhava and Madhu. Consequently, the corrupted and sluggish Kapha has been eliminated from the system, allowing the patient to experience relief and the purification of bodily channels (srotas), enabling Vata to traverse the srotas without obstruction (C.S.Ci.17/74-76).

d. Dhumapana: Following Vamana, to eradicate the concealed pathogenic chemicals, namely the Dosha present in the Linavastha (not quite cleansed), the physician should strive to destroy them by Dhuma Cikitsa (inhalation treatment) (C.S.Ci.17/77).

Virechana, as delineated by Charaka, is a procedure wherein waste materials (Dosa, Mala) are expelled through the lower channels (Adhobhaga), namely the anus (C.S.Ka.1/4). All Virecana medications possess a Panchabhautika constitution, with Jala and Prithvi Mahabhuta being predominant (C.S.Ka.1/5). According to Charaka, an optimal Virecana preparation must possess five characteristics.

The Gunas are Vyavayi, Vikasi, Suksma, Ushna, and Tikshna (C.S.Ka.1/5).

Samsamana: The applicability of Samsamana treatment in this condition is extensive and pragmatic, relevant to all situations throughout all phases. For patients ineligible for Samsodhana Karma (Durbala), Samsamana treatment should be implemented. The Samsamana therapy in this instance comprises Deepana, Pacana, Kapha

Vatasamaka medications and regimen, in conjunction with agents that purify Pranavaha Srotas. Children and elderly individuals are also treated with Samsamana treatment.

Brimhana and Rasayana Therapy¹⁹

Chronic episodes of the sickness ultimately weaken the sufferer owing to the exhaustion of the Dhatu. This Dhatukshaya exacerbates the pathophysiology and hinders the use of vigorous therapy during an episode of Tamak Shwas. Consequently, it is essential to preserve the patient's physical strength through the application of Brihana therapy. The sickness has a chronic trajectory with a persistent character. The condition may be most effectively mitigated with the application of Rasayana Chikitsa. The Brihana and Rasayana Chikitsa are considered advantageous for people afflicted with Tamak Shwas.

The optimal therapy regimen between episodes consists of Virechan, followed by Vyadhihara Rasayana and Brihana Chikitsa. These techniques are quite effective in alleviating symptoms and avoiding further episodes of Tamak Shwas. Formulations that can regulate Vata and Kapha while simultaneously enhancing tissue and organ strength, managing remodeling, and augmenting immunity against risk factors are chosen to treat Tamak Shwasa.

Modern Disease Review²⁰⁻²²

Asthma is a respiratory condition marked by heightened sensitivity of the tracheobronchial tree to various stimuli, leading to extensive spasmodic constriction of the airways, which may resolve spontaneously or via treatment. Asthma is a sporadic condition clinically characterized by episodes of dyspnea, cough, and wheeze. Nonetheless, a critical and persistent variant of the condition known as status asthmaticus may be lethal.

Frequency

Asthma is prevalent, with an estimated 5 to 10 percent of the global population afflicted. Comparable figures have been documented in other nations. Bronchial asthma manifests at all ages, but primarily during early infancy. Approximately fifty percent of instances manifest before to the age of 10, while an additional thirty percent arise before the age of 40. During childhood, there is a 2:1 male-to-female ratio, which equalizes by the age of 30.

Etiopathogenesis and Classifications

Bronchial asthma is typically categorized into two primary etiological kinds based on its triggering stimuli: extrinsic (allergic, atopic) and intrinsic (idiosyncratic, non-atopic) asthma. A third category is a mixed pattern whereby the characteristics do not distinctly align with either of the two primary groups.

1) Extrinsic (Atopic, Allergic) Asthma

This is the predominant form of asthma. It often begins in childhood or early adulthood. The majority of individuals with this kind of asthma had a personal and/or familial history of prior allergy conditions, including rhinitis, urticaria, or infantile eczema. Hypersensitivity to diverse extrinsic antigenic compounds or allergens is typically seen in these instances. Many of these allergens induce adverse effects by inhalation, such as home dust, pollen, animal dander, and molds. Occupational asthma induced by fumes, gases, and organic or chemical dusts is a subtype of extrinsic asthma. Elevated blood IgE levels and a positive skin test for the specific inhaled antigen indicate an IgE-mediated type 1 hypersensitivity reaction, characterized by a 'acute rapid response' and a 'late phase reaction.'

- An acute instantaneous reaction is triggered by IgE-sensitized mast cells located on the mucosal surface. Mast cells, upon degranulation, produce mediators such as histamine, leukotrienes, prostaglandins, platelet-activating factor, and chemotactic factors for eosinophils and neutrophils. The net consequences of these mediators include bronchoconstriction, edema, mucus hypersecretion, and the buildup of eosinophils and neutrophils.

The late-phase reaction occurs subsequent to the acute rapid response and is accountable for the enduring signs of asthma. The condition is attributable to the excessive mobilization of blood leukocytes, including basophils, eosinophils, and neutrophils. This leads to further release of mediators that amplify the aforementioned effects. Furthermore, inflammatory damage is induced by neutrophils and by the main basic protein (MBP) of eosinophils.

2) Intrinsic (Idiosyncratic, Non-Atopic) Asthma

This kind of asthma manifests in adulthood, characterized by an absence of personal or familial allergic history, negative skin test results, and normal blood IgE levels. The majority of these individuals have a characteristic symptom complex following a viral upper respiratory tract infection. Nasal polyps and chronic bronchitis frequently coexist. No identifiable allergens exist; nonetheless, around 10% of individuals exhibit hypersensitivity to medications, particularly to little doses of aspirin (aspirin-sensitive asthma).

3) Hybrid Type

A significant number of patients do not distinctly conform to any of the aforementioned categories and exhibit a combination of traits from both. Patients who get the condition later are often non-allergic. Both forms of asthma can be triggered by cold temperatures, physical exertion, and mental stress.

Discussion-

Tamaka Shwasa is a thoroughly characterized respiratory ailment in Ayurveda, closely associated with bronchial asthma due to its analogous genesis, clinical presentations, chronic relapsing nature, and therapeutic response. The classical Ayurvedic texts characterize Tamaka Shwasa as a disease predominantly involving Vata and Kapha that affects the Pranavaha Srotas, whereas modern medicine identifies bronchial asthma as a chronic inflammatory airway condition marked by reversible airflow obstruction, bronchial hyper-responsiveness, and excessive mucus production. Despite differing nomenclature, both systems recognize airway constriction and compromised breathing as the primary pathophysiological occurrences.

The etiology of Tamaka Shwasa starts with exposure to several Nidana, including inappropriate food, environmental allergens, dust, smoking, cold exposure, extreme activity, and psychological stress. The causative variables hinder Jatharagni, resulting in Agnimandya and the production of Ama, which in turn exacerbates Kapha Dosha. The accumulating Kapha obstructs the Pranavaha Srotas, leading to Kapha-Āvṛta Prana Vata, which results in irregular respiratory motions and dyspnea. This process closely resembles the contemporary understanding of chronic airway inflammation, mucus obstruction, bronchoconstriction, and airway hyper-responsiveness seen in bronchial asthma. Consequently, the Ayurvedic elucidation of Srotorodha (airway blockage) and Pratiloma Gati of Vata (aberrant movement of Vata) offers a coherent understanding of the illness mechanism.

The administration of Tamaka Shwasa is comprehensive and personalized. Shodhana Chikitsa, namely Vamana Karma, is regarded as the primary treatment for Kapha-dominant individuals since it facilitates the expulsion of excess Kapha from the upper gastrointestinal and respiratory systems. Shamana Chikitsa, including formulations like Sitopaladi Churna, Talisadi Churna, Agastya Haritaki Avaleha, Kanakasava, and Vasavaleha, seeks to alleviate bronchospasm, liquefy mucus, enhance respiratory function, and reestablish Dosha equilibrium. Furthermore, Deepana-Pachana, dietary restriction, lifestyle change, and Rasayana treatment enhance digestion, immunity, and sustained respiratory health.

Conclusion-

Tamaka Shwasa is a well delineated Vata-Kapha dominating condition of the Pranavaha Srotas, as outlined in traditional Ayurvedic texts, and has a strong clinical association with bronchial asthma. The Ayurvedic principles of Nidana, Samprapti, Purvarupa, and Rupa offer a thorough comprehension of illness causation and clinical symptoms. Management emphasizes Nidana Parivarjana, Shodhana, Shamana Chikitsa, suitable dietary and lifestyle alterations, and the application of medicinal herbs to reestablish Dosha equilibrium and enhance respiratory function. Recent scientific research corroborates the bronchodilatory, anti-inflammatory, antioxidant, and immunomodulatory effects of many Ayurvedic medications employed in Tamaka Shwasa. A comprehensive strategy that merges Ayurvedic principles with evidence-based contemporary medicine may provide a safe, holistic, and successful means of improving symptom management, decreasing disease recurrence, and boosting the quality of life for patients with bronchial asthma. Additional rigorously conducted clinical investigations are required to bolster the scientific evidence supporting Ayurvedic therapies..

REFERENCES

1. Chakrapani. Charaka Samhita of Charaka with Ayurveda Dipika commentary Chikitsasthana 17/55-60. Delhi: Rastriya Sanskrit Sansthana; 2006. p. 533, 535.
2. API Textbook of Medicine, Edited by Siddharth N. Shah. Executive editor M Paul Anand, 8th edition, Published by The Association of Physicians of India, Mumbai, volume 1 page no.355.
3. Stuart H Ralston, Ian D Penman, Mark WJ Strachan & Richard P Hobson, Davidson's Principles and Practice of Medicine, Ch.17/ Page 548, 23rd edition 2018.
4. Pt. Kashinath Shastri & Dr. Gourakha Nath Chaturvedi, Charak Samhita, Vidhyotini Hindi Commentry, Vol-2, Hikkashwasa Chikitsa Adhyaya 17, Chaukhamba Sanskrit Sansthan, Varanasi Reprint 2017.
5. Murthy K, Srikantha R. Madhava Nidana of Madhavakara, 12/17-34. Varanasi: Chaukhambha Orientalia; 1993. pp. 50-1.
6. Clinical research protocols for traditional health sciences, Central Council for Research in Ayurveda & Siddha.
6. Santavelkarkuljen Damodarbhattach Shri pad Sharma, Yajurveda Samhita Sutra. 25/2, Published by Vasant Shripad Salvelkar, Mumbai, Edition VI, Year of Publication 2003

7. Madhavakar, Madhava Nidana, revised by Vijayarakshita and Kanthadatta 'Madhukosha' commentary with english translation by Prof.Himasagara Chandra Murthy, Published by Chaukhambha Krishnadas Academy, Varanasi, Edition 1, Year of publication 2006, Purvardha 12/15,pg no.175
8. Acharya J.T., Charaka Samhita, Chikitsasthana 17/19-20, Chaukhamba Surbharati Prakashan, Banaras.
9. Sharma PV, Sushruta Samhita, Uttartantra 51/6, Chaukhamba Orientalia, Banaras.
10. Acharya J.T., Charaka Samhita, Chikitsasthana 17/55-61, Chaukhamba Surbharati Prakashan, Banaras.
11. Sharma PV, Sushruta Samhita, Uttartantra 51/8-10, Chaukhamba Orientalia, Banaras.
12. Athavale Anant, Vagbhhatt. Astanga Sangraha, Nidana Sthana 4/8-12, Pune publication, Pune.
13. Tripathi B., Vagbhhatt. Astanga Hridaya, Nidana sthana 4/6-10, Chaukhamba Surbharati Prakashan, Banaras.
14. Acharya J.T., Acharya Charaka, Charaka Samhita, Chikitsasthana 17/10-11,60, Chaukhamba Surbharati Prakashan, Banaras.
15. Agnivesha, Hikka-Shwasa Chikitsa adhyaya, Chikitsa Sthana, Charaka Samhita, Chakrapani Datta (Commentator) Dr. Yadavji Trikamji (Editor), 5th Edition, Chaukambha Sanskrit Prathistana, Varanasi, 2001, pp.533-539.
16. Amarakosha, Amarasimha, Mani Prabha Hindi Commentary, Pd. Haragovinda Shastri, Chowkambha Sanskrit Series, Varanasi, 4th ed., 1978: 31,36,47,521
17. Acharya Madhavakara, Madhava nidanam with madhukosha Sanskrit commentary by Acharya Vijaya Rakshit and Shrikanta Dat, Edited by Dr.Ravidatt Tripady, 1st Volume 12th chapter, 1st Edition - 1993 published by Varanaseya Sanskrit Sansthan, Page no.363.
18. Acharya YT, editor, Charaka Samhita of Agnivesha elaborated by Charaka and Drdhabala with Ayurveda Dipika commentary by Sri Chakrapanidatta, chikitsasthana 17th chapter 63-64 verse, Varanasi: Chaukhamba Surbharati Prakashan, 2014, pn. 535.
19. Agnivesha, Hikka-Shwasa Chikitsa adhyaya, Chikitsa Sthana, Charaka Samhita, Chakrapani Datta (Commentator) Dr. Yadavji Trikamji (Editor), 5th Edition, Chaukambha Sanskrit Prathistana, Varanasi, 2001, pp.533-539.
20. Mohan Harsh, Textbook of pathology, 7th edition 2015, Ch. 15, Page no.463.
21. H Ralston Stuart, D Penman Ian, et. Al., Davidson's Principles and Practice of Medicine, 23rd edition 2018, Ch. 17, Page no. 567.
22. Mohan Harsh, Textbook of pathology, 7th edition 2015, Ch. 15, Page no.464...